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**Social media use and subjective  
well-being: An investigation of  
individual differences in personality,  
social comparison and Facebook  
behaviour**

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For the degree of Doctor of Philosophy  
A thesis submitted to City, University of London  
Department of Psychology

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## Declaration

I hereby declare that the work in this thesis is my own, is original and has not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other University. I grant powers of discretion to the University Librarian to copy this thesis in part or in whole without further reference to me. This permission covers only single copies for study purposes. The contents of this thesis are subject to normal conditions of acknowledgement.

The following sections of this thesis have been published or submitted for publication.

### Chapter 2, study 2.1:

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### Appendix B:

Gerson, J., Plagnol, A. C., & Corr, P. J. (2017). Dimensionality of the Iowa-Netherlands Comparison Orientation Measure and Its Relationship to Reinforcement Sensitivity Theory. *Journal of Individual Differences*, 38(4), 256–264. <https://doi.org/10.1027/1614-0001/a000242>

### Chapter 4, study 4.2:

Gerson, J., Plagnol, A. C., & Corr, P. J. (under review). Facebook use and subjective well-being: Associations with differing levels of engagement and intensity

## **Abstract**

This thesis investigates how social media use is associated with subjective well-being by examining the role of individual differences. The popularity of social networking sites has increased significantly over the past decade, with the most popular social media site, Facebook, now reporting over 2 billion users (Facebook Newsroom, 2018). With such widespread use, it is important to understand how Facebook use is related to its users' subjective well-being (SWB). Previous research has yielded mixed results; however, many of these studies have not taken individual differences into account. Therefore, this thesis investigates how individual differences associated with SWB. The research in Chapter 2 demonstrates that some personality traits moderate the relationship between Facebook social comparison and SWB. Goal-Drive Persistence moderates the relationship between eudaimonic well-being and Facebook social comparison, and BIS moderates the relationship between negative affect and Facebook social comparison. Chapter 3 introduces Facebook engagement styles (active/passive use), and develops scales to measure these differences. The Passive Active Use Measure quantifies three types of Facebook engagement: Active social use, Active non-social use, and Passive use. The research in Chapter 4 finds that personality traits are associated with Facebook engagement styles, and that active forms of use have positive associations with SWB, while passive use is negatively associated with life satisfaction. The results further reveal that individuals who use Facebook intensely to alleviate boredom or for self-expression have higher SWB, while users who overuse report lower SWB. Finally, chapter 5 finds that Facebook engagement styles are associated with social comparison behaviour; active users compare their opinions, while passive users compare both opinions and abilities. Further investigation reveals that the comparison of opinions on Facebook is associated with higher SWB, while the comparison of abilities on Facebook is associated with lower SWB. The results of this thesis suggest that how Facebook is associated with SWB is dependent on individual differences and demonstrates the importance of accounting for individual differences when studying the relationship between Facebook use and SWB.

## **Glossary of Abbreviations**

**BAS** – Behavioural Approach System

One of three systems which make up the Reinforcement Sensitivity Theory of Personality. Responsible for positive-incentive and related to anticipatory pleasure. See p. 18.

**BIS** – Behavioural Inhibition System.

One of three systems which make up the Reinforcement Sensitivity Theory of Personality. Responsible for the detection and resolution of goal-conflict within and between the other systems. See p. 18.

**FAQ** – Facebook Activity Questionnaire

A questionnaire designed to measure how often users participate in different activities on Facebook. Adapted in Chapter 3 for use in the Passive Active Use Measure. See p. 79.

**FBSC** – Facebook social comparison valence

A Facebook social comparison scale which measures whether users are comparing themselves in a positive or negative light in comparison to their Facebook friends. Low scores indicate positive comparison and high scores indicate negative comparison. See p. 54.

**FFM** – Five-Factor Model

The Five-Factor Model of personality, also known as the “Big 5”; theorises that personality can be quantified by measuring five dimensional traits: Openness to Experience, Conscientiousness, Agreeableness, Extraversion, and Neuroticism. See p. 18.

**FFFS** – Fight-Flight-Freeze System

One of three systems which make up the Reinforcement Sensitivity Theory of Personality. Responsible for the avoidance of and escape from immediate harm. See p. 18.

**F-INCOM** – Facebook-adapted Iowa-Netherlands Comparison Orientation Measure

A Facebook-adapted social comparison scale which measures how frequently users compare their opinions and abilities to their Facebook friends. See p. 139.

**INCOM** – Iowa-Netherlands Comparison Orientation Measure

A social comparison scale which measures how frequently respondents compare their opinions and abilities to others. See p. 24.

**MFIS** – Multidimensional Facebook Intensity Measure

A multidimensional measure of Facebook Intensity which measures a user’s attachment to Facebook and how integrated the site has become into their day-to-day lives with four factors: Persistence, Boredom, Self-Expression and Overuse. See p. 82.

**Mini IPIP** – Mini International Personality Item Pool

A short measure of the Five-Factor Model of Personality. See p. 90

**PANAS** – Positive and Negative Affect Scales

A pair of scales which measures positive affect and negative affect; which refers to respondents' mood or emotional state. See p. 53.

**PAUM** – Passive Active Use Measure

A scale which measures how users engage with Facebook with three factors: Active social use, Active non-social use, and Passive use. See p. 88.

**RQ** – Research Question

**RST** – Reinforcement Sensitivity Theory

A personality theory which proposes that individual differences in personality reflect variations in three systems originally adapted for survival: the Behavioural Approach System, the Fight-Flight-Freeze System, and the Behavioural Inhibition System. See p. 19.

**RST-PQ** – Reinforcement Sensitivity Theory Personality Questionnaire

A scale which measures a revised version of the Reinforcement Sensitivity Theory of Personality where the Behavioural Approach System is broken down into four factors: Reward Interest, Reward Reactivity, Goal-Drive Persistence and Impulsivity. See p. 19.

**SCO** – Social comparison orientation

Individual differences in the frequency individuals compare themselves to others. See p. 24.

**SWB** – Subjective well-being

Refers to how individuals subjectively experience and evaluate their lives. Consists of three major components: life evaluation, eudaimonic well-being, and affective well-being. See p. 13.

**SWLS** – Satisfaction with Life Scale

A scale which measures an individual's satisfaction with their life. See p. 53.

# **Chapter 1. Introduction and literature review**

## **Introduction**

The popularity of social networking sites such as Facebook, Instagram and Twitter has increased rapidly over the past decade (Pew Research Center, 2017). In 2005, only 5% of adult internet users reported using a social networking site; however, as of April 2016, 79% of American adult internet users reported using at least one social networking site (Greenwood, Perrin, & Duggan, 2016; Pew Research Center, 2014). These social networking sites have become rapidly integrated into daily life, with more of our social lives taking place online than ever before. As previous studies have shown that social relationships are an important determinant of subjective well-being (an individual's cognitive and emotional judgements about how their life is going; Diener, Emmons, Larsen, & Griffin, 1985; Myers & Diener, 1995), it is important to understand the impact social networking site use has on subjective well-being. This thesis will focus on how individual differences in personality, social comparison behaviour, and Facebook use are associated with subjective well-being. As social networking sites like Facebook are ultimately social tools to enable communication, it is important to understand what individual differences users bring into the site with them in order to understand how use of the site is then associated with each user's subjective well-being (SWB).

In this chapter, I will cover background literature and prominent theories on subjective well-being and other theories of individual differences which are associated with SWB including personality, social comparison, and Facebook use. First, I will define subjective well-being and introduce why studying well-being is important. Next, I will introduce the Reinforcement Sensitivity Theory of personality, and discuss background literature on the known relationships between personality traits and subjective well-being. Then I will introduce social comparison theory, and discuss previous literature on how social comparison behaviour relates to both subjective well-being and personality traits. Finally, I will discuss

the background literature on how Facebook use is associated with subjective well-being, personality and social comparison, and discuss the structure of the thesis.

### **Subjective well-being**

Subjective well-being (SWB) refers to how individuals subjectively experience and evaluate their lives. While SWB is often referred to as ‘happiness’, these are not terms that should be used interchangeably; SWB is a complex construct which consists of three major components: life evaluation, eudaimonic well-being, and affective well-being (Diener, Suh, Lucas, & Smith, 1999; The Organisation for Economic Co-operation and Development, 2013). While SWB can be measured with a single component, there is evidence that to gain a complete view of an individual’s SWB, all three components should be measured simultaneously (Keyes, 2007; Seligman, 2011; Seligman, Parks, & Steen, 2004).

### **Life evaluation**

Life evaluation is broadly defined as “a global assessment of a person’s quality of life according to his chosen criteria” (Diener et al., 1985, p. 71). Life evaluation is a measure of hedonic well-being. The concept of hedonia emphasises the maximisation of positive emotional experiences, such as pleasure, comfort and enjoyment, while minimising unpleasant experiences such as pain or discomfort as the pathway to happiness (Fredrickson, 2001; Kahneman, 1999; Henderson & Knight, 2012). These experiences are theorised to have an accumulative effect; the more positive experiences over time, the higher an individual will perceive his or her wellness to be (Fredrickson, 2004). However, since there are many routes to subjective pleasure that are not indicative of high levels of wellness (such as illegal drugs

or unlawful behaviour), this philosophical path to wellness is frequently challenged by eudaimonic well-being researchers (e.g., Henderson & Knight, 2012).

Life evaluation/hedonic well-being is often measured with life satisfaction measures, which include an individual's cognitive judgements about how their life is going. Life satisfaction captures how individuals feel about their life as a whole and is based on how people remember experiences, which may differ from how they perceived the event at the time (Kahneman, 1999).

### **Eudaimonic well-being**

Although there are varying definitions for eudaimonic well-being, most involve “the importance of developing one's potentials, and living in accordance with one's true self” (Henderson & Knight, 2012, p. 199), hence self-actualisation or self-fulfilment. Historically, the concepts of hedonia and eudaimonia are considered as contrasting viewpoints (Deci & Ryan, 2008). Eudaimonic well-being researchers are less interested in whether an individual is experiencing happiness and more interested in *why* an individual is experiencing happiness (Henderson & Knight, 2012). Eudaimonic well-being researchers also view well-being and happiness as on-going processes rather than an end-point (Henderson & Knight, 2012). The concept of eudaimonia emphasises achieving well-being through “the development of a person's best potentials and their application in the fulfilment of personally expressive, self-concordant goals” (Waterman, 2010, pp. 41). It also traditionally differentiates between pleasure and living a ‘good life’, as Aristotle, the first philosopher to write about eudaimonia believed hedonism made humans into “the slaves of desire” (Henderson & Knight, 2012, pp. 198; Norton, 1976).



In modern research, eudaimonic well-being describes the extent to which individuals feel they have a sense of meaning or purpose in life (Waterman, 2008). It represents psychological functioning, and focuses on the realisation of potential (Deci & Ryan, 2008).

### **Affective well-being**

Affective well-being refers to an individual's emotional states or moods, and captures how individuals experience life rather than how life is remembered later (Daniel Kahneman & Krueger, 2006). It is measured as positive affect (e.g., joy, contentment) and negative affect (e.g., anger, sadness). While some studies suggest that positive and negative affect are a bipolar construct on the same scale (Green, Goldman, & Salovey, 1993), more rigorous analyses of positive and negative affect have found that they are two separate but related constructs (Diener, Smith, & Fujita, 1995). Indeed, it is possible that an individual reports both high negative and high positive affect at the same time.

Watson, Clark and Tellegan describe high positive affect as a state where individuals feel alert, active and enthusiastic and low positive affect as a state where individuals feel lethargic (1988). In contrast, they describe high negative affect as a state of subjective distress where individuals may experience negative mood states such as anger, disgust, contempt, guilt, anxiety, and fearfulness, whereas low negative affect is defined by a state of serenity, where the individual is calm and untroubled (Watson et al., 1988). Positive and negative affect can be both states (fleeting momentary conditions) and traits (stable psychological attributes) (Diener et al., 1995). Affective well-being refers to the state of affect (The Organisation for Economic Co-operation and Development, 2013), therefore in this thesis when I refer to positive or negative affect, I am referring to affective states, not traits.

## **Differences between aspects of SWB**

While each component of SWB measures an aspect of how individuals experience and evaluate their lives, there are conceptual differences.

Affect is the most transient of the components, as it deals with moods and emotional states which can change day-to-day and moment-to-moment. Affect deals with SWB in the present, and does not consider moods or emotional states from the past or future.

Life satisfaction is more stable than affect, as it is an overall measure of how individuals judge their life. Life satisfaction deals with SWB both in the past (“If I could live my life over, I would change almost nothing”) and the present (“The conditions of my life are excellent”) (Diener et al., 1985). While life satisfaction is more stable than affect, it can also fluctuate based on current events such as political elections (Lench et al., 2018) and the weather (Barrington-Leigh & Behzadnejad, 2017).

The least transient component of SWB is eudaimonic well-being, as it deals with an individuals’ sense that their life has meaning or purpose, which does not change with moods or environmental conditions (such as political climate or the weather).

Further demonstrating their differences, research shows that while the components of SWB are correlated, they are distinct constructs (Huebner & Dew, 1996). It is possible for individuals to score high on one measure of SWB and simultaneously score low on another. For example, new parents score high on eudaimonic well-being as having children gives parents a sense of purpose (Brandel, Melchiorri, & Ruini, 2018). However, the literature also suggests that having children is associated with lower life satisfaction, as the social, emotional, and financial costs of having dependent children can influence a variety of determinates of life satisfaction (i.e., marital satisfaction, stress, anxiety, etc.) (Hansen, 2012).

## **Predictors and determinants of SWB**

Research has demonstrated that SWB is associated with circumstances in many areas of life such as health, social relationships, and career success (for an overview see Diener, Oishi, & Lucas, 2003; or Diener et al., 1999). However, most studies do not allow researchers to establish the direction of causality between SWB and life circumstances, and in many cases, causality may run in both directions.

**Health.** Research has found that individuals who report higher levels of SWB have stronger immune systems (Barak, 2006). They are also less likely to contract common viruses like the cold and flu, and are less likely to report severe symptoms if they do get ill (Cohen, Alper, Doyle, Treanor, & Turner, 2006; Cohen, Doyle, Turner, Alper, & Skoner, 2003).

**Social relationships.** Previous research on social relationships and SWB has shown that people with high SWB tend to be more sociable, have more self-confidence and more friends, which may suggest that individuals with higher SWB create their own social support systems (Cunningham, 1988; Ed Diener & Ryan, 2008). Research on romantic social relationships has found that individuals with high SWB are more likely to marry, remain married and report higher marital satisfaction than those with lower SWB, while individuals with lower SWB preceding marriage are more likely to get divorced (Lucas, 2005).

**Career success.** Research also finds that high SWB is good for career success. Individuals with high SWB are more likely to be given a second interview when applying for jobs than those with lower SWB (Burger & Caldwell, 2000). They are also less likely to become unemployed (Diener, Nickerson, Lucas, & Sandvik, 2002), and more likely to find a new position quickly if they do become unemployed (Marks & Fleming, 1999). Similar to the research on SWB and marriage, a longitudinal study found that individuals who were unemployed had reported lower SWB prior to losing their job (Lucas, Clark, Georgellis, & Diener, 2004). There is also evidence that people with higher SWB are more creative (Baas,

De Dreu, & Nijstad, 2008), and display improved job performance than those with lower SWB (Boehm & Lyubomirsky, 2008).

SWB is a large area of research in the social science field, and the above paragraphs briefly define the major components and introduce the importance of studying the subject. For a more detailed analysis of SWB and its importance, see Diener & Ryan, 2008; Diener et al., 1999; Lucas, 2007; or The Organisation for Economic Co-operation and Development, 2013.

### **Individual differences in personality and subjective well-being theory**

While there are many factors which contribute to an individual's SWB, recent research has concluded that the factor which has the largest impact on SWB is personality (Lucas & Diener, 2009). Several lines of inquiry support this conclusion. First, research shows that sociodemographic factors can, at best, account for about 10-15% of the variance in SWB (Butkovic, Brkovic, & Bratko, 2012). This is supported by DeNeve and Cooper's 1998 meta-analysis of 137 studies, which found that demographic factors such as age, gender and marital status made little difference in the variance of SWB. When effect sizes from sociodemographic variables are directly compared with those of personality traits, the effect sizes from personality traits tend to be noticeably larger (Lucas & Diener, 2009). Additionally, there is evidence that SWB is stable over time (Diener et al., 2003; Headey & Wearing, 1989), and that personality traits and SWB share genetic variance which may suggest that to some extent, SWB may be heritable (Weiss, Bates, & Luciano, 2008). This suggests that individuals with different personality traits may experience similar life events in different ways, and experience different levels of positive and negative affect (Soto & Luhmann, 2013). Researchers refer to this concept as a top-down theory of SWB (Butkovic et al., 2012).

Top-down theory suggests that personality traits influence how individuals view life, leading some individuals to view life and life events in a more positive light than others (DeNeve & Cooper, 1998; Lucas & Diener, 2009). This would explain why sociodemographic variables have little impact on SWB, as life events and circumstances have less influence over SWB than how an individual views the world (Lucas & Diener, 2009). Recent research suggests that there may be a reciprocal relationship between personality traits and SWB, as a longitudinal study found that personality traits and SWB influenced each other over time (Soto, 2015). In contrast, bottom-up theory of SWB hypothesises that SWB is an outcome brought about by life circumstances such as life events (i.e., marriage) and demographic factors (i.e., income, socioeconomic status, etc.)(Lucas & Diener, 2009). Research into which theory is correct has revealed that both models predict SWB equally, which may suggest that causality for SWB runs both ways (Feist, Bodner, Jacobs, Miles, & Tan, 1995). If the bidirectional theory for causation is correct, this would mean that SWB is both a cause and effect of the correlates found to be associated with it, such as marriage, health and ability to cope with life's situations (Feist et al., 1995).

### **Reinforcement Sensitivity Theory of Personality**

Most previous research on personality and SWB focuses on the Five-Factor model of personality (for a review, see DeNeve & Cooper, 1998). The Five-Factor Model (FFM) of personality theorises that personality can be quantified by measuring five dimensional traits: Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness (Costa & McCrae, 1992). While FFM is well-known and widely used, it fails to offer an explanation for the causal source of personality traits, thus making it difficult to fully understand how these traits relate to other variables such as the components of SWB or measures of Facebook use (Corr et al., 2013). To account for this, this thesis focuses on the

Reinforcement Sensitivity Theory of personality (RST). RST is based on the biological and psychological processes which motivate behaviour, and underlie emotion, motivation and learning (Corr, 2008). It assumes that individual differences in personality reflect variations in three systems: the *behavioural approach system* (BAS), responsible for positive-incentive and related to anticipatory pleasure; the *fight-flight-freeze system* (FFFS), responsible for the avoidance of and escape from immediate harm, and related to fear; and the *behavioural inhibition system* (BIS), responsible for the detection and resolution of goal-conflict within and between the other systems (BAS and FFFS) and related to anxiety. While the BAS was originally conceptualised as a single dimension, studies have shown that the BAS is multifaceted, prompting revisions of the RST (Carver & White, 1994; Smederevac, Mitrović, Čolović, & Nikolašević, 2014; see Corr, 2016 for an overview). Although different variations of the revised RST exist, I chose to focus on the recent Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ) operationalisation of the revised RST (Corr & Cooper, 2016). As the RST is based in evolutionary psychology and the systems function to ensure biological success and survival, the RST is able to offer an explanation to the causal source of personality missing from the FFM (Corr et al., 2013). For an overview of other variations of the revised RST, see Krupić, Corr, Ručević, Križanić, & Gračanin (2016).

### **RST-PQ traits**

**RST-PQ BAS.** In RST-PQ, the BAS has been re-conceptualised to reflect its multidimensional nature. This allows for the differentiation between parts of the reward obtainment process, sometimes called sub-goal scaffolding (Corr, 2008). Sub-goal scaffolding is a sequence of events which starts with the identification of a reinforcer and ends with the capture of the reward. This process sometimes involves restraint and planning, and other times requires quick reactions to acquire rewards which may expire. Therefore,

RST-PQ splits the BAS into four sub-processes: Reward Interest, Reward Reactivity, Goal-Drive Persistence, and Impulsivity (Corr & Cooper, 2016).

Reward Interest is responsible for the pursuit of new experiences, activities and social relationships. It contains items such as ‘I regularly try new activities just to see if I enjoy them’, and is the most similar to the FFM trait Openness to Experience. Individuals who score high on Reward Interest are open to new experiences, enjoy novelty and like meeting new people.

Reward Reactivity is associated with the pleasure of receiving a reward, and is responsible for feelings of anticipation and hope. It contains items such as ‘I get a special thrill when I am praised for something I’ve done well’, and is the most similar to the FFM trait Extraversion. Individuals who score high on Reward Reactivity are sensitive to reward and enjoy the rush of winning competitions or general success (i.e., good marks on an exam, promotions at work).

Goal-Drive Persistence is associated with organisation, goal-planning and restraint, as well as the pursuit of goals and sub-goals, and is relevant when a reward is possible, but not within immediate reach. It contains items such as ‘I will actively put plans in place to accomplish goals in my life’, and is the most similar to high Conscientiousness in the FFM. Individuals who are high on Goal-Drive Persistence are likely to be highly organised and driven to succeed.

Impulsivity is associated with impulsive and unplanned behaviour, and can be advantageous when planning and restraint are no longer appropriate and the reward needs to be seized quickly. It contains items such as ‘I often do risky things without thinking of the consequences’, and is the most similar to low Conscientiousness in the FFM. It is characterised by a lack of planning or thought, and individuals who score highly on Impulsivity would likely agree that one must ‘seize the moment’.

**RST-PQ FFFS.** The FFFS is responsible for avoidance behaviour and is triggered by threatening stimuli such as predators or imminent physical danger. It operates solely in the present, and is associated with fear. It contains items such as ‘I would run fast if I knew someone was following me late at night’, and is thought to be one of the underlying systems of FFM Neuroticism (Corr et al., 2013). Individuals who score highly on FFFS might refuse to hold animals which are often associated with fear, such as snakes or spiders, and are likely to be jumpy walking alone at night in an unfamiliar area.

**RST-PQ BIS.** Unlike FFFS, BIS operates mainly in the future. The BIS is responsible for settling disputes within and between other RST systems. It does this by increasing the strength of negative associations of the stimuli (which is the source of the conflict) through repetitive loops, until one system gains favour over the other (Corr, 2008). For example, there may be a conflict within the FFFS system where the individual needs to decide whether it would be more advantageous to fight or flee. Alternatively, there may be a conflict between BAS Reward Interest, which may be compelling the individual to try a new experience, and FFFS, which may at the same time be compelling the individual to flee. In both cases, BIS is responsible for weighing the consequences and settling the conflict. Due to the nature of how BIS resolves conflict, disputes within and between systems are experienced as anxiety. BIS is theorised to be one of the underlying components of Neuroticism (Corr et al., 2013), and contains items such as ‘I am often preoccupied with unpleasant thoughts’. Individuals with high BIS tend to be anxious and prone to rumination.

### **Prior literature on individual differences in personality and subjective well-being**

Personality traits have been found to have different relationships with the distinct components of SWB. As RST-PQ is a new scale, to the best of my knowledge, there is no research relating its dimensions to the components of SWB. While some literature dedicated



to older versions of RST and SWB exist, research on how RST traits relate to SWB is extremely limited. I therefore conduct an exploratory analysis into the relationships between the components of SWB and RST-PQ traits in Chapter 2, and most of the discussion below focuses on the relationships between SWB components and the FFM.

**Personality and life satisfaction.** While research on RST and SWB is limited, a recent study found that unidimensional BAS was positively related to life satisfaction, while BIS was negatively related to life satisfaction (Harnett, Loxton, & Jackson, 2013). However, this finding needs to be replicated prior to drawing conclusions, as a recent study found no associations between multidimensional BAS (using the Jackson-5 scale) or BIS with life satisfaction (Gill, Kane, & Mazzucchelli, 2017).

While literature on SWB and RST is sparse, several studies have linked FFM personality traits to life satisfaction. In their meta-analysis of 137 studies, DeNeve and Cooper found that the strongest predictor of life satisfaction was Neuroticism, which had a negative relationship with life satisfaction (1998). Other studies corroborate this relationship (Chico Librán, 2006; Garcia, 2011; Hayes & Joseph, 2003). DeNeve and Cooper also reported a significant positive association between life satisfaction and Openness to Experience (1998). Extraversion has also been found to be an important trait for life satisfaction, with higher levels of Extraversion being associated with higher levels of life satisfaction (Garcia, 2011; Steel, Schmidt, & Shultz, 2008). While Extraversion has received much attention in the SWB literature (For an overview, see Diener et al., 2003), some research indicates that other traits may be more important. For example, Hayes and Joseph found that Conscientiousness predicted life satisfaction better than Extraversion (2003), and Steel and colleagues report a positive association between life satisfaction and Agreeableness (2008).

**Personality and eudaimonic well-being.** Similar to research on life satisfaction, little work has been done on the relationship between eudaimonic well-being and RST traits. The

same study mentioned earlier found a positive association between unidimensional BAS and eudaimonic well-being and a negative association between BIS and eudaimonic well-being (Harnett et al., 2013).

In regards to the FFM, Extraversion and Neuroticism are also important to eudaimonic well-being (Garcia, 2011; Keyes, Shmotkin, & Ryff, 2002; Schmutte & Ryff, 1997), however, researchers have suggested that Conscientiousness may be more important (Garcia, 2011; Hayes & Joseph, 2003; Schmutte & Ryff, 1997). Conscientiousness deals with goal planning, therefore high Conscientiousness may lead to high goal efficacy, which in turn, may lead to greater eudaimonic well-being (Hayes & Joseph, 2003; McGregor & Little, 1998). It has been suggested that Agreeableness is also important to eudaimonic well-being, as it may help to further social goals and experiences (McCrae & Costa, 1991), thus increasing an individuals' feeling of meaning or purpose in life (Hayes & Joseph, 2003). Research has also found a positive association between Openness to Experience and eudaimonic well-being using a subscale which measures personal growth (Schmutte & Ryff, 1997).

**Personality and affect.** Positive and negative affect also exhibit unique relationships with personality traits. Limited research into RST and affect has found that BIS is positively related to negative affect (Gill et al., 2017; Harnett et al., 2013). Research is currently mixed on the relationship between BAS and affect. Unidimensional BAS was found to be positively related to positive affect and negatively related to negative affect (Harnett et al., 2013), however, a recent study using a different multidimensional revised BAS scale did not find any relationships between BAS components and negative affect (Gill et al., 2017). In contrast, Gill and colleagues did report a positive association between BAS reward responsiveness (similar to Reward Reactivity) and positive affect (Gill et al., 2017).

As with previous SWB components, there are numerous studies investigating the relationships between affect and FFM. Extraversion and Neuroticism are strong predictors of positive affect, with Extraversion positively associated with positive affect and Neuroticism negatively associated with positive affect across several studies (DeNeve & Cooper, 1998; Garcia, 2011; González Gutiérrez, Jiménez, Hernández, & Puente, 2005; Steel et al., 2008). Positive associations between personality and positive affect have also been found for Openness to Experience, Agreeableness and Conscientiousness (DeNeve & Cooper, 1998; González Gutiérrez et al., 2005). Predictably, Neuroticism is one of the strongest predictors of negative affect (DeNeve & Cooper, 1998; Garcia, 2011; González Gutiérrez et al., 2005). Negative affect is negatively correlated with Extraversion, Agreeableness and Openness to Experience in previous research (González Gutiérrez et al., 2005).

### **Social comparison theory**

Another type of individual difference which has been found to be associated with SWB are differences in social comparison behaviour. Social comparison theory was first introduced in the 1950s (Festinger, 1954), and has since become a central concept in the social psychological literature (Buunk & Gibbons, 2007). The theory describes the process by which individuals compare themselves to obtain an external guideline against which to assess their opinions, skills, abilities, personality traits and emotions (Festinger, 1954; White et al, 2006). Social comparison is a way to obtain information about the self, and is motivated by self-enhancement, self-improvement and self-evaluation (Gibbons & Buunk, 1999). Although social comparison can take place between any two individuals, it most commonly takes place when an individual believes another has similar opinions, beliefs and abilities to their own (Festinger, 1954; Gibbons & Buunk, 1999). Individuals compare themselves to others when they are confronted with information about others, such as how others are doing, others'

abilities and what others have achieved (Mussweiler, Rueter, & Epstude, 2006). Social comparison can also be prompted by certain situations such as periods of change or stress (Buunk, 1994; Gibbons & Buunk, 1999), or circumstances which promote competition (Garcia, Tor, & Schiff, 2013; Ruble & Frey, 1991).

### **Comparison orientation**

While social comparison is broadly recognised as a basic attribute of human socialisation (Gilbert, Price, & Allan, 1995), research indicates that the frequency of such comparisons vary from individual to individual – these individual differences are known as ‘comparison orientation’ (Gibbons & Buunk, 1999). Individuals with high social comparison orientation (SCO) have three common characteristics. As summarised by Gibbons and Buunk (2007, p. 14): "... those with high SCO are characterised by a combination of (a) a high accessibility and awareness of the self, (b) an interest in what others feel and think, and (c) some degree of negative affectivity and self-uncertainty."

In order to measure comparison orientation, Gibbons and Buunk developed a social comparison orientation questionnaire, basing their theoretical factors on Festinger’s original theory, which suggested that individuals compare their abilities and opinions (Festinger, 1954). Therefore, the resulting measure (the Iowa-Netherlands Comparison Orientation Measure; INCOM) has an Ability factor and an Opinion factor. The Ability factor measures an individual’s drive to compare their abilities, which includes comparisons based on physical and/or cognitive abilities (i.e., sports, IQ), performance in similar situations (i.e., job performance, marks on an assignment), or general life success (i.e., income). The Opinion factor measures how frequently individuals’ compare their opinions. This is different than the comparison of abilities as the comparison of opinions is not competitive, but instead functions as a way for individuals to assess whether their opinions on current events/topics

are supported or refuted by those around them to judge if they are ‘correct’ (Festinger, Gerard, Hymovitch, Kelley, & Raven, 1952). Although the Iowa-Netherlands Comparison Orientation has two factors, due to the high correlation between these factors in Gibbons and Buunk’s findings, comparison orientation is most often measured as a unidimensional construct (Gibbons & Buunk, 1999).

### **Social comparison and subjective well-being**

**Upward/downward comparison and subjective well-being.** Much of the attention on social comparison in the SWB literature is placed on the direction of comparison. Festinger’s original theory proposes that people have a ‘drive upward’, suggesting that individuals have a preference to compare themselves against those they perceive as slightly better off than themselves (1954). Therefore, upward comparison is defined as comparison against a better-off peer. In contrast, downward comparison is defined as the comparison against a worse-performing peer. Wills (1981) theorised that individuals engage in downward social comparison when they have experienced a drop in subjective well-being in an effort to make themselves feel better about their situation. Evidence does suggest that this may be effective, as downward comparison has been shown to raise self-esteem, boost positive affect and lower anxiety (Amoroso & Walters, 1969; Crocker, Thompson, McGraw, & Ingerman, 1987; Gibbons, 1986). In contrast, upward comparison raises negative affect and induces lower self-evaluations (Morse & Gergen, 1970; Tesser, Millar, & Moore, 1988), but can be a source of inspiration and hope, and can be used to identify role models (Collins, 1996; Taylor & Lobel, 1989). This evidence is supported by a two-week diary study which found that upward comparisons decreased affective well-being, while downward comparisons increased affective well-being (Wheeler & Miyake, 1992).

While the direction of comparison is seemingly important in the short-term, recent research suggests that there may be long-term consequences of social comparison, regardless of direction. Frequent social comparison behaviour can induce negative emotions such as defensiveness, envy, guilt and regret (White, Langer, Yariv, & Welch, 2006). This may indicate that for SWB, it is the frequency of comparison that matters, not the direction. This is supported by research by Buunk and colleagues, who found that the directionality of comparison does not affect SWB consistently (Buunk, Collins, Taylor, VanYperen, & Dakof, 1990). Their research suggests that other traits such as self-esteem, perceived control and/or personality traits may moderate or mediate the relationship between directionality of comparison and SWB. For example, if a student is comparing grades on an assignment and sees a student who is worse off, he may experience a boost in SWB because he could interpret his grade as ‘not that bad’, however, the comparison may make him believe that his grade in the class could get even lower which would decrease feelings of SWB. Similarly, seeing someone with an A\* may inspire hope or envy (Diener et al., 1999).

**Social comparison orientation and subjective well-being.** Given the age of social comparison theory, there is surprisingly little literature investigating how frequent social comparison impacts subjective well-being directly. Several studies investigate how social comparison orientation relates to correlates of well-being, including self-esteem (Fuhr, Hautzinger, & Meyer, 2015), depressive symptoms (Buunk & Brenninkmeijer, 2001), satisfaction (Buunk, 2006), and relative income (Cheung & Lucas, 2016). However, to the best of my knowledge, there are very few studies which directly investigated the impact of comparison orientation on SWB.

During the development and validation of the Iowa-Netherlands Comparison Orientation Measure (INCOM), Gibbons and Buunk investigated whether high comparison

orientation was associated with life satisfaction, and found no difference in life satisfaction between those with high comparison orientation and those with low comparison orientation (Gibbons & Buunk, 1999). A more recent study split the INCOM into its subscales (Ability and Opinion) and replicated these findings with panel data (Schneider & Schupp, 2014). While there is evidence that social comparison orientation impacts affect (Fuhr et al., 2015; White et al., 2006), to the best of my knowledge, there is no research to date on social comparison orientation and eudaimonic well-being.

Although the literature has not found a relationship between offline social comparison and life satisfaction, there is reason to believe that the relationships between social comparison orientation and the components of subjective well-being may differ online. Prior research on offline social comparison has indicated that social comparison may be provoked by certain situations or pictures of relevant others (Schneider & Schupp, 2014). Social networking sites may be one of these ‘certain situations’, as sites like Facebook and Instagram expose their users to pictures of relevant others in abundance. It is therefore possible that the relationships between online social comparison and subjective well-being will differ from those previously found between offline social comparison and subjective well-being, especially as a recent study found that offline and online social comparison are distinct constructs (Feinstein et al., 2013).

**Social comparison valence and subjective well-being.** Social comparison can also be measured in relation to how an individual perceives him/herself compared to others. Positive or negative comparison (henceforth known as valence) does not consider whether an individual’s reference group/peer is better off or worse off (such as with upward/downward comparison), but instead focuses on whether the individual is viewing themselves in a positive or negative light when conducting comparisons (Allan & Gilbert, 1995). Positive

social comparisons involve the individual viewing themselves in a superior light compared to their reference group/peer, while negative social comparisons involve the individual viewing themselves as inferior compared to their reference group/peer. This differs from upward/downward social comparison as it is concerned with how the individual views themselves in comparison to others as opposed to whether others are better or worse off. For example, an individual could compare themselves in a downward positive fashion (i.e., ‘I am smarter than my friend who has a lower income than me’), or in an upward positive fashion (i.e., ‘I am smarter than my friend who has a higher income than me’). Previous research on comparison valence and correlates of SWB has found that individuals who view themselves in a negative light compared to others often struggle with depression, social anxiety, shame, and are more likely to ruminate than those who perceive themselves in a positive light compared to others (Cheung, Gilbert, & Irons, 2004; Gilbert, 2000; Gilbert & Irons, 2008; Weisman, Aderka, Marom, Hermesh, & Gilboa-Schechtman, 2011).

### **Social comparison and personality**

Literature on social comparison behaviour and its relationship with personality traits is also relatively sparse. To the best of my knowledge, there is no research to date on social comparison behaviour and RST traits. However, research based on the FFM of personality demonstrates evidence that personality traits are associated with social comparison behaviour (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee, Buunk, Sanderman, Botke, & Van Den Bergh, 1999). Prior research has found a positive association between social comparison behaviour and Neuroticism. Individuals who score high in Neuroticism compare themselves to others frequently, tend to interpret comparisons negatively, and are prone to negative affect from such comparisons (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee et al., 1999). Additionally, evidence indicates that individuals scoring high in



Extraversion show higher comparison orientation; although, it needs to be noted, these individuals interpret comparisons differently than those high in Neuroticism (Olson & Evans, 1999; van der Zee et al., 1999). The remaining FFM traits do not display consistent associations with comparison orientation (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee et al., 1999), however, as both RST and social comparison have their roots in evolution, RST may be more suitable to revealing potential relationships between personality traits and comparison orientation than the previous theories used in the literature. Therefore, I explore this research question in Appendix B.

### **Social Networking Sites**

Having discussed the literature on SWB, personality, social comparison and their relationships to each other, I now discuss the literature on social networking sites. Social networking sites (SNS) are online environments which enable users to create a public profile and connect with other users (Ellison, Steinfield, & Lampe, 2007). They allow SNS users to quickly and easily share contact information, messages, pictures, life events, and view or browse information created by these connections (Boyd & Ellison, 2008). While social connection is the main characteristic of all SNS, each SNS has its own additional features which can impact how the site is used, and therefore, each SNS may affect SWB differently. Due to its overwhelming popularity, this thesis will focus specifically on Facebook use.

**The popularity of Facebook.** Of the SNS available, Facebook is by far the most popular with 79% of all American adult internet users reporting that they have a Facebook account (Greenwood et al., 2016). Of these users, 76% claim they visit Facebook daily, with 55% visiting multiple times per day (Greenwood et al., 2016). Facebook is popular on a global scale, with Facebook boasting 2.13 billion active users as of December, 2017 (Facebook Newsroom, 2018). To put Facebook's popularity into perspective, the second most popular

SNS is Instagram, with 32% of all American internet users in 2016 reporting that they have an Instagram account (Greenwood et al., 2016), and Instagram reporting around 800 million users (Instagram, 2018).

### **Why would Facebook use be associated with SWB?**

As mentioned briefly above, social relationships are an important determinant of SWB (Myers & Diener, 1995). Facebook has become a daily part of social relationships for many people (Greenwood et al., 2016), but it is not evident that online communication is associated with well-being in the same way as personal contact. Facebook is ultimately a tool for communication, and as with any tool, there are upsides and downsides to Facebook use as a communication method. For example, Facebook use helps individuals stay in touch with long-distance friends and family, which contributes to the maintenance of social capital (the resources accumulated through relationships among people or networks), a determinant of SWB (Ellison et al., 2007). However, frequent Facebook use also exposes users to constant information about the lives of others which they may not have had access to otherwise. This could trigger damaging social comparisons, as Facebook users tend to post content which portrays them in a positive light, creating an unrealistic standard which may lead users to believe their friends are happier and having better lives than they are (Chou & Edge, 2012). It is therefore unsurprising that research into how Facebook use is related to SWB often yields conflicting results. Below, I discuss some of these studies to demonstrate how Facebook use has been associated with SWB in prior work, and to provide an introduction to Facebook use literature. Additional literature will be discussed in each relevant chapter of the thesis.

## **Facebook use and SWB – Mixed findings**

Although research on the association between Facebook use and SWB has increased in recent years, these studies have often reached different conclusions. Some studies report positive associations between Facebook use and SWB (Ellison et al., 2007; Grieve, Indian, Witteveen, Anne Tolan, & Marrington, 2013; Oh, Ozkaya, & LaRose, 2014), while others report the opposite (Fox & Moreland, 2015; Kross et al., 2013; Sagioglou & Greitemeyer, 2014). In this section, I will briefly summarise the literature on Facebook use and SWB.

**Positive associations between Facebook use and SWB.** Research investigating the social aspects of Facebook use, such as its ability to build social connections, report that Facebook use is positively associated with SWB. For example, Grieve and colleagues found that offline social connectedness and Facebook social connectedness were distinct constructs, and that Facebook social connectedness was associated with greater SWB and lower depression and anxiety (Grieve et al., 2013). Facebook use has also been positively associated with increased social capital, which is a determinant of SWB (Portela, Neira, & Salinas-Jiménez, 2013). Ellison and colleagues (2007) found that Facebook use was associated with bridging, bonding and maintenance social capital, suggesting that Facebook use helped their student sample turn acquaintances into friends, build connection with existing friends, and maintain long-distance friendships. The authors also found that Facebook use was positively associated with satisfaction with university life, and that Facebook use helped students with low self-esteem gain bridging social capital (turning acquaintances into friends) (2007). Research also shows that Facebook can be used to gain social support, which in turn can lead to greater SWB (Liu & Yu, 2013; Oh et al., 2014; Rozzell et al., 2014), and that looking through old pictures and posts on one's own Facebook wall can have a self-soothing effect, leading to a higher perceived sense of well-being (Good, Sambhantham, & Panjganz, 2013).

Other research indicates that Facebook use can decrease loneliness (Deters & Mehl, 2013) and reduce stress through perceived social support (Nabi, Prestin, & So, 2013).

**Negative associations between Facebook use and SWB.** In contrast to the above studies, other research finds that Facebook use is negatively associated with SWB. For example, one study found that students who frequently use Facebook to procrastinate from their schoolwork experienced increased academic stress and impaired SWB (Meier, Reinecke, & Meltzer, 2016). Facebook use in general has also been linked to stress, as a qualitative study using focus groups found that Facebook use induced stress through negative experiences including feeling tethered to the site (users feel as though they are missing out if not checking Facebook frequently) and Facebook use inciting ‘drama’ in offline relationships (such as offline arguments induced by comments written on Facebook, or not ‘friending’ relatives) (Fox & Moreland, 2015). Stress was also cited in a recent study which found that users who do not present their ‘true selves’ on Facebook, but instead have an online persona have higher stress levels than those who are authentic on the site (Grieve & Watkinson, 2016). The respondents in Fox and Moreland’s study also cited social comparison and jealousy as negative experiences caused by Facebook use (2015). Research on Facebook use and social comparison shows that comparison on Facebook can lead to depressive symptoms (Steers, Wickham, & Acitelli, 2014), envy (Krasnova, Wenninger, Widjaja, & Buxmann, 2013), and users believing their friends are happier and having better lives (Chou & Edge, 2012). This may be due to image management, as previous research has found that Facebook users tend to post mostly positive content and portray themselves online in a positive light (Pempek, Yermolayeva, & Calvert, 2009; Vogel, Rose, Roberts, & Eckles, 2014). Frequent Facebook use has also been associated with lower SWB. For example, in an experience sampling study (users are asked about SWB and Facebook multiple times over the course of a week), more time spent on Facebook was associated with lower SWB over time (Kross et al.,

2013). Another study found that Facebook use causes declines in mood (affective well-being), and that this decline in mood was mediated by the feeling that Facebook use was not meaningful (Sagioglou & Greitemeyer, 2014). Research also links excessive time spent on Facebook with negative impacts to correlates of SWB such as lower self-esteem (Kalpidou, Costin, & Morris, 2011), depressive symptoms through rumination (Feinstein et al., 2013), and increased social anxiety (Shaw, Timpano, Tran, & Joormann, 2015).

### **Individual differences in personality and Facebook use**

The results of the above studies represent the average association between Facebook use and SWB. However, experiences on Facebook are likely to vary by individual, and thus there may be differences in how individuals use Facebook, and therefore how Facebook use is associated with SWB depending on personality traits and other individual differences. There is evidence to support this idea, as studies have found that individual differences in personality are correlated with differences in Facebook use. For example, one study found that there were significant differences in personality and social characteristics between people who did not use Facebook at all, and those who were frequent users (Ljepava, Orr, Locke, & Ross, 2013). Individual differences in personality have also been associated with how frequently users access Facebook and how long they spend online during each session (Caci, Cardaci, Tabacchi, & Scrima, 2014), how much content a user ‘like’s and how many groups they belong to (Bachrach, Kosinski, Graepel, Kohli, & Stillwell, 2012), and willingness to share personal information, use Facebook features and upload photos to the site (Amichai-Hamburger & Vinitzky, 2010). Additionally, research finds that personality traits can influence what users post on Facebook, as Marshall and colleagues found that personality was associated with which topics a user discussed in his/her status updates most frequently

(Marshall, Lefringhausen, & Ferenczi, 2015). There is also evidence that personality influences an individual's motivations to use Facebook (Orchard, Fullwood, Galbraith, & Morris, 2014; Seidman, 2013). While there is much literature investigating how individual differences influence the use of Facebook itself, to the best of my knowledge, there is no research to date which took this topic a step further and examined how these individual differences in personality related to how Facebook use is associated with SWB.

**Individual differences in Facebook use.** Researchers have started to investigate how users spend their time on site only recently. While some users spend their Facebook time creating content (clicking like, writing posts, communication with friends), others simply browse the newsfeed (a scrolling feed of friend's posts and pictures, interspersed with advertisements and links to other sites), consuming content without creating any (Burke & Kraut, 2011). This browsing behaviour where content is consumed, but not created is called "passive use" (Burke & Kraut, 2011). Recent research has found that passive use is associated with lowered affective well-being (Verduyn et al., 2015), social anxiety symptoms (Shaw et al., 2015), increased loneliness and reduced social capital (Burke, Marlow, & Lento, 2010). Researchers also theorise that passive use may be related to increased social comparison and envy (for a review, see Verduyn, Ybarra, Resibois, Jonides, & Kross, 2017).

### **Aim of this thesis**

As the above literature demonstrates that personality traits may influence how users interact with Facebook, and that there are individual differences in how users interact with the site, it seems likely that how users spend time on the site and which activities they choose to engage in when using Facebook impact how the usage of the site is associated with SWB. Therefore, the aim of this thesis is to investigate whether the association between Facebook use and subjective well-being depends on individual differences, including individual

differences in personality, individual differences in Facebook use, and individual differences in social comparison behaviour. This is presented below as the general research question (RQ) underlying the work in this thesis.

**RQ:** Does the association between Facebook use and subjective well-being depend on individual differences in personality, individual differences in how users interact with Facebook, and individual differences in Facebook social comparison behaviour?

### **Contributions and applications**

As Facebook and other SNS's are essentially tools for human interaction, it is necessary to understand what users bring into the online environment in order to explore how Facebook use is associated with individuals' SWB. This thesis aims to contribute to the growing literature on SNS use by exploring how individual differences in personality, social comparison behaviour, and Facebook usage style are associated with SWB. I expect to contribute to a better understanding of the role that individual differences in user characteristics and Facebook use play in the complex relationship between Facebook use and SWB.

As individuals potentially experience Facebook in a different way based on their personality traits and how they choose to interact with the site, the work from this thesis could be disseminated to the public in order to help users make informed decisions about how to use Facebook. Additionally, Facebook has recently been in the media for the site's potential to have a negative impact on users' moods and general wellbeing (Ginsberg & Burke, 2017; Levin, 2017; Price, 2017). The results of this thesis could be applied to the Facebook algorithms to potentially improve the relationship between Facebook use and user SWB. Furthermore, the results of this thesis may have implications for public policy, as

Facebook allows users as young as thirteen to create a Facebook account. If Facebook is negatively associated with SWB, the results of this thesis could inform public policy about what types of use have negative associations for users, which could shape suggestions to parents on how to teach their children/young adults about how to interact with the site in a healthy way.

### **Structure of the thesis**

This thesis will explore the above research question through quantitative research in the following format:

In Chapter 2, I will introduce further literature on Facebook use and SWB. I will also introduce literature on the relationships between Facebook use and personality traits found by previous research into the Five Factor Model of personality (Openness to Experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism). I will then conduct regression and correlation analyses to explore how Facebook use is related to SWB, how personality traits are correlated with Facebook use, and whether RST personality traits moderate the relationship between Facebook social comparison and SWB. This analysis is related to the general research question of the thesis as it will investigate whether individual differences in personality strengthen or change the relationship between Facebook social comparison and SWB.

In Chapter 3, I will introduce evidence that there are different styles of Facebook engagement. I will discuss previous research on “Passive use”, a type of Facebook use where users consume, but do not create content. I will then use exploratory and confirmatory factor analysis to create and validate new scales to measure different types of Facebook engagement. I will further use correlations to test for discriminant validity, convergent validity, and test re-test reliability. The creation of the Passive Active Use Measure is related



to the general research question of the thesis as individual differences in Facebook engagement may potentially lead to different associations with SWB, but this cannot be investigated without creating a way to measure different types of use.

In Chapter 4, I will explore whether individual differences in personality (RST) are associated with different types of Facebook engagement. This analysis is related to the general research question of the thesis as it will investigate whether individual differences in personality are associated with different Facebook engagement styles, which may affect how Facebook use is associated with SWB. Then, I will then introduce literature describing possible issues with previous measures for Facebook use, and use a newly developed (at the time) multidimensional Facebook intensity scale to investigate how individual differences in Facebook engagement style and Facebook intensity are related to SWB. The second study of chapter 4 is related to the general research question of the thesis as it investigates how individual differences in Facebook engagement style and individual differences in Facebook intensity are associated with SWB.

In Chapter 5, I will explore whether there is a relationship between Facebook engagement styles and individual differences in social comparison behaviour. As social comparison behaviour can be associated with SWB, this pertains to the general research question of the thesis as individual differences in Facebook engagement style may be associated with different types of social comparison behaviour. After determining if Facebook engagement styles are associated with individual differences in social comparison behaviour, I will then investigate how differences in Facebook social comparison behaviour are associated with SWB. This analysis is related to the general research question of the thesis as individual differences in social comparison behaviour on Facebook may affect how Facebook use is associated with SWB.

Chapter 6 will summarise the findings of the thesis, discuss practical and theoretical applications of the results, and consider the limitations of the work. It will also suggest avenues for future research to investigate.

See Table 1.1 for a complete description of the input, studies, methods, and results for each chapter of this thesis. Input describes the knowledge brought into each chapter from the previous chapter, studies describes the title of each study included in the chapter, methods details the statistical analysis used in each study, and results/output describes the results or contributions to knowledge derived from each chapter. For diagrams displaying the relationships explored in each chapter, see Appendix A.

### **Chapter summary**

This chapter has identified, defined, and discussed the background of necessary concepts for this thesis such as the components of SWB, the RST of personality, the theory of social comparison, and Facebook use. It has also discussed the previous literature on how each topic relates to each other. In the next chapter, I will explore whether individual differences in personality moderate the relationship between Facebook social comparison and the components of SWB.

Table 1.1 Content and Structure of Thesis Chapters

Chapter	Input	Studies/Content	Methods	Results/Output
Chapter 1: Introduction and literature review		Explores the literature pertaining to: <ul style="list-style-type: none"> <li>- SWB</li> <li>- Reinforcement sensitivity theory of personality</li> <li>- Social comparison theory</li> <li>- Relationships between SWB and personality</li> <li>- Relationships between SWB and social comparison</li> <li>- Relationships between personality and social comparison</li> <li>- Facebook use and SWB</li> <li>- Facebook use and personality</li> <li>- Facebook use and social comparison</li> </ul>	Literature review	Background knowledge on known theories for SWB, RST, social comparison, and how each relate to SWB and Facebook use  General research question: Does the association between Facebook use and subjective well-being depend on individual differences in personality, individual differences in how users interact with Facebook, and individual differences in Facebook social comparison behaviour?
Chapter 2: Relationship between Facebook use, Facebook social comparison and SWB: Personality as a moderator	Background literature from chapters 1 and 2  Chapter RQ's: 1. How is Facebook intensity associated with the components of SWB? 2. How is Facebook social comparison (valence) associated with the components of SWB? 3. What is the relationship between the components of SWB and RST personality traits? 4. Do RST personality traits moderate the relationship between Facebook social comparison (valence) and the components of SWB?	2.1. Relationship between Facebook use, Facebook social comparison (valence) and SWB: RST personality as a moderator	2.1. OLS regression, correlation	Facebook intensity positively associated with SWB (contributes to mixed literature)  Facebook social comparison (valence) negatively associated with SWB  RST personality associated with SWB  Goal-Drive Persistence and BIS moderate the relationship between Facebook social comparison (valence) and components of SWB

Chapter	Input	Studies/Content	Methods	Results/Output
Chapter 3: Development and validation of the Passive Active Use Measure (PAUM)	Literature from chapters 1-2, Limitations/flaws from study 2.1	3.1. Development of the PAUM 3.2. Validation of the PAUM 3.3. Test-Retest reliability and further validation of the PAUM	3.1. Exploratory Factor Analysis, correlation for discriminant validity 3.2. Confirmatory Factor Analysis, correlation for discriminant validity 3.3. Confirmatory Factor Analysis, correlation for test-retest reliability and discriminant validity	The Passive Active Use Measure (PAUM)  Users have different engagement styles when using Facebook which should be accounted for when measuring Facebook use.  Engagement style is not binary: Active use can be split into active social and active non-social use
Chapter 4: Individual differences in Facebook use and their relationship to personality and SWB	Literature from chapters 1-3, limitations/flaws from study 2.1, PAUM scales, short RST (Appendix K)  RQ for study 4.1: 1. Do individual differences in personality affect how a user engages with Facebook?  RQ's for study 4.2: 1. How are individual differences in Facebook engagement style associated with the components of SWB? 2. How are individual differences in Facebook intensity style associated with the components of SWB?	4.1. Associations between Facebook engagement styles (PAUM) and RST personality 4.2. Relationship between SWB measures, Facebook engagement style (PAUM) and types of Facebook intensity (MFIS)	4.1. OLS regression 4.2. OLS regression	Facebook engagement styles are associated with individual differences in RST personality  Individual differences in Facebook engagement and intensity are associated with SWB. Active forms of use are positively associated with SWB, while Passive use is negatively associated. Intense use for self-expression or to relieve boredom is positively associated with SWB, while intense overuse is negatively associated with SWB.  The relationship between Facebook use and the components of SWB are nuanced and depend on individual differences in engagement and intensity styles.

Chapter	Input	Studies/Content	Methods	Results/Output
Chapter 5: The association between Facebook engagement style and social comparison orientation, and their association with SWB	<p>Literature from chapters 1-4, limitations/flaws from study 2.1, PAUM scales, results from studies 4.1 and 4.2, research from Appendix B</p> <p>RQ for study 5.1:</p> <ol style="list-style-type: none"> <li>1. Do individual differences in Facebook engagement style affect how users socially compare themselves on Facebook?</li> </ol> <p>RQ's for study 5.2:</p> <ol style="list-style-type: none"> <li>1. How are individual differences in Facebook social comparison associated with the components of SWB?</li> </ol>	<p>5.1. Relationship between Facebook engagement style and Facebook social comparison (valence and frequency)</p> <p>5.2. Associations between SWB measures and Facebook comparison orientation (frequency of social comparison)</p>	<p>5.1. OLS regression</p> <p>5.2. OLS regression</p>	<p>Individual differences in Facebook engagement are associated with individual differences in social comparison behaviour on Facebook: Active users (both) are likely to compare their opinions on Facebook, while Passive users compare both abilities and opinions</p> <p>Active non-social users tend to view themselves in a positive light compared to their Facebook friends</p> <p>Online and offline social comparison orientation are separate constructs</p> <p>Individual differences in social comparison on Facebook are associated differently with SWB: The comparison of Opinions is positively associated with SWB, while the comparison of Abilities is negatively associated with SWB</p>
Chapter 6: General discussion, limitations, contributions and conclusions	Literature from chapters 1-5, results from chapters 2-5	General discussion, chapter summaries, practical and theoretical applications, limitations and future work	Review	Practical and theoretical applications, suggestions for future work

**Chapter 2. The relationship  
between Facebook use, Facebook  
social comparison, and subjective  
well-being: Personality as a  
moderator**

## **Introduction**

Having established through the literature that personality is associated with subjective well-being (SWB), and that personality is also associated with social comparison behaviour, I now investigate whether the relationship between SWB and social comparison on Facebook is moderated by individual differences in personality. In this chapter, I also do some preliminary investigations between key variables. I first investigate how Facebook use is related to SWB, as this relationship yields mixed results in the literature (see Chapter 1, p. 33 for an overview). Next, I look at the relationships between SWB and Reinforcement Sensitivity Theory (RST) personality traits. Finally, I investigate the relationships between RST personality traits and Facebook use, as previous research on individual differences in Facebook use have focused on the Five-Factor Model (FFM) of personality. The results of these preliminary relationships will lay the groundwork for understanding how individual differences in personality may lead people to use Facebook in different ways, thus affecting how Facebook use is associated with SWB.

### **Facebook use and subjective well-being**

As discussed in the literature review, previous studies which have investigated SWB and Facebook use tend to yield mixed results, which may be due to the studies' focus on particular covariates. For example, previous studies on social capital, perceived social support or social connectedness have found that Facebook use is positively associated with life satisfaction (Ellison et al., 2007; Grieve et al., 2013; Oh et al., 2014; Valenzuela, Park, & Kee, 2009) while studies examining envy or problematic use have found that Facebook use is negatively associated with life satisfaction (Chou & Edge, 2012; Krasnova et al., 2013; Satici & Uysal, 2015). These studies typically measure Facebook use with the Facebook Intensity Scale (Ellison et al., 2007). Facebook intensity is defined as how attached an individual is to

Facebook, and how integrated use of the site has become into their day-to-day lives (Ellison et al., 2007). A previous study investigated the impact of Facebook use on life satisfaction through experience sampling, and found that the more participants used Facebook, the more their life satisfaction declined over time (Kross et al., 2013). I therefore hypothesize that the intensity of Facebook use will be negatively associated with life satisfaction. While few studies have investigated Facebook use and eudaimonic well-being, Satıcı & Uysal found that problematic Facebook use was associated with lower eudaimonic well-being (2015). Recent studies have also found that Facebook use can lower mood (Sagioglou & Greitemeyer, 2014; Verduyn et al., 2015). In light of these findings, I hypothesize that:

**H1.** Respondents who use Facebook more intensively will have lower life satisfaction, lower eudaimonic well-being, lower positive affect and higher negative affect than those who use Facebook less intensively.

### **Facebook use and social comparison**

One of the main features of Facebook is that it allows users to control how they are presented in the online environment. Many users practice image management and present an idealized version of themselves in the form of flattering pictures and status updates about their successes (Chou & Edge, 2012; Qiu, Lin, Leung, & Tov, 2012). At the same time Facebook allows users to gain insights into their Facebook friends' lives which they would normally not have, thus making Facebook the ideal platform for social comparison. Features such as Facebook's newsfeed provide a steady stream of information about peers' lives, achievements, abilities, emotions and personalities, creating a perfect breeding ground for social comparison to take place.



Previous studies which focused on social comparison on Facebook have investigated how it relates to correlates of SWB, such as depressive symptoms (Feinstein et al., 2013; Steers et al., 2014), body image (Haferkamp & Krämer, 2011), and envy (Chou & Edge, 2012; Krasnova et al., 2013). Many of these studies investigate the direction of comparison such as upward or downward comparison, (see Chapter 1 for an overview, i.e., Lee, 2014; Liu, Li, Carcioppolo, & North, 2016; Steers et al., 2014; Vogel, Rose, Okdie, Eckles, & Franz, 2015), while fewer investigate how users see themselves in comparison to their Facebook friends (i.e., Feinstein et al., 2013; Frison & Eggermont, 2016). While investigating comparison direction can reveal information about how comparisons take place, research shows that comparisons in either direction can be associated with heightened or decreased SWB (Buunk et al., 1990), therefore, for this study I chose to look at whether individuals were considering themselves in a positive or negative light in comparison to their Facebook friends (social comparison valence). Studies investigating Facebook use and social comparison typically find that social comparison affects the user negatively (see above citations). Social comparison has also been found to mediate the relationship between time spent on Facebook and depressive symptoms (Steers et al., 2014). Additionally, previous research investigating negative Facebook social comparison has found that individuals who view themselves in a negative light in comparison to their Facebook friends experience more depressive symptoms through ruminations and tend to have lower life satisfaction (Feinstein et al., 2013; Frison & Eggermont, 2016). Therefore, I hypothesize that users who compare themselves to their peers on Facebook in a negative light will have lower SWB than users who compare themselves in a positive light.

**H2.** Respondents who compare themselves negatively to their peers on Facebook will have lower life satisfaction, lower eudaimonic well-being, lower positive affect and

higher negative affect than those who mostly compare themselves in a positive way (Facebook social comparison valence).

### **Facebook use and RST personality traits**

While past studies have investigated Facebook social comparison (see above and chapter 1), none to my knowledge have examined the role personality traits play in its association with SWB. Past studies on Facebook use and personality commonly focus on feature use (posting photos, joining public groups, etc.), frequency of use, and number of Facebook friends, in conjunction with the Five-Factor Model of personality (FFM; Amichai-Hamburger & Vinitzky, 2010; Correa, Hinsley, & de Zúñiga, 2010; Ljepava, Orr, Locke, & Ross, 2013). In contrast, the present study extends previous research on social comparison on Facebook and SWB by investigating whether individual differences in personality make Facebook users more likely to compare themselves to others in a negative way, and therefore experience decreased well-being. This study is the first to my knowledge to investigate the relationships between Facebook use and personality using the RST as opposed to the FFM. I therefore base my hypotheses on previous literature about how Facebook use is correlated with the FFM.

Reward Interest is associated with seeking behaviour and is responsible for the motivation to find rewarding places, activities and people. Individuals with high Reward Interest are likely to enjoy exploring new places, approaching new people and participating in new activities. It therefore is most similar to Openness to Experience in the FFM of personality (Corr & Cooper, 2016). Studies on the FFM of personality and Facebook use found that people high in Openness to Experience use social media more frequently (Correa et al., 2010). As Facebook creates opportunities to seek out friends, events and new experiences, I hypothesize that respondents who have high Reward Interest will be more

intensive Facebook users. Studies which have investigated personality and SWB have found that Openness to Experience is positively related to quality of life (a eudaimonic well-being measure)(Steel et al., 2008) and positive affect (DeNeve & Cooper, 1998; McCrae & Costa, 1991; Steel et al., 2008). While Openness to Experience is not associated with life satisfaction or negative affect, previous research into the original and revised RST scales has found that unidimensional BAS is associated positively with life satisfaction, positive affect and psychological well-being (a eudaimonic well-being measure), and negatively associated with negative affect (Harnett et al., 2013). I therefore predict that respondents high in Reward Interest will report higher SWB.

**H3a:** Respondents with high Reward Interest will use Facebook more intensively.

**H3b:** Respondents with high Reward Interest will have higher life satisfaction, eudaimonic well-being, positive affect and lower negative affect than respondents with low Reward Interest.

Reward Reactivity is often conceptualized as the core component to the BAS (Corr & Cooper, 2016). As the BAS may be the central quality of Extraversion (Depue & Collins, 1999; Lucas & Baird, 2004) and extraverts are more likely to be attentive to rewards (Steel et al., 2008), I propose that Reward Reactivity would be closest to the FFM trait of Extraversion. Studies on Facebook and FFM of personality have found that people high in Extraversion use social media more than people who are low in Extraversion (Caci et al., 2014; Correa et al., 2010). As such, I predict that respondents high in Reward Reactivity will use Facebook more intensively than respondents low in Reward Reactivity. FFM studies which have investigated SWB found that higher scores on a variety of SWB measures, including positive affect, life satisfaction, were associated with higher Extraversion (Hayes &

Joseph, 2003; Steel et al., 2008). Additionally, unidimensional BAS is positively associated with psychological well-being (a eudaimonic well-being measure), and negatively associated with negative affect (Harnett et al., 2013). Therefore, I hypothesize that respondents with high Reward Reactivity will have higher SWB than respondents with low Reward Reactivity.

**H4a:** Respondents with high Reward Reactivity will use Facebook more intensively than respondents low in Reward Reactivity.

**H4b:** Respondents with high Reward Reactivity will have higher life satisfaction, eudaimonic well-being, positive affect and lower negative affect than respondents with low Reward Reactivity.

Impulsivity measures an individual's proneness to impulsive behaviour, which can be beneficial when caution and planning are not appropriate and the reward needs to be seized quickly (Corr & Cooper, 2016). A past study linking BIS/BAS traits to the FFM of personality found that Impulsivity was the most similar to low Conscientiousness (Steel et al., 2008). Conscientiousness reflects organization and goal-planning, which requires the delay of gratification. Therefore, it is plausible that individuals low on Conscientiousness would display impulsive traits. Previous research on Facebook use has found that people who are high on Conscientiousness used Facebook less than those who are low on Conscientiousness (Caci et al., 2014; Ryan & Xenos, 2011). I therefore surmise that respondents who have high Impulsivity will use Facebook more intensively than those with low Impulsivity. In regards to SWB, research has found that impulsive individuals are more susceptible to negative behaviours such as procrastination (Steel, 2007). Additionally, research shows that choosing short-term gain over rewards which require the delay of gratification is sometimes associated with poor health (Bogg & Roberts, 2004) and financial deficit (Angeletos, Laibson, Repetto,

Tobacman, & Weinberg, 2001). As such, I would expect that respondents with high Impulsivity would have lower life satisfaction and eudaimonic well-being. However, as Impulsivity is a facet of the BAS, which has been positively associated with well-being measures (Harnett et al., 2013), it is possible that Impulsivity will be positively associated with SWB. Therefore, I expect to see a relationship between Impulsivity and the components of SWB, but do not make predictions about the direction of this relationship.

**H5a:** Respondents with high Impulsivity will use Facebook more intensively than those with low Impulsivity.

**H5b:** There will be a relationship between Impulsivity and the components of SWB.

Goal-Drive Persistence is characterized by a high level of organization and goal-planning, it is therefore the most similar to the FFM trait of high Conscientiousness. Studies which have investigated the FFM of personality and Facebook use have found that people with high Conscientiousness spend less time on Facebook than people who are low in Conscientiousness (Caci et al., 2014; Ryan & Xenos, 2011). However, Goal-Drive Persistence is also characterized by a high level of persistence in general which is not accounted for in the FFM concept of high Conscientiousness. This high level of persistence may result in people with high Goal-Drive Persistence spending more time on Facebook than people with low Goal-Drive Persistence. Due to the divergence between the FFM concept of high Conscientiousness and the RST concept of Goal-Drive Persistence, I predict that there will be a significant relationship between Goal-Drive Persistence and Facebook intensity, but do not predict the direction of this relationship. Also, as personal development and the achievement of goals are important components of eudaimonic well-being (Sheldon, 2002; Waterman, 2008), and previous studies have found positive associations between high

Conscientiousness and facets of SWB, including positive affect, life satisfaction, and lower negative affect (DeNeve & Cooper, 1998; Hayes & Joseph, 2003; McCrae & Costa, 1991), I hypothesize that respondents with high Goal-Drive Persistence will have higher SWB than those with low Goal-Drive Persistence.

**H6a:** There will be a significant association between Goal-Drive Persistence and Facebook intensity.

**H6b:** Respondents with high Goal-Drive Persistence will have higher life satisfaction, eudaimonic well-being and positive affect, and lower negative affect than those with low Goal-Drive Persistence.

Both the BIS and the FFFS are associated with the FFM concept of Neuroticism (Corr et al., 2013). The FFFS differs from the BIS as the FFFS operates in the present, whereas the BIS is mainly concerned with the future. As FFFS prompts behaviour to remove the individual from the perceived danger, it is unlikely to be related to Facebook use. Therefore, I do not have any predictions for FFFS and Facebook intensity or social comparison, but include it in my model as all RST personality traits should be assessed together. Previous studies on FFM Neuroticism and Facebook use have found that individuals high in Neuroticism spend more time on Facebook and access it more frequently than those low in Neuroticism (Caci et al., 2014; Correa et al., 2010). I therefore hypothesize that respondents who have a high BIS will be more intensive Facebook users than those low in BIS. Previous research has also found that individuals high in Neuroticism compare themselves to others more frequently (Gibbons & Buunk, 1999), and are more likely to interpret these comparisons in a negative way (van der Zee et al., 1999). I therefore also hypothesize that respondents who are high in BIS will be more likely to make negative comparisons between

themselves and their Facebook friends than those with low BIS. Several studies have established a link between high Neuroticism and lower SWB (including lower life satisfaction, lower positive affect and higher negative affect) (DeNeve & Cooper, 1998; Hayes & Joseph, 2003; McCrae & Costa, 1991; Steel et al., 2008). Additionally, research on BIS/BAS found that BIS was negatively associated with life satisfaction, positive affect and psychological well-being, and positively associated with negative affect (Harnett et al., 2013). The same study found that components of the FFFS were associated negatively with positive affect (Freeze), life satisfaction (Fight and Freeze), and psychological well-being (Freeze), but positively associated with negative affect (Fight, Flight and Freeze) (Harnett et al., 2013). I therefore further hypothesize that high BIS and high FFFS are associated with lower SWB.

**H7a:** Respondents with high BIS will use Facebook more intensively than those with low BIS.

**H7b:** Respondents with high BIS will be more likely to compare themselves negatively to their friends on Facebook than those with low BIS.

**H7c.** Respondents with high BIS will have lower life satisfaction, lower eudaimonic well-being, lower positive affect and higher negative affect.

**H7d.** Respondents with high FFFS will have lower life satisfaction, lower eudaimonic well-being, lower positive affect and higher negative affect.

## **Moderation**

Although there is a wealth of literature on social comparison, there are few studies which have investigated the role that personality plays in social comparison behaviour. However, personality has been found to moderate other social processes, such as the

relationship between mood and social approach (Brown, Diekmann, Tennen, & Solomon, 2011), and the interaction between daily events and stress (Longua, DeHart, Tennen, & Armeli, 2009). Therefore, I believe it is also possible that personality traits moderate the relationship between social comparison and SWB. Facebook is an ideal environment to investigate this theory, as Facebook provides ample opportunity for social comparison to take place. I therefore further conduct exploratory analysis to investigate whether personality traits moderate the relationship between Facebook social comparison and SWB.

## **Methods**

### **Sample and procedure**

Respondents were recruited online via Amazon Mechanical Turk (MTurk) and social media sites (Facebook, Twitter and Reddit) over a 4-month period from February to May 2015. To access the study, respondents clicked a link which directed them to a secure online survey website (Qualtrics). Upon giving consent, respondents completed a 15-minute questionnaire. Respondents who were recruited through MTurk were paid \$2 in exchange for their participation, while those recruited through social media sites were compensated with personality results upon completion of the questionnaire. Respondents were required to be at least 18 years old and have a Facebook account to participate. Data were collected from 495 individuals, however, respondents who failed the attention checks (such as “Please select slightly agree for this question”), who completed the survey in an unrealistic amount of time (less than 5 minutes), or who did not finish the survey were not included in the final sample. The final sample ( $N = 334$ ) consisted of 136 males and 198 females between the ages of 18 and 70 ( $M_{\text{age}} = 36.5$ ,  $SD_{\text{age}} = 11.3$ , Table 2.1). Respondents were asked which employment status best reflected their current situation, and were told to select as many as applied to allow for overlap (such as student and part-time employment). Employment status categories



included: full-time employment, part-time employment, student, homemaker, retired, and unemployed. Most respondents were employed either full-time or part-time (267 employed, 30 unemployed, 28 homemakers, 9 retired, and 33 students). Over half of the sample (198 respondents) had obtained a university degree (147 had bachelor's degrees, 41 had master's degrees and 10 had a professional/doctoral degree). Most respondents were US residents (308), however, a small portion of the sample resided in other countries (24 UK, 1 New Zealand, 1 Burundi).

## Measures

Life satisfaction was assessed using the 5-item Satisfaction with Life Scale (SWLS), an instrument developed by Diener and colleagues (1985) to measure overall judgments of one's life. Respondents were asked to indicate their responses to each of the five questions on a 7-point scale ranging from (1) strongly disagree to (7) strongly agree (see Appendix E). These scores were summed, with a low score indicating a low level of life satisfaction and a high score indicating a high level of life satisfaction (see Table 2.1 for descriptive statistics and reliability).

Eudaimonic well-being was assessed with the 21-item Questionnaire for Eudaimonic Well-being developed by Waterman and colleagues (2010). Respondents were asked to indicate their responses on a 5-point scale ranging from (0) strongly disagree to (4) strongly agree (see Appendix F). These scores were summed, with a low score indicating a low level of eudaimonic well-being and a high score indicating a high level of eudaimonic well-being (see Table 2.1).

Positive and negative affect were assessed with the 20-item Positive and Negative Affect Scales (PANAS), which consists of two 10-item scales, one measuring positive affect and one measuring negative affect (Watson et al., 1988). Respondents were asked to indicate

the extent they currently felt each item on a scale ranging from (1) very slightly or not at all to (5) extremely (See Appendix G). Items from each scale were summed separately, with a low score representing a low level of affect and a high score indicating a high level of affect (see Table 2.1).

Facebook use was measured with the Facebook Use Intensity Scale, an 8-item scale developed by Ellison, Steinfield and Lampe (2007). Respondents were asked to indicate how many friends they have on Facebook (8-point scale ranging from 0 friends to 400 friends or more), and approximately how many minutes per day they spend on the site (5-point scale ranging from less than 10 minutes a day to more than 3 hours per day), followed by six questions exploring how attached they feel to Facebook (e.g. “I would be sorry if Facebook shut down”; 5-point scale ranging from (1) strongly disagree to (5) strongly agree). See Appendix I. These 8-items were averaged to produce a Facebook intensity score, with low scores representing less intense Facebook use and high scores representing more intense Facebook use (see Table 2.1).

To measure Facebook social comparison valence (FBSC), I used the 11-item Social Comparison Rating Scale. The scale was originally developed by Allan and Gilbert (1995), but was adapted for use in Facebook research by Feinstein and colleagues (2013). The original scale began using the stem, “In relationship to others I generally feel...”. Following the adaptation used by Feinstein, this study used the stem “When I compare myself to others on Facebook, I feel...”. Respondents then responded by selecting a number from 0 to 10 that best illustrated their perceived position between two poles. Some of the poles included items such as “When I compare myself to others on Facebook I feel: 0 = inferior to 10 = superior, 0 = different to 10 = same, and 0 = an outsider to 10 = an insider (See Appendix J). Following Feinstein et al (2013) these scores were summed and then reversed, with a low score indicating positive self-perceptions compared to others and a high score indicating negative

self-perceptions compared to others (see Table 2.1). It should be noted that the original Social Comparison Rating Scale is on a scale from 1-10. For this thesis, the scale was adapted to 0 to 10, so 5 would reflect the true half-way point of the scale and give respondents a neutral response option.

To measure RST personality traits, I used the 73-item Reinforcement Sensitivity Personality Questionnaire (RST-PQ, Corr & Cooper, 2016). This instrument measures the Behavioural Inhibition System (BIS), the Fight-Flight-Freeze System (FFFS) and the subscales of the Behavioural Approach System (BAS: Reward Interest, Reward Reactivity, Goal-Drive Persistence and Impulsivity). As the questionnaire was still in development at the time this research was conducted, this version of the RST-PQ also included questions for an additional subscale: Defensive Fight. Defensive Fight measures defensive aggression towards immediate perceived threats when other forms of escape are not possible (such as when cornered in a dark alleyway at night), and was not included in this research as I did not feel it was relevant to Facebook social comparison. Respondents were asked to evaluate to what extent each statement described them in general on a 4-point scale ranging from (1) not at all to (4) highly (see Appendix H). Low scores indicate that the individual does not have many traits which match the traits measured by the subscale, while high scores indicate that the respondent has many traits which match the traits measured by the subscale. Descriptive statistics and reliability for each subscale of the RST-PQ can be found in Table 2.1.

### **Control variables**

Previous studies have established significant associations between SWB and socio-demographic characteristics including education, gender and age (Deeming, 2013; Portela et al., 2013; Vera-Villarroel et al., 2012). I also include a quadratic age term in the models to investigate if age has a curvilinear relationship with any of the dependent variables.

Additionally, I control for student status, as previous research has established that student populations are more susceptible to social comparison and peer influence (Maxwell, 2002; Stipek & Tannatt, 1984). Descriptive statistics for these control variables can be found in Table 2.1, questions for the control variables can be found in Appendix R.

Table 2.1 Descriptive Statistics for Study 2.1 Variables

Variable	Mean	St. Dev.	Min	Max	Sample $\alpha$
<b>Dependent</b>					
Life satisfaction	21.2	8.0	5	35	.93
Eudaimonic well-being	55.7	11.5	19	82	.89
Positive affect	29.0	8.8	10	50	.91
Negative affect	14.5	7.1	10	47	.94
<b>Independent</b>					
Facebook intensity	3.4	1.0	1.0	5.4	.83
Facebook social comparison valence	54.7	17.1	8	110	.92
Reward Interest	17.1	4.6	7	28	.83
Reward Reactivity	26.4	5.5	11	40	.83
Impulsivity	16.5	4.6	8	29	.76
Goal-Drive Persistence	20.2	4.7	9	28	.88
BIS	52.8	16.1	24	88	.95
FFFS	23.7	6.9	10	40	.85
<b>Controls</b>					
Male	0.4	0.5	0	1	
Age	36.6	11.3	18	70	
University Education or higher	0.6	0.5	0	1	
Student	0.1	0.3	0	1	

Note: N= 334. University education or higher is a binary variable with 1 denoting that the respondent has obtained at least a university degree.

## Data analysis

Using R statistical software (R Core Team, 2015), I first ran zero-order correlations to evaluate the relationships between all study variables. Then I ran multiple ordinary least squares regressions (OLS) and Pearson correlations to test the study hypotheses. As the study employs four measures of SWB, I ran each regression model for each of the outcome variables (life satisfaction, eudaimonic well-being, positive affect, and negative affect). The

potential moderation relationship of personality traits between Facebook social comparison and the SWB variables was estimated by including interaction terms between the z-scores for Facebook social comparison and each personality trait. All regression coefficients reported throughout this thesis are unstandardized regression coefficients ( $B$ 's). I ran Pearson's correlations to investigate the relationships between Facebook use and RST-PQ personality traits.

## **Results**

The results for the zero-order correlations between variables can be found in Table 2.2.

### **Facebook intensity**

The OLS regressions showed a significant positive association between life satisfaction and Facebook intensity ( $B = 1.34, p < .01$ ; Table 2.3, column 1), eudaimonic well-being and Facebook intensity ( $B = 2.28, p < .001$ ; Table 2.4, column 1) and positive affect and Facebook intensity ( $B = 1.74, p < .001$ ; Table 2.5, column 1). Facebook intensity was not associated with negative affect in the model. H1 is therefore rejected, as Facebook intensity was positively associated with most components of SWB contrary to my predictions that there would be negative associations between Facebook intensity and measures of SWB. The regressions for model 1 explained 5% of the variance in life satisfaction, 6% of the variance in eudaimonic well-being, 5% of the variance in positive affect, and 3% of the variance in negative affect.

### **Facebook social comparison valence (FBSC)**

The results revealed significant negative associations between Facebook social comparison valence (FBSC) and life satisfaction ( $B = -0.22, p < .001$ , Table 2.3, column 2),

eudaimonic well-being ( $B = -0.26, p < .001$ , Table 2.4, column 2) and positive affect ( $B = -0.21, p < .001$ ; Table 2.5, column 2), and a significant positive association between Facebook social comparison valence and negative affect ( $B = 0.13, p < .001$ ; Table 2.6, column 2), suggesting that respondents who compare themselves negatively to their friends on Facebook have lower SWB thus confirming hypothesis H2. Adding Facebook social comparison valence to model 2 significantly improved the fit of the model to the data compared to Model 1 for life satisfaction ( $F(1, 326) = 97.67, p < .001$ ), eudaimonic well-being ( $F(1, 326) = 107.06, p < .001$ ), positive affect ( $F(1, 326) = 84.59, p < .001$ ) and negative affect ( $F(1, 326) = 44.21, p < .001$ ) with the explained variance increasing to 24% of the variance in life satisfaction, 20% of the variance in eudaimonic well-being, 20% of the variance in positive affect, and 11% of the variance in negative affect.

### **RST personality traits**

Adding personality traits in model 3 significantly improved the fit of the model to the data compared to model 2 for all SWB variables (life satisfaction: ( $F(6, 320) = 8.93, p < .001$ ), eudaimonic well-being ( $F(6, 320) = 50.74, p < .001$ ), positive affect ( $F(6, 320) = 21.23, p < .001$ ), negative affect ( $F(6, 320) = 21.46, p < .001$ )). However, adding the personality and FBSC interactions in model 4 only improved the fit compared to model 3 for negative affect ( $F(6, 314) = 2.53, p < .05$ ). The final regression models explained 34% of the variance in life satisfaction, 58% of the variance in eudaimonic well-being, 42% of the variance in positive affect, and 37% of the variance in negative affect. I discuss the results for each personality trait below.

**Reward Interest.** Correlation results revealed a significant positive correlation between Reward Interest and Facebook intensity ( $r = .17, p < .01$ , Table 2.2), suggesting that

people high in Reward Interest are more likely to be intense Facebook users, thus supporting H3a.

Contrary to my predictions, there were no significant associations between Reward Interest and life satisfaction or negative affect; however, there were positive significant associations between Reward Interest and eudaimonic well-being ( $B = 0.54, p < .001$ , Table 2.4, column 3), and Reward Interest and positive affect ( $B = 0.55, p < .001$ , Table 2.5, column 3), thereby partially supporting H3b which predicted that Reward Interest would be positively associated with the components of SWB.

**Reward Reactivity.** Results revealed a significant positive correlation between Reward Reactivity and Facebook intensity ( $r = .37, p < .001$ , Table 2.2), thereby supporting hypothesis H4a. Contrary to my hypothesis (H4b) Reward Reactivity was not significantly associated with life satisfaction. However, Reward Reactivity was positively associated with eudaimonic well-being ( $B = 0.22, p < .05$ , Table 2.4, column 3) and positive affect ( $B = 0.35, p < .001$ , Table 2.5), column 3), and negatively associated with negative affect ( $B = -0.22, p < .01$ , Table 2.6, column 3), therefore partially supporting H4b.

**Impulsivity.** Results revealed a significant positive correlation between Impulsivity and Facebook intensity ( $r = .18, p < .01$ , Table 2.2), thus supporting H5a. The regression model did not find any evidence of a significant association between Impulsivity and life satisfaction or positive affect; however, there was a significant negative relationship between Impulsivity and eudaimonic well-being ( $B = -0.35, p < .01$ , Table 2.4, column 3) and a significant positive relationship with negative affect ( $B = 0.22, p < .05$ , Table 2.6, column 3). Therefore, H5b is partially supported, as Impulsivity is associated with lower eudaimonic well-being and higher negative affect, but shows no evidence of an association with life satisfaction or positive affect.

**Goal-Drive Persistence.** There was a significant positive correlation between Goal-Drive Persistence and Facebook intensity ( $r = .23, p < .001$ , Table 2.2), thus supporting H6a. In partial support of H6b, Goal-Drive Persistence shows positive associations with eudaimonic well-being ( $B = 1.22, p < .001$ , Table 2.4, column 3) and positive affect ( $B = 0.29, p < .01$ , Table 2.5, column 3), but was not associated with life satisfaction or negative affect in the models.

In the eudaimonic well-being model, there was a significant interaction between Goal-Drive Persistence and Facebook social comparison ( $B = 1.54, p < .01$ , Table 2.4, column 4), but the main effect of Facebook social comparison is no longer significant ( $B = -0.02, ns$ ). The positive Goal-Drive Persistence-FBSC interaction coefficient therefore suggests that for people high in Goal-Drive Persistence negative social comparison on Facebook can have a positive association with eudaimonic well-being.

**BIS.** Contrary to my predictions, BIS was not correlated with Facebook intensity; I therefore reject H7a. However, there was a significant positive correlation between BIS and Facebook social comparison ( $r = .47, p < .001$ , Table 2.2), thus confirming H7b which predicted that individuals who are high in BIS would be more likely to compare themselves negatively to their friends on Facebook. The regressions revealed significant negative relationships between BIS and life satisfaction ( $B = -0.15, p < .001$ , Table 2.3, column 3), eudaimonic well-being ( $B = -0.13, p < .001$ , Table 2.4, column 3), and positive affect ( $B = -0.12, p < .001$ , Table 2.5, column 3), and a positive relationship with negative affect ( $B = 0.27, p < .001$ , Table 2.6, column 3), thereby fully supporting H7c. The negative affect regressions revealed a significant interaction between BIS and Facebook social comparison ( $B = 1.07, p < .01$ , Table 2.6, column 4), but the main effect of Facebook social comparison is no longer significant ( $B = 0.002, ns$ ). The positive BIS-FBSC interaction



coefficient therefore suggests that for people high in BIS, negative social comparison on Facebook is associated with higher negative affect.

**FFFS.** Contrary to my predictions, FFFS was not associated with any of the components of SWB. Therefore, H7d is rejected.

### **Control variables**

The results also revealed some significant associations between SWB and the control variables. Results revealed a significant positive association between the university education dummy variable and life satisfaction ( $B = 2.22, p < .01$ , Table 2.3, column 4), indicating that respondents who had completed a university degree had higher life satisfaction than those who had not completed a degree. In this sample, females reported higher life satisfaction ( $B = -2.26, p < .01$ , Table 2.3, column 4) and higher eudaimonic well-being ( $B = -2.58, p < .05$ , Table 2.4, column 2) than males. There was also a significant negative association between life satisfaction and age ( $B = -0.47, p < .05$ , Table 2.3, column 4), suggesting that older respondents in this sample reported lower life satisfaction than younger respondents.

### **Summary of results**

In summary, the results of this study found that Facebook intensity was positively associated with life satisfaction, eudaimonic well-being and positive affect, and Facebook social comparison was negatively associated with all components of SWB (except for negative affect, which had a positive association with Facebook social comparison). Goal-Drive Persistence moderated the relationship between Facebook social comparison and eudaimonic well-being, and BIS moderated the relationship between Facebook social

comparison and negative affect. Therefore, I conclude that some personality traits moderate the association between Facebook social comparison and SWB.

Table 2.2 Zero-order Correlations for Study 2.1 Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Life satisfaction															
2. Eudaimonic well-being	0.50***														
3. Positive affect	0.45***	0.59***													
4. Negative affect	-0.30***	-0.32***	-0.20***												
5. University education or higher	0.16**	0.01	0.06	0.09											
6. Male	-0.08	-0.10	-0.05	0.01	0.08										
7. Age	-0.02	0.19***	0.14**	-0.14*	-0.15**	-0.15**									
8. Student	-0.01	-0.04	-0.02	0.17**	0.13*	0.09	-0.24***								
9. Facebook intensity	0.17**	0.20***	0.19***	-0.07	0.03	-0.12*	0.00	-0.04							
10. Facebook social comparison (valence)	-0.46***	-0.41***	-0.43***	0.31***	-0.02	-0.07	-0.09	0.10	-0.28***						
11. Reward Interest	0.37***	0.51***	0.53***	-0.12*	0.05	0.01	0.01	0.01	0.17**	-0.42***					
12. Reward Reactivity	0.24***	0.37***	0.40***	-0.03	-0.02	-0.14*	-0.15**	0.04	0.37***	-0.31***	0.50***				
13. Impulsivity	0.08	0.01	0.14*	0.15**	-0.06	-0.01	-0.14**	0.03	0.18**	-0.17**	0.46***	0.46***			
14. Goal-Drive Persistence	0.38***	0.69***	0.49***	-0.16**	0.14*	-0.06	0.01	0.10	0.23***	-0.40***	0.51***	0.45***	0.05		
15. BIS	-0.39***	-0.35***	-0.34***	0.56***	0.01	-0.13*	-0.30***	0.16**	-0.01	0.47***	-0.25***	0.15**	0.14**	-0.19***	
16. FFFS	-0.14*	0.01	-0.02	0.11*	-0.14*	-0.39***	0.07	-0.01	0.10	0.21***	-0.10	0.19***	0.05	0.01	0.38***

Note: \*p < .05, \*\*p < .01, \*\*\*p < 0.001. Student is a binary variable with 1 denoting student status. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree.

Table 2.3 Life Satisfaction OLS Regression Models

	Life satisfaction			
	Facebook use	Social comparison	Personality	Personality interactions
	(1)	(2)	(3)	(4)
University education or higher	2.67** (0.89)	2.40** (0.80)	2.05** (0.76)	2.22** (0.78)
Male	-1.07 (0.90)	-2.12** (0.81)	-2.40** (0.81)	-2.26** (0.82)
Age	-0.40 (0.26)	-0.27 (0.24)	-0.44 (0.23)	-0.47* (0.23)
Age <sup>2</sup>	0.005 (0.003)	0.003 (0.003)	0.004 (0.003)	0.005 (0.003)
Student	-1.08 (1.52)	0.16 (1.36)	-0.09 (1.29)	-0.56 (1.32)
Facebook intensity	1.34** (0.45)	0.19 (0.42)	0.21 (0.42)	0.19 (0.42)
Facebook social comparison (valence)		-0.22*** (0.02)	-0.10*** (0.03)	-0.10*** (0.03)
Reward Interest			0.19 (0.11)	0.18 (0.12)
Reward Reactivity			0.10 (0.09)	0.09 (0.10)
Impulsivity			-0.05 (0.10)	-0.05 (0.10)
Goal-Drive Persistence			0.20 (0.10)	0.18 (0.10)
BIS			-0.15*** (0.03)	-0.14*** (0.03)
FFFS			-0.02 (0.06)	-0.03 (0.06)
Reward Interest x FBSC				-0.30 (0.50)
Reward Reactivity x FBSC				-0.04 (0.54)
Impulsivity x FBSC				-0.07 (0.51)
Goal-Drive Persistence x FBSC				0.82 (0.51)
BIS x FBSC				-0.41 (0.45)
FFFS x FBSC				-0.12 (0.38)
Constant	23.50*** (5.37)	37.93*** (5.04)	35.09*** (5.79)	36.08*** (5.81)
Observations	334	334	334	334
R <sup>2</sup>	0.06	0.26	0.36	0.38
Adjusted R <sup>2</sup>	0.05	0.24	0.34	0.34
Residual Std. Error	7.85 (df = 327)	7.00 (df = 326)	6.54 (df = 320)	6.52 (df = 314)
F Statistic	3.77** (df = 6; 327)	16.17*** (df = 7; 326)	14.07*** (df = 13; 320)	10.09*** (df = 19; 314)

*Note:* \*p < .05, \*\*p < .01, \*\*\*p < 0.001. Regression table shows unstandardized regression coefficients with standard errors in parentheses. Student is a binary variable with 1 denoting student status. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. To compute interactions, z-scores were calculated for each personality trait and Facebook social comparison. These z-scores were then interacted and entered into the regression model. FBSC is an abbreviation for Facebook social comparison valence.

Table 2.4 Eudaimonic Well-being OLS Regression Models

	Eudaimonic well-being			
	Facebook use	Social comparison	Personality	Personality interactions
	(1)	(2)	(3)	(4)
University education or higher	0.86 (1.27)	0.54 (1.17)	-1.01 (0.87)	-0.72 (0.88)
Male	-1.33 (1.27)	-2.58* (1.19)	-1.06 (0.92)	-1.10 (0.93)
Age	0.11 (0.37)	0.26 (0.35)	0.03 (0.26)	0.02 (0.26)
Age <sup>2</sup>	0.001 (0.004)	-0.001 (0.004)	0.001 (0.003)	0.001 (0.003)
Student	0.61 (2.15)	2.09 (2.00)	-0.81 (1.47)	-0.69 (1.51)
Facebook intensity	2.28*** (0.64)	0.90 (0.62)	0.13 (0.47)	0.02 (0.48)
Facebook social comparison (valence)		-0.26*** (0.04)	-0.02 (0.03)	-0.02 (0.03)
Reward Interest			0.53*** (0.13)	0.54*** (0.13)
Reward Reactivity			0.23* (0.11)	0.21 (0.11)
Impulsivity			-0.34** (0.11)	-0.31 (0.42)
Goal-Drive Persistence			1.22*** (0.12)	1.20*** (0.12)
BIS			-0.13*** (0.04)	-0.13*** (0.04)
FFFS			0.10 (0.07)	0.10 (0.07)
Reward Interest x FBSC				-0.77 (0.57)
Reward Reactivity x FBSC				-0.42 (0.61)
Impulsivity x FBSC				-0.0001 (0.03)
Goal-Drive Persistence x FBSC				1.54** (0.57)
BIS x FBSC				0.51 (0.51)
FFFS x FBSC				-0.03 (0.43)
Constant	42.63*** (7.61)	59.82*** (7.41)	25.72*** (6.60)	26.27** (9.14)
Observations	334	334	334	334
R <sup>2</sup>	0.08	0.21	0.60	0.61
Adjusted R <sup>2</sup>	0.06	0.20	0.58	0.58
Residual Std. Error	11.12 (df = 327)	10.30 (df = 326)	7.46 (df = 320)	7.42 (df = 314)
F Statistic	4.72*** (df = 6; 327)	12.66*** (df = 7; 326)	36.17*** (df = 13; 320)	25.50*** (df = 19; 314)

*Note:* \*p < .05, \*\*p < .01, \*\*\*p < 0.001. Regression table shows unstandardized regression coefficients with standard errors in parentheses. Student is a binary variable with 1 denoting student status. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. To compute interactions, z-scores were calculated for each personality trait and Facebook social comparison. These z-scores were then interacted and entered into the regression model. FBSC is an abbreviation for Facebook social comparison valence.

Table 2.5 Positive Affect OLS Regression Models

	Positive affect			
	Facebook use	Social comparison	Personality	Personality interactions
	(1)	(2)	(3)	(4)
University education or higher	1.41 (0.98)	1.15 (0.90)	0.87 (0.79)	1.02 (0.80)
Male	-0.10 (0.98)	-1.11 (0.91)	-0.24 (0.83)	-0.37 (0.84)
Age	-0.05 (0.29)	0.08 (0.26)	0.04 (0.23)	0.07 (0.23)
Age <sup>2</sup>	0.002 (0.003)	0.0002 (0.003)	0.0004 (0.003)	0.0002 (0.003)
Student	0.26 (1.66)	1.45 (1.53)	0.47 (1.33)	1.01 (1.36)
Facebook intensity	1.74*** (0.49)	0.63 (0.47)	0.003 (0.43)	-0.08 (0.43)
Facebook social comparison (valence)		-0.21*** (0.03)	-0.05 (0.03)	-0.06 (0.03)
Reward Interest			0.55*** (0.12)	0.54*** (0.12)
Reward Reactivity			0.35*** (0.10)	0.35*** (0.10)
Impulsivity			-0.14 (0.10)	-0.11 (0.10)
Goal-Drive Persistence			0.29** (0.11)	0.30** (0.11)
BIS			-0.12*** (0.03)	-0.13*** (0.03)
FFFS			0.09 (0.06)	0.09 (0.07)
Reward Interest x FBSC				-0.81 (0.51)
Reward Reactivity x FBSC				-0.78 (0.55)
Impulsivity x FBSC				0.66 (0.53)
Goal-Drive Persistence x FBSC				0.98 (0.52)
BIS x FBSC				0.56 (0.46)
FFFS x FBSC				0.22 (0.39)
Constant	21.09*** (5.87)	34.91*** (5.67)	11.63 (5.96)	10.73 (5.98)
Observations	334	334	334	334
R <sup>2</sup>	0.06	0.21	0.44	0.45
Adjusted R <sup>2</sup>	0.05	0.20	0.41	0.42
Residual Std. Error	8.58 (df = 327)	7.88 (df = 326)	6.73 (df = 320)	6.71 (df = 314)
F Statistic	3.78** (df = 6; 327)	12.60*** (df = 7; 326)	19.02*** (df = 13; 320)	13.54*** (df = 19; 314)

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < 0.001$ . Regression table shows unstandardized regression coefficients with standard errors in parentheses. Student is a binary variable with 1 denoting student status. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. To compute interactions, z-scores were calculated for each personality trait and Facebook social comparison. These z-scores were then interacted and entered into the regression model. FBSC is an abbreviation for Facebook social comparison valence.

Table 2.6 Negative Affect OLS Regression Models

	Negative Affect			
	Facebook use	Social comparison	Personality	Personality interactions
	(1)	(2)	(3)	(4)
University education or higher	0.90 (0.80)	1.05 (0.77)	1.10 (0.67)	1.17 (0.68)
Male	-0.34 (0.81)	0.28 (0.78)	0.58 (0.71)	0.73 (0.71)
Age	-0.30 (0.24)	-0.37 (0.23)	-0.09 (0.20)	-0.06 (0.20)
Age <sup>2</sup>	0.003 (0.003)	0.004 (0.003)	0.002 (0.002)	0.001 (0.002)
Student	2.94* (1.36)	2.22 (1.31)	1.60 (1.14)	1.70 (1.15)
Facebook intensity	-0.47 (0.40)	0.21 (0.40)	-0.03 (0.37)	-0.09 (0.36)
Facebook social comparison (valence)		0.13*** (0.02)	0.02 (0.02)	0.002 (0.02)
Reward Interest			0.10 (0.10)	0.07 (0.10)
Reward Reactivity			-0.22** (0.08)	-0.21* (0.08)
Impulsivity			0.22* (0.09)	0.22* (0.09)
Goal-Drive Persistence			-0.01 (0.09)	0.003 (0.09)
BIS			0.27*** (0.03)	0.27*** (0.03)
FFFS			-0.08 (0.06)	-0.07 (0.06)
Reward Interest x FBSC				0.83 (0.44)
Reward Reactivity x FBSC				-0.43 (0.47)
Impulsivity x FBSC				0.52 (0.45)
Goal-Drive Persistence x FBSC				-0.33 (0.44)
BIS x FBSC				1.07** (0.39)
FFFS x FBSC				0.14 (0.33)
Constant	22.17*** (4.81)	13.72** (4.85)	2.09 (5.10)	1.65 (5.06)
Observations	334	334	334	334
R <sup>2</sup>	0.05	0.13	0.38	0.40
Adjusted R <sup>2</sup>	0.03	0.11	0.35	0.37
Residual Std. Error	7.04 (df = 327)	6.73 (df = 326)	5.76 (df = 320)	5.68 (df = 314)
F Statistic	2.71* (df = 6; 327)	7.04*** (df = 7; 326)	14.81*** (df = 13; 320)	11.22*** (df = 19; 314)

*Note:* \*p < .05, \*\*p < .01, \*\*\*p < 0.001. Regression table shows unstandardized regression coefficients with standard errors in parentheses. Student is a binary variable with 1 denoting student status. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. To compute interactions, z-scores were calculated for each personality trait and Facebook social comparison. These z-scores were then interacted and entered into the regression model. FBSC is an abbreviation for Facebook social comparison vale

## Discussion

The aim of this study was to examine whether the association between Facebook social comparison and SWB is moderated by users' personality traits. I further investigated how Facebook use and Facebook social comparison were associated with SWB, and how RST personality traits were related to SWB and Facebook use.

The results revealed that Goal-Drive Persistence moderated the relationship between Facebook social comparison and eudaimonic well-being, and that BIS moderated the relationship between Facebook social comparison and negative affect. The relationship between Facebook social comparison, eudaimonic well-being, and Goal-Drive Persistence is especially interesting, as it suggests that people who are high in Goal-Drive Persistence and who compare themselves negatively on Facebook have higher eudaimonic well-being. While this may sound counter-intuitive, research has demonstrated a link between social comparison and motivation for self-improvement (Mumm & Mutlu, 2011; Taylor & Lobel, 1989). As such, it is possible that for people high in Goal-Drive Persistence, negative social comparison on Facebook acts as a source of motivation for improvement. In contrast, the moderation relationship between Facebook social comparison, negative affect and BIS is unsurprising. It suggests that Facebook users who are high in BIS and compare themselves in a negative light on Facebook are more susceptible to higher negative affect. This fits well with previous research, which found that rumination mediated the relationship between negative Facebook social comparison and depressive symptoms (Feinstein et al., 2013), and users who are high in BIS are likely to be prone to anxious rumination (Corr, 2008). Research has also found that high negative affect contributes to the development of depressive symptoms (Tortella-Feliu, Balle, & Sesé, 2010). This may suggest that users high in BIS have a larger risk of developing depressive symptoms from comparing themselves negatively on Facebook, as



users who are high in BIS are more likely to ruminate over these social comparisons, thus lowering their negative affect.

Results revealed that high Facebook intensity was associated with higher life satisfaction, eudaimonic well-being and positive affect. While contrary to my predictions, this finding confirms previous findings for life satisfaction (Ellison et al., 2007; Grieve et al., 2013; Oh et al., 2014; Valenzuela et al., 2009). To my knowledge, this study is the first study to investigate Facebook use and eudaimonic well-being directly in a non-student population, as the few previous studies which have investigated Facebook use and eudaimonic well-being have investigated eudaimonic well-being through social support (Liu & Yu, 2013) or in relation to problematic Facebook use (Satici & Uysal, 2015). This finding is not in line with previous research on affect, which found that Facebook use was associated with lower affect (Sagioglou & Greitemeyer, 2014). However, Sagioglou and Greitemeyer combined positive and negative affect to create an overall ‘mood measure’, and measured Facebook use as self-estimated time spent on the site as opposed to Facebook intensity, which may account for the difference in results.

There was also a significant negative association between Facebook social comparison and life satisfaction, eudaimonic well-being, and positive affect, and a positive association between Facebook social comparison and negative affect. The coefficient for Facebook social comparison was significant in three out of the four models for life satisfaction, however it was only significant in the second model (which was the model where the variable was introduced) for the remaining components of SWB. This may suggest that life satisfaction is particularly susceptible to social comparison behaviour.

## **Personality and subjective well-being**

The personality model revealed some interesting relationships between the components of SWB and RST-PQ personality traits. As the RST-PQ is a newly developed scale (2016), to my knowledge, no research to date has investigated how RST-PQ traits are associated with the different components of SWB. I was surprised to see that none of the BAS traits were associated with life satisfaction, as BAS is thought to be the underlying driver of Extraversion which is frequently linked to higher life satisfaction (Depue & Collins, 1999; Lucas & Baird, 2004). This may suggest that BAS and Extraversion are not as closely related as previously thought, or that one or more of the concepts which is measured by Extraversion is not reflected in RST BAS traits. The results suggests that RST BAS traits do not influence life satisfaction, which both contradicts (Harnett et al., 2013) and confirms (Desjardins, Zelenski, & Coplan, 2008) previous studies on unidimensional BAS and life satisfaction. As there are very few studies investigating RST and cognitive measures of SWB (to my knowledge), further work is needed to establish whether BAS traits influence life satisfaction.

In contrast, RST personality traits were strong predictors of eudaimonic well-being (as observed by the increase in  $R^2$  at the introduction of RST-PQ to the regression models). Respondents who were high in Reward Interest, Reward Reactivity and Goal-Drive Persistence reported higher eudaimonic well-being, while respondents high in Impulsivity and BIS reported lower eudaimonic well-being. While most of these results confirm previous findings on unidimensional BAS and BIS (Harnett et al., 2013), the negative relationship between RST Impulsivity and eudaimonic well-being (to my knowledge) is novel. RST Impulsivity was also positively associated with negative affect. These result may be explained by previous studies on impulsivity in general, which have linked impulsive behaviours to health problems (Bogg & Roberts, 2004), financial deficit (Angeletos et al.,

2001) and procrastination (Steel, 2007), which may be more likely to impact meaning and purpose in life and day to day moods (such as negative affect) than cognitive judgements about life satisfaction.

The remainder of personality results were in line with my expectations. In corroboration with previous research on BIS and Neuroticism (DeNeve & Cooper, 1998; Harnett et al., 2013; McCrae & Costa, 1991), respondents high in BIS reported lower SWB (all components). Positive and negative affect were also related to several RST traits, which is to be expected, as RST was originally conceptualized as sensitivity to reward and punishment (Gray, 1970), which have been shown to affect positive and negative affect in daily life (Hundt et al., 2013).

### **Personality and Facebook use**

The positive correlations found between Facebook intensity, Reward Interest, Reward Reactivity and Impulsivity were in line with my hypotheses and concur with findings from previous research on the FFM personality traits and frequency of Facebook use for individuals high in Openness to Experience, Extraversion, and low in Conscientiousness (Andreassen, Torsheim, Brunborg, & Pallesen, 2012; Caci et al., 2014; Correa et al., 2010; Ryan & Xenos, 2011). Research has found that people on both sides of the Extraversion scale demonstrate elevated Facebook use; as those high in Extraversion use Facebook for social enhancement, while those low in Extraversion use Facebook for social compensation (Kuss & Griffiths, 2011). A previous study established a link between people who score low on Conscientiousness and heightened Facebook use, and suggested that people with low Conscientiousness spend time on Facebook as a way of procrastinating (Wilson, Fornasier, & White, 2010). In regards to specific personality traits, the results found that Facebook intensity and time spent on Facebook was positively correlated with Reward Interest and

Reward Reactivity. Individuals high in Reward Interest may spend more time on Facebook to seek out new friends and social groups. Individuals who are high in Reward Reactivity may use Facebook to seek rewarding feedback from their peers, and may be especially sensitive to “likes” and comments. In this case, using Facebook intensively may be rewarding for those who are high in Reward Interest and Reward Reactivity by helping these individuals to gain social capital (Steinfeld, Ellison, & Lampe, 2008), social support (Nabi et al., 2013) and maintain friendships which would be otherwise geographically difficult (Burke & Kraut, 2014). Past research which has found negative associations between Facebook use and correlates of SWB usually focus on topics such as envy (Krasnova et al., 2013) and social comparison (Steers et al., 2014). Therefore, intensive Facebook use may be able to contribute to the SWB of individuals who are high in Reward Interest and/or Reward Reactivity as long as they do not frequently compare their lives to the lives of their friends in a negative way. In this study, Impulsivity was positively correlated with Facebook intensity. Individuals high in Impulsivity may use Facebook to alleviate boredom or as a form of procrastination. However, individuals high in Impulsivity should be cautious of the amount of time they spend using Facebook in this manner, as Facebook use as a method of procrastination has been linked to declines in academic success (Kirschner & Karpinski, 2010). This relationship may also be relevant to individuals who are not students, but have access to Facebook at work.

I also found a positive correlation between Facebook intensity and Goal-Drive Persistence. Individuals high in Goal-Drive Persistence may benefit from social rewards by using Facebook intensively, as research on Goal-Drive Persistence has found that the trait is related to the motivation for social exchange (Krupić, Gračanin, & Corr, 2016). Facebook creates many opportunities to exchange social resources, which may be of interest to those high in Goal-Drive Persistence. As highlighted by the results of this study, individuals who

are high in Goal-Drive Persistence may also benefit in terms of SWB by using Facebook social comparison as a source of motivation. However, such individuals should be cautious of how frequently they employ this method, as research has suggested that frequent social comparison negatively impacts SWB by inducing negative emotions such as guilt, envy, defensiveness and regret (White et al., 2006).

Contrary to my predictions, BIS was not associated with using Facebook intensively. While this conflicts with previous studies, the differences in findings may stem from how Facebook was measured in this study as opposed to previous research. Studies which found a relationship between Neuroticism and Facebook use measured Facebook as time spent on the site and frequency of log-ins (Caci et al., 2014; Correa et al., 2010). The results may demonstrate that individuals who spend a lot of time on Facebook are not necessarily using it intensively. This study also found a significant positive correlation between BIS and negative social comparison on Facebook, suggesting that those high in BIS are more likely to compare themselves to their Facebook friends in a negative way. As mentioned above, individuals who are high in BIS are prone to rumination (Corr, 2008). Given the relationship discussed above between rumination, social comparison on Facebook and depressive symptoms (Feinstein et al., 2013), these individuals should try to be mindful of how frequently they compare themselves to others when using Facebook. Individuals who are high in BIS should also keep in mind that people present an idealized version of themselves on the site, volunteering information which casts themselves in a socially desirable light (Chou & Edge, 2012). The posts of Facebook friends are not usually a good representation of their day-to-day life, and are often instead, a highlight reel of their celebrations and successes.

### **Limitations and directions for future work**

This research is cross-sectional and correlational in nature and as such, does not allow causal inferences. Experimental manipulation is needed to establish if the relationships

between Facebook use, Facebook social comparison and SWB found in this study are causal in nature. It is possible that the positive correlations found between personality traits and Facebook use in this study may mean that people with those traits are simply more likely to use Facebook more intensively, or it is possible that to some extent, causality runs both ways, and future studies should address these issues. Although the respondents for this study were paid (either monetary or with personality results), they volunteered to take part in the study and therefore, the sample may therefore suffer from self-selection bias. Also, the respondents for this study were all drawn from a western sample (USA and UK), and results therefore may not generalize to other cultures. Future research could include a more cross-cultural sample to verify whether these results are specific to individualistic-analytic cultures or whether they also apply to collectivistic-holistic cultures.

Due to the absence of literature on Facebook use and RST of personality, this study compared FFM personality traits to RST personality traits to create theory driven hypotheses. Some of these hypotheses were rejected, demonstrating the potential differences between the two personality models. Future studies on Facebook use and personality could investigate the RST of personality in greater detail.

The Facebook intensity measure used in this study was unidimensional, thus distilling all types of Facebook use down to a single variable. Measuring Facebook use in this way may not be ideal, as there are several activities which users can participate in when using Facebook, and two users who both spend an hour a day on the site may have completely different experiences. Therefore, future studies investigating Facebook use and SWB should use or develop a multi-dimensional Facebook intensity measure to reflect different types of Facebook use. Additionally, users may not all engage with Facebook in the same way. Literature on Facebook use and SWB suggests that users who access Facebook to gain social capital or social connectedness may experience different impacts to their SWB than users

who browse Facebook without participating (Burke et al., 2010; Verduyn et al., 2015). Therefore, future research should also consider how users are interacting with the site by measuring Facebook engagement level. Finally, this study assessed whether Facebook users compared themselves positively or negatively in comparison to their Facebook friends, but did not assess how frequently these comparisons take place. Future research on how Facebook social comparison is related to SWB should investigate how frequently these comparisons take place in addition to how users compare themselves to others.

### **Chapter summary**

The results of this study find that Goal-Drive Persistence moderates the relationship between Facebook social comparison and eudaimonic well-being, and BIS moderates the relationship between Facebook social comparison and negative affect. It also investigates the relationship between Facebook intensity and SWB, showing that Facebook use is associated with all three components of SWB, and explores the relationships between Facebook use and RST personality, demonstrating that individual differences may affect the way users interact with Facebook. This study relates to the research question as it demonstrates that individual differences in personality can moderate the relationship between Facebook behaviours (such as social comparison) and SWB. However, due to the correlational nature of the research, the direction of causality cannot be established. As a limitation of this chapter was that I was unable to account for how users were engaging with Facebook, in the next chapter I will develop and validate a scale to measure active and passive Facebook use to allow for the measurement of individual differences in Facebook engagement style.

# Chapter 3. Development and validation of the Passive Active Use Measure



## **Introduction**

While chapter 2 revealed some preliminary relationships between Facebook use, personality, social comparison, and subjective well-being (SWB), to gain a better understanding of how individual differences in Facebook use are associated with these variables, more sensitive measures of Facebook use than the unidimensional Facebook intensity scale are required. As discussed in chapter 2, Facebook consists of many activities, and two users who both spend an hour on the site a day may engage with Facebook in completely different ways. Previous research has implied that a users' level of engagement with Facebook matters, as a past study found that users who interact socially on Facebook build social capital, while users who consume large amounts of content report reduced social capital and increased loneliness (Burke et al., 2010). Additionally, an experimental study found that for users who consume, but do not create content, increased time on Facebook leads to declines in affective well-being over time (Verduyn et al., 2015). This level of engagement, where users consume, but do not create content is known as 'passive use' or 'lurking' (Brandtzæg, 2012; Burke & Kraut, 2011). The opposite level of engagement, where users create content and interact with others on the site, would therefore be 'active use'. While previous studies have measured these levels of engagement in various ways, to the best of my knowledge, there is currently no validated scale designed for differentiating passive and active Facebook use. Therefore, to improve the measurement Facebook use throughout the remainder of the thesis, the purpose of this chapter was to design and validate a brief questionnaire to measure passive and active Facebook use. Developing a passive and active Facebook use measure will allow the research in the remainder of the thesis to account for both intensity and engagement style when investigating individual differences in Facebook use and how they relate to SWB and social comparison processes.

## **Facebook engagement**

In its original form, Facebook was mainly a social activity. However, as Facebook became more popular it began to offer a wider range of activities such as online games and the newsfeed. These ‘passive use’ activities do not involve the same level of social connection as the original activities (such as posting on a friend’s wall or writing a Facebook status). Recent studies have found that passive use is positively associated with envy on Facebook (Krasnova et al., 2013; measured passive use with a scale evaluated with EFA, but not validated further), and negatively associated with affective well-being (Sagioglou & Greitemeyer, 2014; Verduyn et al., 2015; both studies measured passive use experimentally). Furthermore, a recent study on life satisfaction and Facebook feature use found that the use of some features, such as looking through others’ photos, or tagging photos (‘passive’ activities), were negatively associated with life satisfaction (Vigil & Wu, 2015). While much of the research into passive use finds negative associations with SWB (or SWB correlates), a few studies suggest that passive use can be beneficial in specific situations. A previous study found that respondents who engaged in passive use on a Weight Watchers Facebook page received informational and emotional support by browsing the page (Ballantine & Stephenson, 2011). Another study found that passively using one’s own Facebook profile page can have a positive impact on emotional well-being, as scrolling through old posts and pictures had a self-soothing effect on respondents (Good et al., 2013). Therefore, passive use is defined as any activity where the user consumes, but does not create content.

In this thesis, active use is defined as a pattern of Facebook activity where users are actively engaged with the site, creating content and communicating with friends. There is evidence that this type of usage is associated with increased SWB, as a number of SWB indicators have been linked to using Facebook to increase social capital (Ellison et al., 2007), establish social connectedness (Grieve et al., 2013), and call on friends for support (Liu &

Yu, 2013). In previous studies, directly interacting with others on Facebook and using the status update feature frequently (both ‘active’ activities) have been associated with reduced loneliness (Burke et al., 2010; Deters & Mehl, 2013). It is therefore important to distinguish between passive and active use when measuring Facebook use.

### **Previous measures of passive and active use**

In previous studies, passive use has been measured in various ways: (a) through experimental manipulation of Facebook activity (Sagioglou & Greitemeyer, 2014; Verduyn et al., 2015), (b) through access to server logs from Facebook (Burke et al., 2010), or (c) by using subscales which measure feature use from other Facebook measures (Krasnova et al., 2013; Shaw et al., 2015). Measuring passive use experimentally can be expensive and time consuming. It also potentially creates inaccurate results, as the people who are being asked to use Facebook passively for a certain amount of time may not use it passively in the real world (and similarly for active users). Alternatively, while subscales from other measures may reflect passive and active use, there is a need for a standardised measure which has been designed and validated to measure these concepts.

### **Study 3.1 Development of the Passive Active Use Measure**

The aim of study 3.1 was to adapt the Facebook activity questionnaire (Junco, 2012) into a multi-scale measure reflecting active and passive Facebook engagement that could be used for quantitative analysis. The results of the exploratory factor analysis were then subjected to replication with new samples in studies 3.2 and 3.3, and further tested for test-retest reliability in study 3.3.

## Methods

**Sample.** Two hundred and thirty-four respondents (84 males, 150 females,  $M_{\text{age}} = 33.80$ ,  $SD = 9.31$ ) were recruited online through Amazon Mechanical Turk (MTurk) over a three-day period during June 2016. Respondents were American residents and were paid \$3 for participation. They accessed the study through a link to a survey website where they gave informed consent and completed a questionnaire that contained measures for multiple studies. The age in this sample ranged from 21 to 67 years old, with most respondents reporting full-time or part-time employment (193 employed, 22 unemployed, 1 maternity leave, 3 students, 8 retired, and 7 “other”). A little less than half of the sample (107 respondents) had obtained a university degree (90 had bachelor’s degrees, 16 had master’s degrees and 1 had a professional/doctoral degree).

**Measures.** To create a measure for passive and active Facebook use I adapted the Facebook activity questionnaire developed by Junco (2012). The Facebook activity questionnaire (FAQ) includes 14 questions which identify which activities Facebook users engage in when visiting the site. The questionnaire asks respondents to determine how frequently they use each feature on a scale of 1 to 5, with (1) representing “Never (0% of the time)” and (5) representing “Very frequently (close to 100% of the time)”. In the original study, each item is regarded as a separate variable and is not scored in any way to create composite scales for quantitative analysis (Junco, 2012). However, many of the questionnaire’s items capture the essence of active use (such as “Commenting”) and passive use (such as “Viewing photos”). The frequency of feature use can be used to imply style of engagement, as active users will be more likely to use features which demonstrate social engagement (such as leaving comments or communicating with friends on Facebook chat) and/or leave traceable evidence of site interaction (such as clicking ‘like’ or tagging photos). In contrast, passive users will be more likely to use features which are socially disengaged

(such as looking through friends' profiles or scrolling through the newsfeed) and are less likely to use features which leave traceable evidence of interaction with the site (e.g., likes, comments). I therefore used the Facebook activity measure as a base for creating composite scales to assess passive and active use, adding new items which directly pertain to active and passive use, and removing items which were no longer relevant. The resulting Passive and Active Use Measure (PAUM) retains the format of the Facebook activity questionnaire and asks respondents "How frequently do you perform the following activities when you are on Facebook?". Answer categories are presented on a 5-point scale, ranging from (1) "Never" (0% of the time) to (5) "Very frequently" (close to 100% of the time). While the PAUM retains most of the items from the Facebook activity questionnaire, I dropped one item and added three additional items to better reflect passive and active Facebook use. These are described below (See Table 3.2 for a full list of items included in the analysis).

As Facebook frequently updates its features, sometimes features which used to be separate become merged. This is the case with Facebook chat and Facebook private messenger. Originally, Facebook chat was an instant messaging type service where one could chat with friends who were online, and Facebook private messenger was similar to email. However, as Facebook has merged these two features, two items from the Facebook activity questionnaire, "Sending private messages" and "Chatting on Facebook chat" have become synonymous. As such, I dropped "Sending private messages" from the PAUM as all messages now go through Facebook chat.

Prior research on Facebook has identified that Facebook use can be broken down into two broad categories: passive social browsing and extractive social searching (Wise, Alhabash, & Park, 2010). Wise and colleagues defined passive social browsing as "seeking general information about friends in a collective manner (i.e., newsfeed page)" (2010, p. 556). As none of the items in the FAQ represent passive social browsing specifically through

the newsfeed, and the use of the newsfeed is mentioned frequently in the literature (Deters & Mehl, 2013; Fox & Moreland, 2015; Tandoc, Ferrucci, & Duffy, 2015), I added items which represent passive social browsing through the newsfeed. As the newsfeed is a feature that can be used both actively and passively, I felt that two items were needed to reflect the use of the newsfeed, and I therefore consulted the literature to create these items. As previous studies have directly explained passive and active usage to respondents (Verduyn et al., 2015), I created an item for active newsfeed use, “Browsing the newsfeed actively (liking and commenting on posts, pictures and updates)”, and an item for passive newsfeed use, “Browsing the newsfeed passively (without liking or commenting on anything)” based on the prompts given to respondents in Verduyn et al.'s study (2015). Wise and colleagues defined extractive social searching as a type of use where “users seek direct interaction with their Facebook friends by acquiring specific information about them (i.e., visiting a friend's profile page) and communicating with them (i.e., writing on a friend's wall)” (2010, p. 556). While some types of extractive social searching were already represented in the Facebook activity scale, the act of directly visiting a friend's profile page was not represented. The FAQ included an item about looking at friends' lives, “Checking to see what someone is up to”; however, I felt that this statement could include viewing friends on the newsfeed as opposed to viewing a friend's Facebook profile page. Therefore, I added “Looking through my friends' profiles” which specifically represents extractive social searching. Information on subscales, validity and reliability are included in the results section.

As part of the validation process, I also included the SWB variables used and described in Chapter 2 (Appendix E, Appendix F, Appendix G), and a recently developed Facebook intensity measure (Orosz, Tóth-Király, & Bőthe, 2015, see Appendix L). The multi-dimensional Facebook intensity scale (MFIS) measures an individual's level of involvement with Facebook in day-to-day life (i.e., “I feel bad if I don't check my Facebook

daily”), as well as their motivations for use (i.e., “When I’m bored, I often go to Facebook”). It can be used as a unidimensional measure to assess general Facebook intensity, or broken down into subscales to measure four types of Facebook intensity: Persistence, Boredom, Overuse, and Self-expression. For the purposes of scale validation, I used the MFIS as a unidimensional measure of general Facebook intensity to demonstrate that the concept of Facebook intensity differed from the concept of Facebook engagement. The measure is anchored on a 7-point Likert scale with responses ranging from (1) strongly disagree to (7) strongly agree. This response format deviates from the original structure of the MFIS, which was on a scale of 1 (strongly disagree) to 5 (strongly agree) due to a coding error. See Table 3.1 for descriptive statistics and reliability for all measures used for validation.

Table 3.1 Descriptive Statistics of Variables Used for Validation

Statistic	Mean	St. Dev.	Min	Max	Sample $\alpha$
Life satisfaction	22.7	8.0	5	35	.95
Eudaimonic well-being	56.1	10.7	20	83	.87
Positive affect	29.8	9.5	10	50	.94
Negative affect	12.2	4.5	10	40	.91
Facebook intensity	44.2	14.3	12	84	.89

Note: N = 234

**Data quality.** To ensure that the respondents were reading the questions and answering honestly, a variety of quality checks were added to the questionnaire. The questionnaire included two attention checks such as “Please select ‘slightly disagree’ for this question” which were integrated into matrix-style questions. Respondents who answered these questions incorrectly were disqualified and were not allowed to complete the questionnaire (twenty-six respondents failed the first attention check, and seven failed the second attention check). Additionally, the survey was designed to disqualify respondents who answered matrix style questions by selecting the same choice for every item in the

questionnaire (for example, choosing “Disagree” for all 20 items in the PANAS scale), however, no respondents chose the same choice for every item in matrix style questions in this sample. The survey prevented respondents who had previously attempted to take the questionnaire from trying again if they had been disqualified. Additionally, twenty-three respondents finished the questionnaires in less than half the time expected, and were therefore removed from the final sample.

**Data analysis.** The data were analysed with R statistical software (R Core Team, 2015) using the psych (Revelle, 2016) and lavaan (Rosseel, 2012) packages. The PAUM uses frequency of feature use as an indicator of engagement style, however, it cannot directly measure how engaged an individual is while using Facebook. As the purpose of the PAUM is to measure Facebook engagement style (a latent construct which can be inferred through measuring Facebook activities), the most appropriate method of analysis is exploratory factor analysis (EFA). I therefore ran maximum likelihood EFA with two, three and four-factor solutions. As I anticipated that the factors would be correlated, I chose to use an oblique rotation method. I first tested the models with an oblimin rotation. Many items cross-loaded on multiple factors. Previous research on rotations has recommended that when factor indicators have strong loadings on multiple factors, a geomin rotation should be used (Browne, 2001). Therefore, I retested the factor structure with the two, three and four-factor solutions with a geomin rotation.

To establish convergent and discriminant validity, I ran Pearson’s correlations between the factors of the PAUM, Facebook intensity, and the SWB measures. The correlations were conducted using the psych package (Revelle, 2016).



## Results

**Exploratory factor analysis.** The results indicate a fair model fit for the two-factor solution,  $\chi^2=249.85$ ,  $df(89)$ ,  $p < .001$ , RMSR = .06. However, the item loadings for the two-factor solution did not accurately reflect passive and active use as some “active” items loaded onto the second factor which mainly reflected passive use, and the RMSR was just above the accepted range (RMSR/SRMR demonstrates good fit if the value is .05 or less). The three-factor solution demonstrated an improved model fit,  $\chi^2 = 157.35$ ,  $df(75)$ ,  $p < .001$ , RMSR = .04, and the item loadings fit the concepts of passive and active use better. The four-factor solution improved the model fit marginally,  $\chi^2 = 112.15$ ,  $df(62)$ ,  $p < .001$ , RMSR = .03. However, only item 6 (“Checking to see what someone is up to”) strongly loaded onto the fourth factor.

I therefore determined that the PAUM consists of three factors. The first factor contains items reflecting active use of a social nature such as “Commenting” and “Chatting on Facebook chat”, and I therefore named the first factor ‘Active social’. The second factor consists of items reflecting active use of a non-social nature such as “Posting videos” and “Tagging photos” where the user is creating content, but not directly interacting with others. Therefore, I named the second factor ‘Active non-social’. The third factor consists of items reflecting passive use such as “Viewing photos” and “Checking to see what someone is up to”. I therefore named the third factor ‘Passive’ (See Table 3.2).

The factor loading for item 1 (“Playing games”) was below the .30 benchmark in the 3-factor solution, and therefore item 1 was removed from the scale and further analyses. Additionally, I removed items 3 and 13, as they cross-loaded closely onto two factors (the cut-off for removing items which cross-loaded was a difference of less than or equal to .05). Once items 1, 3 and 13 were removed, the fit of the three-factor solution improved slightly,

$\chi^2 = 107.69$ ,  $df(42)$ ,  $p < .001$ ,  $RMSR = .04$ . See Table 3.2 for factor loadings, eigenvalues and variances. The final version of the PAUM scales can be found in Appendix M.

Table 3.2 Factor Loadings for the Passive and Active Use Measure

Item	Active social	Active non-social	Passive
1. <i>Playing games (Farmville, MafiaWars, etc.)</i>			
2. Posting status updates	<b>.83</b>		
3. <i>Sharing links</i>	.35	.34	
4. Commenting (on statuses, wall posts, pictures, etc)	<b>.76</b>		
5. Chatting on FB chat	<b>.34</b>		
6. Checking to see what someone is up to	.36		<b>.43</b>
7. Creating or RSVPing to events		<b>.35</b>	
8. Posting photos	<b>.52</b>		
9. Tagging photos		<b>.70</b>	
10. Viewing photos			<b>.83</b>
11. Posting videos	.36	<b>.53</b>	
12. Tagging videos		<b>.87</b>	
13. <i>Viewing videos</i>		.36	.41
14. Browsing the newsfeed passively (without liking or commenting on anything)			<b>.62</b>
15. Browsing the newsfeed actively (liking and commenting on posts, pictures and updates)	<b>.43</b>		
16. Looking through my friends' profiles			<b>.47</b>
Eigenvalue	2.3	2.3	1.7
Variance	17%	16%	12%

*Note:* Bold indicates to which factor an item belongs. Italics denote item removal. Factor loadings are only displayed if loading was above the .30 benchmark. Eigenvalues and variances do not include removed items. The cut-off for removing items which cross-loaded was a difference of less than or equal to .05.

**Internal reliability and correlation between factors.** Cronbach's alphas for all three factors demonstrated adequate internal reliability. The Active social subscale had an alpha of .80, the Active non-social subscale had an alpha of .78 and the Passive use subscale had an alpha of .70.

The factors of the PAUM were distinct, but correlated. The two active factors: *Active social use* and *Active non-social use* were strongly correlated ( $r = .62$ ,  $p < .001$ ), which demonstrates the similarity of the concepts, as would be expected from two measures of active engagement. The *Passive use* factor was moderately correlated with both the *Active*

*social use* factor ( $r=.52$ ,  $p < .001$ ) and the *Active non-social use* factor ( $r=.37$ ,  $p < .001$ ).

Some correlation is to be expected as all the factors are measuring engagement on Facebook, however, the moderate correlations demonstrate that the factors are measuring separate, but related constructs.

**Discriminant and convergent validity.** I employed four SWB measures to establish discriminant validity, and a Facebook Intensity measure to establish convergent validity.

Discriminant validity is used to show that measures which should not theoretically be related are not highly correlated, while convergent validity shows that measures which should be theoretically related are correlated. Weak correlations are represented by  $r$  values between 0 and .39, moderate correlations are represented by  $r$  values between .40 and .59, strong correlations are represented by  $r$  values between .60 and .79, and very strong correlations are represented by  $r$  values between .80 and 1.0 (Evans, 1996). The PAUM scales have weak correlations with the SWB measures, demonstrating that the scales are measuring different concepts, and thus the PAUM scales display good discriminant validity (Table 3.3). In contrast, the PAUM scales are moderately to strongly correlated with the Facebook intensity measure, demonstrating that the PAUM scales also have good convergent validity, as Facebook intensity and Facebook engagement should theoretically be correlated (Table 3.3). The correlations between the two active use scales and life satisfaction are especially interesting, as previous studies have shown positive associations between Facebook use and life satisfaction when Facebook is being used to accrue social capital (Ellison et al., 2007; Oh et al., 2014).

Table 3.3 Correlations of the Passive Active Use Measure with Other Scales, Study 3.1

	Active social	Active non-social	Passive
<b><u>Discriminant validity</u></b>			
Life satisfaction	0.16*	0.27***	-0.01
Eudaimonic well-being	0.16*	0.05	0.07
Positive affect	0.33***	0.34***	0.21**
Negative affect	0.08	0.05	0.09
<b><u>Convergent validity</u></b>			
Facebook intensity	0.64***	0.53***	0.42***

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

## Discussion

The purpose of study 3.1 was to create a multi-item measure which reflected active and passive Facebook engagement. I adapted the Facebook Activity Questionnaire (Junco, 2012) for this purpose and conducted an EFA to explore the factors of the new measure. The results revealed that the Passive Active Use Measure (PAUM) consists of 13 items which load onto three factors: *Active social*, *Active non-social*, and *Passive* use. The factors of the PAUM demonstrated acceptable internal reliability, good discriminant validity and good convergent validity.

The items for *Active social* use describe a type of Facebook engagement which is both active (creating content) and social in nature (communicating with friends). In contrast, the items for *Passive use* show a type of engagement which is both passive and non-social. The existence of the third factor, *Active non-social use*, was unexpected, and identifies a type of Facebook engagement which is somewhere between the traditional definitions of active and passive use. The items for *Active non-social* use describe a level of Facebook engagement where the user creates content, but is not communicating directly with friends. It is likely that *Active non-social* use was either grouped with passive use in previous research due to its non-

social nature, or active use due to the creation of content, and thus may have been overlooked as its own level of engagement.

While most of the items for each factor are similar to each other, there was one discrepancy which warrants further investigation. “Posting pictures” and “Posting videos” are similar in nature, and thus I would expect these activities to load onto the same factor. However, “Posting pictures” loads onto the *Active social* factor, while “Posting videos” loads onto the *Active non-social* factor. It is possible this discrepancy stems from the content of the media being posted. For example, users may be posting pictures of themselves or friends, which would be social in nature since they would be sharing pictures to update their Facebook friends about their lives. However, sharing videos found on YouTube or the newsfeed may not contain the same personal information, and thus would still be considered active use, but would lack the social element gained from posting personal information to update friends. I investigate these differences further in study 3.3.

### **Study 3.2 Validation of the Passive Active Use Measure**

The aim of study 3.2 was to replicate the factor structure of the scales found in study 3.1 using the final version of the PAUM.

#### **Methods**

**Sample.** Three hundred respondents (172 males, 128 females,  $M_{\text{age}} = 34.30$ ,  $SD = 9.87$ ) were recruited online through MTurk over a 2-day period during October 2016. Respondents were US residents, and accessed the study through a link to a survey website where they gave informed consent and were paid \$1.45 for participating in a 10-minute survey. The age in the sample ranged from 19 to 71 years old, with most respondents reporting full-time or part-time employment (253 employed, 22 unemployed, 2 maternity

leave, 2 students, 14 retired, and 9 “other”). Less than half of the sample (140 respondents) had obtained a university degree (115 had bachelor’s degrees, 16 had master’s degrees and 9 had a professional/doctoral degree).

**Measures.** Respondents completed the PAUM and the same SWB measures included in study 3.1. To further validate the PAUM against a personality scale, FFM personality was measured using the Mini-IPIP scale (Donnellan, Oswald, Baird, & Lucas, 2006). The 20-item scale measures Extraversion, Agreeableness, Conscientiousness, Neuroticism and Intellect/Imagination. Respondents were asked how accurately each statement described them and responded on a scale from (1) not accurate at all to (5) extremely accurate. See Table 3.4 for descriptive statistics and internal reliability for all measures. The same data quality parameters from study 3.1 were used in study 3.2.

Table 3.4 Descriptive Statistics and Internal Reliability for Study 3.2

Statistic	Mean	St. Dev.	Min	Max	Sample $\alpha$
<b>Subjective well-being</b>					
Life satisfaction	21.8	8.2	5	35	.94
Eudaimonic well-being	55.8	11.3	20	84	.89
Positive affect	28.2	8.6	11	50	.91
Negative affect	11.8	3.9	10	42	.92
<b>Mini-IPIP</b>					
Extraversion	10.6	4.2	4	20	.86
Agreeableness	15.1	3.4	4	20	.84
Conscientiousness	14.9	3.4	4	20	.78
Neuroticism	9.7	3.7	4	20	.78
Intellect	16.3	3.3	4	20	.77
<b>PAUM</b>					
Active social	13.7	3.7	5	23	.78
Active non-social	7.3	2.4	4	16	.72
Passive	13.5	2.9	5	20	.72

Note: N=300,  $\alpha$  = Cronbach’s alpha.

**Data analysis.** The data were analysed with maximum likelihood confirmatory factor analysis using R statistical software (R Core Team, 2015) and the lavaan package (Rosseel, 2012). Prior to analysis, I tested the three factors of the PAUM for normality. The Active social and Passive factors were both normally distributed, however, the Active non-social factor was not (skewness = 5.07, kurtosis = 1.69). For the CFA, I therefore applied a Satorra-Bentler scaled chi-square to better approximate chi-square under non-normality. To further test for discriminant validity, I ran Pearson's correlations between the factors of the PAUM, SWB and the Mini-IPIP traits. Correlations were conducted using the psych package (Revelle, 2016).

## Results

**Confirmatory factor analysis.** The results of the confirmatory factor analysis revealed an adequate model fit, thus confirming the structure found in sample 3.1,  $\chi^2=201.07$ ,  $df(74)$ ,  $p < .001$ , scaling correction factor for MLR: 1.22, RMSEA=.08, CFI=.89, SRMR=.06.

**Internal reliability and correlation between factors.** Cronbach's alphas demonstrated adequate internal reliability for study 3.2 (see Table 3.4). I found similar correlations for the factors of the PAUM in study 3.2 as I did in study 3.1: Active use and Active non-social use were strongly correlated ( $r=.62$ ,  $p < .001$ ), and Passive use was moderately correlated with both Active non-social use ( $r=.35$ ,  $p < .001$ ), and Active social use ( $r=.45$ ,  $p < .001$ ).

**Discriminant validity.** To test for discriminant validity, I ran Pearson's correlations with the SWB measures and the Mini-IPIP personality measure to verify that different scales were measuring unique concepts. Despite some significant correlations, the PAUM

demonstrated good evidence of measuring distinct constructs from the other scales (correlations under .40 are weak correlations). See Table 3.5.

Table 3.5 Correlations of the Passive Active Use Measure with Other Scales, Study 3.2

	Active social	Active non-social	Passive
<b>Subjective well-being</b>			
Life satisfaction	0.16**	0.23***	-0.04
Eudaimonic well-being	0.09	0.17**	0.04
Positive Affect	0.32***	0.33***	0.28***
Negative Affect	0.07	0.03	0.07
<b>Mini-IPIP</b>			
Extraversion	0.22***	0.32***	0.05
Conscientiousness	0.05	0.10	-0.01
Intellect/Imagination	0.07	0.01	0.11
Neuroticism	0.08	-0.04	0.10
Agreeableness	0.16**	0.08	0.13*

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

## Discussion

The aim of study 3.2 was to confirm the factor structure and reliability for the PAUM scales. The results of the CFA confirmed the factor structure found in study 3.1. The factors of the PAUM demonstrated acceptable internal reliability, and good discriminant validity against the SWB measures and the Mini-IPIP scales.

### Study 3.3 Further validation of the Passive Active Use Measure

The aim of study 3.3 was to further replicate the factor structure of the scales found in studies 3.1 and 3.2 using the final version of the PAUM, and to establish test re-test reliability for the scales. I further investigated the difference between posting photos and posting videos to establish why the two similar items loaded on separate factors. Data were collected in two waves. The data from the first wave were used to retest the factor structure found in studies



3.1 and 3.2, and investigate the differences between posting videos and posting photos. The data from wave two were used to investigate the test-retest reliability for the scales.

## Methods

**Sample, wave one.** Two-hundred and forty-five respondents (106 males, 139 females,  $M_{\text{age}}=35.43$ ,  $SD=11.93$ ) who used Facebook were recruited online through Prolific Academic over a 2-day period during April 2017. Respondents were United Kingdom and United States residents, and accessed the study through a link to a survey website where they gave informed consent and were paid £2 for participating in a 15-minute survey (US residents were also paid in £'s, which was converted into \$'s when they were paid by Prolific Academic). The age in the sample ranged from 19 to 68 years old, with most respondents reporting full-time or part-time employment (176 employed, 22 unemployed, 2 maternity leave, 2 sick leave, 6 retired, 34 students, and 3 “other”). Over half of the sample (152 respondents) had obtained a university degree (114 had bachelor's degrees, 28 had master's degrees and 10 had a professional/doctoral degree).

**Sample, wave two.** Two weeks after the initial survey, respondents from the first wave were asked to return to complete a 2-minute follow-up survey, for which they were paid an additional £0.50. One-hundred and sixty-six respondents (74 males, 92 females,  $M_{\text{age}}=36.27$ ,  $SD=12.10$ ) returned to complete the follow-up survey (68% of wave 1 sample). The age in the returning sample ranged from 19 to 68, with most respondents reporting full-time or part-time employment (127 employed, 12 unemployed, 1 maternity leave, 2 sick leave, 2 retired, 19 students, and 3 “other”). Over half of the sample (101 respondents) had obtained a university degree (81 had bachelor's degrees, 14 had master's degrees and 6 had a professional/doctoral degree).

**Measures.** Respondents from wave one completed the PAUM and the SWB measures included in studies 3.1 and 3.2, and the Facebook intensity measure included in study 3.1. To investigate the differences between posting photos and posting videos found in study 3.1, respondents from the first wave answered questions about the content of the photos and videos they post on Facebook. Respondents who indicated that they posted photos on Facebook were asked if the photos they posted were most frequently photos they had taken themselves, photos of them which had been taken by someone they knew, or pictures they had found online such as memes or cute/funny animal pictures. They were also asked to indicate what percentage of the photos they posted on Facebook were original content versus photos they found online and shared. These questions were repeated for videos if the respondent indicated they also post videos on Facebook.

To assess test retest reliability, returning respondents for the second wave were asked to complete the PAUM scales for a second time. The same data quality parameters from studies 3.1 and 3.2 were used in both waves for study 3.3. See Table 3.6 for descriptive statistics and internal reliability for all measures.

Table 3.6 Descriptive Statistics and Internal Reliability for Study 3.3

Statistic	Wave 1					Wave 2				
	Mean	St. Dev.	Min	Max	Study $\alpha$	Mean	St. Dev.	Min	Max	Study $\alpha$
<b>Subjective Well-being</b>										
Life satisfaction	20.6	7.2	5	35	.91					
Eudaimonic well-being	53.8	9.9	24	77	.86					
Positive affect	27.2	7.7	11	49	.89	27.2	7.7	11	47	.89
Negative affect	12.9	4.9	10	34	.91	13.4	5.7	10	40	.92
<b>PAUM</b>										
Active social	13.0	3.6	5	25	.75	13.2	3.5	5	24	.73
Active non-social	7.1	2.9	4	20	.81	7.1	2.6	4	16	.78
Passive	12.6	2.8	4	20	.69	13.4	2.6	7	20	.65

Note: Wave 1 N= 245, Wave 2 N= 175

**Data analysis.** The data from the first wave were analysed with maximum likelihood confirmatory factor analysis using R statistical software (R Core Team, 2015) and the lavaan package (Rosseel, 2012). Prior to analysis, I tested the three factors of the PAUM for normality. The Active social and Passive factors were both normally distributed, however, the Active non-social factor was not (skewness = 1.15, kurtosis = 1.67). For the CFA, I therefore applied a Satorra-Bentler scaled chi-square to better approximate chi-square under non-normality. To assess discriminant validity, I ran Pearson's correlations between the factors of the PAUM, the SWB measures, and the Facebook intensity measure. To assess test-retest reliability, the PAUM factors from both waves were analysed with intraclass correlation coefficients. Although Pearson's correlations are often used to assess test re-test reliability, research into psychometrics has demonstrated that intraclass correlation coefficients are a more robust measure of reliability (Koo & Li, 2016; Streiner & Norman, 2008). Intraclass correlation coefficients and their 95% confidence intervals were calculated using the irr package (Gamer, Lemon, & Singh, 2012) based on a mean-rating (k=2), absolute-agreement, 2-way mixed effects model. A two-way mixed effects model with absolute agreement was chosen based on the recommendations of Koo and Li's guidelines for selecting calculation methods for intraclass correlation coefficients used for test re-test reliability (2016). Two-way mixed effects are appropriate as repeated measurements are not considered to be a randomised sample (Koo & Li, 2016).

## **Results**

**Confirmatory factor analysis.** The results of the confirmatory factor analysis revealed an adequate model fit, thus re-confirming the structure found in samples 3.1 and 3.2,  $\chi^2=164.97$ ,  $df(62)$ ,  $p < .001$ , scaling correction factor for MLR: 1.19, RMSEA=.08, CFI=.90, SRMR=.06.

**Internal reliability, correlation, discriminant and convergent validity.** Cronbach's alphas demonstrated adequate internal reliability for study 3.3 (see Table 3.6). I found similar correlations for the factors of the PAUM in study 3.3 as I did in studies 3.1 and 3.2: Active use and Active non-social use were strongly correlated ( $r=.67, p < .001$ ), and Passive use was moderately correlated with both Active non-social use ( $r=.42, p < .001$ ), and Active social use ( $r=.48, p < .001$ ). To test for discriminant validity, I ran Pearson's correlations with the SWB measures to verify that different scales were measuring unique concepts. Despite some significant correlations, the PAUM demonstrated good evidence of measuring distinct constructs (r values under .40 demonstrate weak correlations). See Table 3.7. To test for convergent validity, I ran Pearson's correlations with the Facebook intensity scale. The PAUM scales are moderately to strongly correlated with the Facebook intensity measure (r values from .40 to .59 represent moderate correlation, r values from .60 to .79 represent strong correlation), which shows that the PAUM scales have good convergent validity, as Facebook intensity and Facebook engagement should theoretically be correlated (Table 3.7).

Table 3.7 Correlations of the Passive Active Use Measure with Other Scales, Study 3.3

	Active social	Active non-social	Passive
<b>Discriminant validity</b>			
Life Satisfaction	0.09	0.08	-0.01
Eudaimonic well-being	0.10	0.04	-0.09
Positive Affect	0.29***	0.23***	0.16*
Negative Affect	0.09	0.20**	0.14*
<b>Convergent validity</b>			
Facebook intensity	0.65***	0.57***	0.48***

Note: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

**Difference between posting photos and videos.** Results showed differences between the content/source of photos and videos posted by respondents to their Facebook pages. Out

of the two-hundred and forty-five respondents, two-hundred and six indicated that they post photos at least “Rarely (25%)” and one-hundred and eighteen indicated that they post videos at least “Rarely (25%)”. These respondents were asked to indicate if the pictures/videos they posted most frequently were original content or found online. Respondents were also asked to indicate what percentage of their posted media was original versus found online. See Table 3.8 and Table 3.9 below for results.

Table 3.8 Most Frequently Posted Pictures and Videos

<b>When you post pictures/videos on Facebook, are they most frequently...</b>	Pictures	Videos
Pictures/Videos I have taken myself	147	50
Pictures/Videos of me taken by friends/family/people I know	24	5
Pictures/Videos I found online	35	63

*Note:* Pictures N=206, Videos N=118

Table 3.9 Percentage of Pictures/Videos Created Versus Found Online

	N	%
<b>Out of 100%, what percentage of the photos you post on Facebook are:</b>		
Pictures taken by me or someone I know	206	73%
Pictures I found online and “shared” (memes, cute/funny animals, etc.)	206	27%
<b>Out of 100%, what percentage of the videos you post on Facebook are:</b>		
Videos recorded by me or someone I know	118	44%
Videos I found online and “shared” (YouTube, news clips, funny animals, etc.)	118	56%

**Test re-test reliability.** To examine test retest reliability, I ran two-way mixed effects intraclass correlation coefficients on the PAUM factors from wave one and wave two. The guidelines for acceptable intraclass correlation coefficients for test retest reliability suggest

that intraclass correlation coefficient values under 0.5 represent poor reliability, values between .05 and .75 represent moderate reliability, values between .75 and .90 represent good reliability and values over .90 represent excellent reliability. Using these guidelines, the factors of the PAUM demonstrated moderate to good test re-test reliability. See Table 3.10 for results.

Table 3.10 Test Retest Reliability Coefficients for the Factors of the PAUM

PAUM factor	Intraclass correlation coefficient	95% confidence intervals	
		Lower bound	Upper bound
Active social	.77	.69	.82
Active non-social	.66	.56	.73
Passive	.64	.52	.73

## Discussion

The aim of study 3.3 was to re-confirm the factor structure found in studies 3.1 and 3.2, and to establish test retest reliability for the PAUM scales. The results of the CFA confirmed the factor structure found in previous studies. The factors of the PAUM demonstrated acceptable internal reliability, good discriminant and convergent validity, and acceptable test retest reliability.

Study 3.3 also explored whether there are differences posting pictures versus videos, as these items loaded onto different factors in study 3.1. Respondents in study 3.3 most frequently posted pictures taken by themselves or friends, but posted videos found online. This difference may explain why “Posting pictures” loads onto the *Active social* factor while “Posting videos” loads onto *Active non-social* factor, as pictures created by the user or the users’ friends are likely to contain more personal content than videos found online.

## General discussion

In this chapter, I developed and validated three scales to measure passive and active forms of Facebook use. Both EFA and CFA confirmed that the 13-item Passive Active Use Measure (PAUM) loads onto three factors: *Active social*, *Active non-social*, and *Passive use*, all of which demonstrated adequate internal reliability. The PAUM scales demonstrated good discriminant and convergent validity, and acceptable test-retest reliability.

## Limitations and future work

I was unable to test concurrent validity as, to my knowledge, there are no other validated scales which have been designed to measure active and passive Facebook use. Additionally, although the respondents in these studies were compensated, the samples may suffer from self-selection bias, as respondents volunteered to participate.

The test retest reliability coefficients for the PAUM were in the acceptable range, but were moderate-to-good as opposed to excellent. It is possible that Facebook engagement levels are more fluid than stable, and that users change their engagement style depending on other factors such as how much time they have to spend on the site or where they are checking Facebook (phone vs computer, work vs home). Facebook engagement level may fluctuate, explaining the moderate test retest reliability coefficients. Future research should investigate whether Facebook engagement styles are stable or change based on other factors.

In this chapter I interpret the Active social and Active non-social factors of the PAUM based on the type of content individuals create while using Facebook. While this is one interpretation of the factors, there are other interpretations. For example, the items included in the Active social factor are basic functions of Facebook (such as posting statuses and writing comments), while the items in the Active non-social factor require a more in-depth understanding of the functionality of the site (such as sharing videos and tagging photos). It is

therefore possible that the factors could also be interpreted as ‘Basic Facebook use’ and ‘Complex Facebook use’.

These scales were validated using Western samples (US/UK), and thus may yield different results in other cultures. Future work should seek to validate these scales on non-Western samples. These scales may also need to be updated in the future to maintain their accuracy. As Facebook changes and updates its features, the scales may become inaccurate and will need to be revised to keep up to date with how users are engaging with Facebook.

### **Chapter summary**

In conclusion, it is important to account for passive and active use when conducting research on Facebook usage and SWB. While measures such as Facebook intensity and access frequency are adequate general measures of use, it is more informative to consider how users are spending time on the site as the type of use may be associated with either positive or negative emotions. Additionally, individual differences in how users engage with Facebook may affect how Facebook use is associated with SWB. Thus, I have developed the passive active use measure as a valid, reliable, and concise means for measuring Facebook engagement. In the next chapter, I will investigate how individual differences in personality are associated with differences in Facebook engagement style, and will further investigate how individual differences in Facebook use are associated with SWB.



# Chapter 4. Different types of Facebook use and their relationship to RST personality traits and subjective well-being

## **Introduction**

Having now developed and validated a way to measure Facebook engagement style, I can now conduct a more thorough investigation of the nuanced relationship between Facebook use, personality, and subjective well-being (SWB). The purpose of this chapter is to establish whether personality traits are associated with different styles of Facebook engagement (active versus passive use), and to investigate how different types of Facebook engagement and intensity are associated with the components of SWB.

### **Study 4.1 Relationships between Facebook engagement style and RST personality traits**

The first study in this chapter investigates whether certain personality traits are associated with Facebook engagement level. Although, to the best of my knowledge, no research to date has investigated how active and passive use relate to personality traits, there is evidence that personality influences how users engage with Facebook. Studies on Facebook use and the Five-Factor Model (FFM) of personality have found that individual differences in personality influenced whether individuals favoured certain site activities, such as uploading photos, posting personal information, or joining groups (Amichai-Hamburger & Vinitzky, 2010; Ross et al., 2009). As feature use can reflect active or passive use, I believe that there will also be individual differences in how users engage with Facebook. There is already indirect evidence of this relationship, as personality has been found to influence how often users comment on other's posts, click "like", and share content (Lee, Ahn, & Kim, 2014; Seidman, 2013). In continuity with chapter 2, I use the Reinforcement Sensitivity Theory of personality (RST) to explore the relationships between Facebook engagement style and personality traits. As active use has been previously linked to positive correlates of SWB (Ellison et al., 2007; Grieve et al., 2013), and passive use has been linked to negative correlates of SWB (Krasnova et al., 2013; Verduyn et al., 2015), it is important to understand

if individual differences in personality play a role in how users engage with Facebook.

While this study is exploratory in nature, previous research suggests that there are certain associations which can be expected for some variables. As Reward Interest is associated with the pursuit of novelty, and individuals who are high in Reward Interest are motivated to seek out new relationships, places and activities, I would expect individuals high in Reward Interest to use Facebook actively, as engaging with others on the site may lead to new friendships. As friendships can be developed both by writing content and by responding to others' posts, I expect to see that Reward Interest is associated with both active social and active non-social use.

**H1.** Reward Interest will be positively associated with both types of active use.

Reward Reactivity is associated with the exhilaration of victory or the pleasure of obtaining rewards; individuals high in Reward Reactivity are likely sensitive to praise, thus I would expect these individuals to use Facebook in an active social way, as creating content on Facebook may lead to friends "liking" their posts.

**H2.** Reward Reactivity will be positively associated with Active social use.

Goal-Drive Persistence is related to focus, restraint and goal-planning, and is responsible for the drive to establish goals and sub-goals. While previous research found that a similar trait, FFM Conscientiousness, was correlated with spending less time on social networking sites (Caci et al., 2014; Ryan & Xenos, 2011), in chapter 2, I found a positive correlation between Goal-Drive Persistence and Facebook Intensity. Posting Facebook statuses gives users the ability to broadcast their goals and goal progress to their friends. Therefore, I expect to see a positive association between Goal-Drive Persistence and active social use.

**H3.** Goal-Drive Persistence will be positively associated with Active social use.

Impulsivity measures an individuals' inclination to disinhibited and unplanned behaviour. Impulsivity can be advantageous when caution and planning are no longer appropriate and the reward needs to be seized quickly. I predict that individuals who are high in Impulsivity will be active non-social Facebook users, as they may impulsively "like" posts and "share" links with Facebook friends.

**H4.** Impulsivity will be positively associated with Active non-social use.

The FFFS is activated by threatening stimuli, such as predators or rivals, and elicits avoidance or escape behaviours. As the motive of the FFFS is to remove the individual from threatening situations, it is theoretically unlikely to be related to Facebook engagement. However, in chapter 2, there was a positive correlation between FFFS and Facebook social comparison. Previous literature speculates that Passive Facebook use may be associated with social comparison behaviour (Verduyn et al., 2017). Therefore, if there is a relationship between FFFS and Facebook engagement, I would expect individuals high in FFFS to be passive users.

**H5.** FFFS will be positively associated with passive use.

The BIS is activated when there are conflicts within or between systems, and is responsible for assessing risk and resolving conflicts. The BIS contributes to anxious behaviour, and is associated with passive avoidance and increased arousal (Corr, 2008; Corr et al., 2013). As the BIS is theorised to be an underlying component of the FFM personality trait Neuroticism (Corr et al., 2013), and a previous study found a positive correlation between Neuroticism and passive Facebook use (Ryan & Xenos, 2011), I predict that individuals who are high in BIS will use Facebook passively.

**H6.** BIS will be positively associated with passive use.

## Methods

**Sample.** To explore the associations between the factors of the Passive Active Use Measure (PAUM) and RST traits, I combined the samples from studies 3.2 and 3.3, resulting in a sample of 544 respondents (278 males, 266 females,  $M_{\text{age}}=34.82$ ,  $SD=10.85$ ). The age in the sample ranged from 19 to 71 years old, with most respondents reporting full-time or part-time employment (428 employed, 42 unemployed, 4 maternity leave, 2 sick leave, 8 retired, 48 students, and 12 “other”). Over half of the sample (291 respondents) had obtained a university degree (228 had bachelor’s degrees, 44 had master’s degrees and 19 had a professional/doctoral degree). Most of the sample were US residents (371 US residents, 173 UK residents).

**Measures.** Personality was measured with a shortened version of the Reinforcement Sensitivity Theory of Personality Questionnaire (see Appendix K for development and validation of the short RST-PQ). The 16-item questionnaire measures the three major systems of RST: the behavioural inhibition system (BIS), the fight-flight-freeze system (FFFS) and the four behavioural approach system (BAS) factors: Reward Interest, Reward Reactivity, Impulsivity and Goal-Drive Persistence. Respondents were instructed to assess how accurately each statement described them on a scale from (1) not at all to (4) highly. The factors have adequate internal reliability for a short scale (Table 4.1).

Level of Facebook engagement was assessed with the 13-item Passive Active Use Measure (PAUM) developed in chapter 3 (Appendix M). See Table 4.1 for descriptive statistics and reliability.

I also included a variety of control variables including gender, age, education level, and country of residence (Table 4.1). To control for potential differences in types of

Facebook engagement between the samples, I also included a dummy variable denoting the data collection in which respondents completed the questionnaire, with 0 indicating respondents participated in the October 2016 data collection, and 1 indicating respondents completed the April 2017 questionnaire.

Table 4.1 Descriptive Statistics and Internal Reliability for Study 4.1 Variables

Variable	Mean	St. Dev.	Min	Max	$\alpha$
<b>PAUM factors</b>					
Active social	13.4	3.7	5	25	.77
Active non-social	7.2	2.6	4	20	.77
Passive	13.1	2.9	4	20	.71
<b>RST personality traits</b>					
Reward Interest	4.9	1.5	2	8	.75
Reward Reactivity	5.9	1.4	2	8	.61
Goal-Drive Persistence	5.5	1.6	2	8	.70
Impulsivity	3.8	1.5	2	8	.66
BIS	9.4	2.9	4	16	.68
FFFS	10.0	2.8	4	16	.57
<b>Controls</b>					
Age	34.8	10.8	19	71	
Male	0.5	0.5	0	1	
University education or higher	0.5	0.5	0	1	

*Note:* N= 544.  $\alpha$ = Cronbach's alpha for study sample. University education or higher is a binary variable with 1 denoting that the respondent has obtained at least a university degree.

**Data analysis.** To analyse the data, I first ran zero-order correlations on the factors of the PAUM and RST traits. I then ran OLS regressions in R using the factors of the PAUM as dependent variables to see if RST traits were associated with different types of Facebook engagement.

## Results

Zero-order correlations for all variables are in Table 4.2. The regression models revealed several relationships between the factors of the PAUM and RST personality traits.

**Active social.** The Active social use regressions showed a significant positive association between Active social Facebook use and two BAS factors, Reward Interest ( $B = 0.44, p < .001$ ; Table 4.3, column 1) and Reward Reactivity ( $B = 0.35, p < .01$ ; Table 4.3, column 1).

**Active non-social.** The Active non-social use regressions revealed significant positive associations between Active non-social Facebook use and three BAS factors, Reward Interest ( $B = 0.20, p < .05$ ; Table 4.3, column 2), Goal-Drive Persistence ( $B = 0.22, p < .01$ ; Table 4.3, column 2) and Impulsivity ( $B = 0.23, p < .01$ ; Table 4.3, column 2).

**Passive.** The Passive use regressions revealed significant positive associations between Passive Facebook use and two BAS factors, Reward Interest ( $B = 0.23, p < .05$ ; Table 4.3, column 3) and Reward Reactivity ( $B = 0.25, p < .05$ ; Table 4.3, column 3). Passive use was also associated positively with both BIS ( $B = 0.14, p < .01$ ; Table 4.3, column 3) and FFFS ( $B = 0.13, p < .01$ ; Table 4.3, column 3).

**Control variables.** In this sample, women were more likely to be Active social users ( $B = -0.70, p < .05$ ; Table 4.3, column 1). Respondents from the October 2016 data collection reported more Active social use ( $B = -1.54, p < .01$ ; Table 4.3, column 1), Active non-social use ( $B = -0.78, p < .05$ ; Table 4.3, column 2), and Passive use ( $B = -1.17, p < .01$ ; Table 4.3, column 3), which suggests that they may be heavier Facebook users than respondents from the April 2017 data collection.

Table 4.2 Zero-order Correlations for PAUM Factors and RST Personality Traits

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Active social													
2. Active non-social	0.64***												
3. Passive	0.47***	0.39***											
4. Male	-0.10*	0.05	-0.03										
5. Age	-0.09*	-0.15***	-0.06	-0.10*									
6. US residents	0.02	-0.02	0.09*	0.16***	-0.10*								
7. April 2017	-0.11*	-0.04	-0.15***	-0.14**	0.05	-0.76***							
8. University education or higher	-0.03	0.06	-0.05	0.04	-0.02	-0.18***	0.15***						
9. Reward Interest	0.25***	0.25***	0.15***	0.05	-0.11*	0.09*	-0.11*	0.07					
10. Reward Reactivity	0.23***	0.14**	0.20***	-0.17***	-0.08	-0.11*	0.09*	-0.05	0.24***				
11. Goal-Drive Persistence	0.17***	0.21***	0.10*	0.08	-0.05	0.09*	-0.11**	0.06	0.47***	0.30***			
12. Impulsivity	0.13**	0.21***	0.07	0.10*	-0.11*	-0.17***	0.17***	0.06	0.38***	0.16***	0.08		
13. BIS	0.04	0.02	0.14**	-0.13**	-0.11*	-0.22***	0.24***	-0.08*	-0.21***	0.18***	-0.25***	0.10*	
14. FFFS	0.10*	-0.03	0.20***	-0.37***	0.00	-0.03	-0.01	-0.05	-0.09*	0.28***	-0.10*	0.00	0.40***

Note: \*p < .05, \*\*p < .01, \*\*\*p < 0.001. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the October 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.



Table 4.3 PAUM and RST OLS Regression Models

	Dependent variables: PAUM factors		
	Active social use (1)	Active non-social use (2)	Passive use (3)
Male	-0.70* (0.33)	0.05 (0.24)	0.13 (0.27)
Age	0.13 (0.09)	-0.02 (0.06)	0.05 (0.07)
Age squared	-0.002 (0.001)	-0.0001 (0.001)	-0.001 (0.001)
US residents	-0.98 (0.50)	-0.68 (0.36)	-0.20 (0.40)
April 2017	-1.54** (0.47)	-0.78* (0.33)	-1.17** (0.38)
University education or higher	-0.20 (0.31)	0.19 (0.22)	-0.10 (0.25)
Reward Interest	0.44*** (0.12)	0.20* (0.09)	0.23* (0.10)
Reward Reactivity	0.35** (0.12)	0.08 (0.09)	0.25* (0.10)
Goal-Drive Persistence	0.10 (0.11)	0.22** (0.08)	0.06 (0.09)
Impulsivity	0.12 (0.11)	0.23** (0.08)	0.03 (0.09)
BIS	0.06 (0.06)	0.07 (0.04)	0.14** (0.05)
FFFS	0.02 (0.06)	-0.04 (0.05)	0.13** (0.05)
Constant	7.13*** (2.13)	4.85** (1.52)	7.32*** (1.71)
Observations	544	544	544
R <sup>2</sup>	0.13	0.12	0.12
Adjusted R <sup>2</sup>	0.11	0.10	0.10
Residual Std. Error (df = 531)	3.46	2.46	2.77
F Statistic (df = 12; 531)	6.87***	6.12***	6.01***

*Note:* \*p < .05, \*\*p < .01, \*\*\*p < 0.001. Regression table shows unstandardized regression coefficients with standard errors in parentheses. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the October 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.

## Discussion

The regression results revealed several interesting relationships. Contrary to my predictions that Reward Interest would be only associated with active use, Reward Interest displayed positive associations with all three PAUM factors. Similarly, Reward Reactivity was associated with both Active social use and Passive use. It is possible that Reward Reactivity and Reward Interest may be associated with multiple types of Facebook engagement as users who are high in these traits access Facebook frequently, and therefore use all engagement patterns. As Reward Reactivity and Reward Interest are subscales of the BAS (theorised to be the underlying factor of FFM Extraversion; Depue & Collins, 1999; Lucas & Baird, 2004), these findings may be corroborated by past studies on FFM

personality and Facebook use, which found that high Extraversion was associated with frequent access and intense use of the site (Caci et al., 2014; Correa et al., 2010).

In line with my predictions, users high in Impulsivity were more likely to be active non-social users. This may reflect the amount of time users high in Impulsivity spend on the site, as it is possible that users who are impulsive are checking Facebook for brief periods of time, but at a high frequency, thereby spending a short time browsing the newsfeed in an active yet non-social way (i.e., RSVPing to events, tagging photos), but not creating any content which would be time consuming such as status updates or comments. Goal-Drive Persistence was also positively associated with Active non-social use, contrary to my predictions that those high in the trait would be Active social users. Previous research on Facebook use and personality has found that people high in FFM Conscientiousness (which shares many traits with Goal-Drive Persistence including restraint and goal-planning) spend less time on Facebook and are more likely to use the site to gain news and information (Caci et al., 2014; Ryan & Xenos, 2011). This may mean that users high in Goal-Drive Persistence are accessing Facebook as a source of news and information, as opposed to a place to maintain friendships, build social capital or broadcast their goals. These users may be spending a shorter amount of time on the site and “liking” informational articles and news updates from friends, thus explaining their active, yet non-social use.

In line with my predictions, BIS was associated with Passive Facebook use. I also found an unpredicted relationship between FFFS and Passive use. These results support prior research which has found a positive association between individuals high in FFM Neuroticism (BIS and FFFS are thought to be the underlying factors of Neuroticism; Corr et al., 2013) and passive use (Ryan & Xenos, 2011). This finding is especially interesting, as previous research has linked FFFS to social anxiety (Kambouropoulos, Egan, O’Connor, &

Staiger, 2014). These results therefore may indicate that users who are socially anxious are more likely to use Facebook passively.

Although the associations between personality and Facebook engagement are significant, the effect sizes in this study are small. These findings suggest that while personality does play a small role in how users interact with Facebook, there are other variables which may have more of an impact on how individuals engage with the site. These results, however, are in line with previous studies on personality and Facebook use, which typically find small effect sizes for the significant relationships between FFM personality traits and aspects of Facebook use (Amichai-Hamburger & Vinitzky, 2010; Caci et al., 2014; Correa et al., 2010; Lee et al., 2014; Marshall et al., 2015; Skues, Williams, & Wise, 2012). In conclusion, this study highlights how individual differences in personality can influence how users engage with Facebook.

#### **Study 4.2 Facebook use and SWB: Associations with differing levels of engagement and intensity**

Having established that individual differences in personality are associated with how users engage with Facebook, I now investigate whether differences in Facebook use are associated with SWB. The second study in this chapter investigates how differing types of Facebook engagement and intensity are associated with life satisfaction, eudaimonic well-being, and positive and negative affect. In previous research, Facebook use is typically assessed with measures such as self-estimates of how much time users spend on the site, frequency of log-ins, or the unidimensional Facebook intensity scale used in chapter 2 (for examples see: Burke & Kraut, 2011; Ellison, Steinfield, & Lampe, 2007; Song et al., 2014). While these measures may reveal some aspect of users' Facebook habits, they cannot give a comprehensive, nuanced view of Facebook use, as time spent on the site is typically not

constrained to a single activity, but consists of several activities nested under the umbrella of “Facebook use”. Thus, two users who both spend one hour per day on the site may be involved in completely different activities and use different styles of engagement, therefore resulting in different impacts on their SWB. As demonstrated in chapter 1, there is disagreement in the literature about the relationships between Facebook use and SWB. The research in chapter 3 and study 4.1 suggests that some of these contradictory results may stem from not accounting for different types of Facebook engagement. However, as there are differences in engagement styles, there may also be differences in how users are attached to Facebook and how Facebook is integrated into users’ day-to-day lives (Facebook intensity). Therefore, these contradictions may also stem from measuring Facebook intensity as a unidimensional concept. To address these issues, study 4.2 conducts an in-depth investigation of the associations between the three components of SWB and Facebook use by accounting for engagement style and using a multi-dimensional Facebook intensity scale. This is an improvement on the analysis in Chapter 2 which did not account for Facebook engagement style and used a unidimensional Facebook intensity measure.

Intensity of Facebook use was first conceptualised by Ellison and colleagues (2007): it represents an individual’s attachment to Facebook, as well as how integrated the site has become into their daily lives. Like most Facebook use measures, the original Facebook intensity scale is unidimensional. In contrast, the multi-dimensional Facebook intensity scale includes four dimensions of attachment and integration: Persistence, Boredom, Overuse, and Self-expression (Orosz et al., 2015). Persistence assesses to what extent the user has fully integrated Facebook use into their daily life. Users who score high in Persistence may check Facebook upon waking up in the morning, and again before bed, and are likely to be ‘always connected’ to the site. Boredom describes to what extent users access Facebook to alleviate boredom. Users who score high in Boredom will access Facebook to pass time; however,

they may spend relatively little time on the site otherwise. Overuse reflects excessive Facebook use. Users who score high in Overuse may find themselves logging onto Facebook at inconvenient times, at the expense of other responsibilities, or may feel as if they spend more time on the site than they would like to. Self-expression reflects users who use Facebook to express their ideas, opinions and individual style. Users scoring high in Self-expression are likely to have highly detailed Facebook profiles, and may spend time picking the perfect profile picture or cover photo to represent how they see themselves. I employ the multi-dimensional Facebook intensity scale in this study to account for different types of Facebook intensity.

While this study is largely exploratory, previous research suggests that certain associations can be expected for some variables. In regards to engagement style, research has found that using Facebook to accrue social capital or build social connectedness is associated with higher life satisfaction (Ellison et al., 2007; Grieve et al., 2013). To build social capital or social connectedness on Facebook, users need to interact socially on the site, thereby engaging in active social use (commenting, chatting with friends, etc.). Therefore, I expect to find a positive association between life satisfaction and Active social use.

**H1.** Life satisfaction will be positively associated with Active social use.

A number of studies found negative relationships between passive use, life satisfaction and other correlates of SWB (Krasnova et al., 2013; Shaw et al., 2015; Verduyn et al., 2017), and, similarly, negative associations between affective well-being and passive use (Verduyn et al., 2015). Research speculates that passive users may be engaging more frequently in social comparison behaviour on Facebook (Kross et al., 2013). As frequent social comparison has been shown to induce negative emotions such as envy, guilt, regret and

defensiveness which are harmful to SWB (White et al., 2006), I therefore expect to see negative relationships between Passive use and the components of SWB.

**H2.** Life satisfaction, eudaimonic well-being and positive affect will be negatively associated with Passive use. Negative affect will be positively associated with Passive use.

Unidimensional Facebook intensity is defined by how attached users are to Facebook, and how integrated the site is in their day-to-day lives (Ellison et al., 2007). Theoretically, this makes unidimensional Facebook intensity similar to the multi-dimensional concept of Persistence. In chapter 2, I found positive associations between unidimensional Facebook intensity, life satisfaction, eudaimonic well-being and positive affect. I would therefore expect to see those relationships replicate to Persistence.

**H3.** Life satisfaction, eudaimonic well-being and positive affect will be positively associated with Persistence.

Research on the amount of time users spend on Facebook has found that increased time spent on the site is negatively associated with life satisfaction (Kross et al., 2013) and mood (Sagioglou & Greitemeyer, 2014). As one of the defining attributes of Overuse is spending more time on the site than the user would like, it is likely that users high in Overuse spend large quantities of time on Facebook. I therefore would expect users who score high in Overuse to report lower life satisfaction, lower positive affect and higher negative affect. A previous study has also drawn links between problematic Facebook use (similar to Overuse) and lower eudaimonic well-being (Satici & Uysal, 2015), and therefore I would expect respondents high in Overuse to have lower eudaimonic well-being.

**H4.** Life satisfaction, Eudaimonic well-being and Positive affect will be negatively associated with Overuse. Negative affect will be positively associated with Overuse.

## Methods

**Sample.** To explore the associations between SWB, the factors of the PAUM and Facebook intensity, I combined the samples from studies 3.1 and 3.3, resulting in a sample of four-hundred and seventy-three Facebook users (186 males, 287 females,  $M_{\text{age}} = 34.7$ ,  $SD_{\text{age}} = 10.8$ ). The final sample included a mix of American and British residents (174 UK, 299 US), ranging in age range from 19 to 68 years old. Just over half of the sample had completed a university degree (258 university educated), most respondents were employed (366 employed, 41 unemployed, 3 maternity leave, 2 sick leave, 9 retired, 42 students, 10 other), and married or living with their current partner (261 married/cohabiting, 183 single, 29 previously married).

**Measures.** To measure SWB, I included the same measures for life satisfaction, eudaimonic well-being and positive and negative affect used in previous chapters (see Chapter 2, page 55). See Table 4.4 for descriptive statistics and internal reliability for the SWB measures.

Facebook intensity was assessed with the 13-item multi-dimensional Facebook intensity scale (MFIS; Orosz et al., 2015, Appendix L), which measures four aspects of Facebook intensity: Persistence, Boredom, Self-expression, and Overuse. As this is an exploratory study, hypotheses were only formulated for MFIS factors which had been previously studied in the literature. Respondents answered questions about their Facebook habits and use on a scale ranging from (1) strongly disagree to (7) strongly agree. This response format deviates from the original structure of the MFIS, which was on a scale of 1 (strongly disagree) to 5 (strongly agree) due to a coding error. Responses for each facet of

Facebook intensity were summed, with a low score representing low intensity and a high score denoting high intensity (see Table 4.4 for descriptive statistics and reliability).

Level of engagement with Facebook was assessed with the 13-item Passive Active Use Measure developed in chapter 3 (Appendix M). See Table 4.4 for descriptive statistics and reliability.

Also included were a variety of control variables which have been found to be significantly associated with SWB in past research (for an overview, see Diener, Suh, Lucas, & Smith, 1999). They included: gender, age, education level, country of residence and marital status (Table 4.4). To control for potential differences in SWB between the samples (e.g., due to the timing of data collection), I included a dummy variable denoting the data collection in which respondents completed the questionnaire, with 0 indicating respondents participated in the July 2016 data collection, and 1 indicating respondents completed the April 2017 questionnaire.



Table 4.4 Descriptive Statistics and Internal Reliability for Study 4.2 Variables

Variable	Mean	St. Dev.	Min	Max	$\alpha$
<b>Dependent variables</b>					
Life satisfaction	21.7	7.7	5	35	.93
Eudaimonic well-being	55.0	10.2	24	83	.84
Positive affect	28.4	8.7	10	50	.92
Negative affect	12.5	4.8	10	40	.92
<b>Independent variables</b>					
MFIS Persistence	12.1	6.1	4	28	.83
MFIS Boredom	15.0	4.2	3	21	.87
MFIS Overuse	9.7	4.5	3	21	.77
MFIS Self-expression	8.5	4.4	3	21	.87
PAUM Active social	13.9	3.9	5	25	.79
PAUM Active non-social	7.6	3.0	4	20	.79
PAUM Passive	13.4	2.9	4	20	.72
<b>Control variables</b>					
Age	34.7	10.8	19	68	
Male	0.4	0.5	0	1	
University education or higher	0.5	0.5	0	1	
Married	0.6	0.5	0	1	
Never married	0.4	0.5	0	1	
Previously married	0.1	0.2	0	1	
April 2017	0.5	0.5	0	1	
US residents	0.6	0.5	0	1	

Note: N=473,  $\alpha$ = Cronbach's alpha for study sample. MFIS is an acronym for Multidimensional Facebook Intensity Scale and PAUM is an acronym for Passive and Active Use Measure. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the July 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.

**Data analysis.** Data were analysed with R statistical software using Pearson's correlations and OLS regression (R Core Team, 2015). To investigate the associations between Facebook engagement style and SWB, and Facebook intensity and SWB, two OLS regression models were run for each component of SWB. The first models investigate the

relationships between SWB and Facebook engagement level, while the second models add multi-dimensional Facebook intensity.

## Results

Zero-order correlations are in Table 4.5. The regression models revealed several relationships between the components of SWB and differing types of Facebook engagement and intensity.

**Life satisfaction.** In the first model (Facebook engagement), there was a significant positive association between Active non-social use and life satisfaction ( $B = 0.35, p < .05$ , Table 4.6, column 1). The first model explained 18% of the variance in life satisfaction (adjusted  $R^2$ ).

In the second model, Active non-social use was no longer significant, however, the results revealed a significant negative association between life satisfaction and passive use ( $B = -0.28, p < .05$ , Table 4.6, column 2). I also found positive associations between life satisfaction and using Facebook to alleviate boredom ( $B = 0.38, p < .001$ , Table 4.6, column 2), and using Facebook as a form of self-expression ( $B = 0.31, p < .01$ , Table 4.6, column 2). In addition, life satisfaction was negatively associated with Facebook Overuse ( $B = -0.39, p < .001$ , Table 4.6, column 2).

The results also revealed some significant associations with the control variables. In this sample, life satisfaction had a curvilinear relationship with age, with younger respondents reporting lower life satisfaction ( $B = -0.49, p < .05$ , Table 4.6, column 2), and older respondents reporting higher life satisfaction ( $B = 0.01, p < .05$ , Table 4.6, column 2). I found a significant positive association between the university education dummy variable and life satisfaction ( $B = 1.71, p < .05$ , Table 4.6, column 2), indicating that respondents who had completed a university degree had higher life satisfaction than those who had not completed a

degree. Respondents who had never been married and respondents who had previously been married were significantly less satisfied with life than those who were currently married or cohabiting (Never married:  $B = -5.55, p < .001$ , Previously married:  $B = -3.24, p < .05$ , Table 4.6, column 2). I also found significant differences in life satisfaction between data collections in both models; respondents from the July data collection were more satisfied with life than those from the April data collection ( $B = -2.94, p < .01$ , Table 4.6, column 2). US residents were less satisfied with life than UK residents ( $B = -2.16, p < .05$ , Table 4.6, column 2). Adding Facebook intensity in model 2 significantly improved the fit of the model to the data compared to model 1 for life satisfaction ( $F(4, 457) = 8.16, p < .001$ ). The final model explained 23% of the variance in life satisfaction (adjusted  $R^2$ ).

Table 4.5 Zero-order Correlations for Study 5.2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Life satisfaction																		
2. Eudaimonic well-being	0.57***																	
3. Positive affect	0.36***	0.44***																
4. Negative affect	-0.24***	-0.24***	-0.11*															
5. Male	-0.03	0.02	0.09*	0.12**														
6. Age	0.06	0.22***	0.13**	-0.17***	-0.06													
7. University education or higher	0.04	0.02	-0.09*	0.06	0.11*	-0.08												
8. Married	0.33***	0.15**	0.09*	-0.10*	-0.17***	0.20***	-0.09											
9. Single	-0.31***	-0.17***	-0.11*	0.11*	0.19***	-0.36***	0.12**	-0.88***										
10. Previously married	-0.07	0.05	0.03	-0.01	-0.03	0.33***	-0.07	-0.28***	-0.20***									
11. April 2017	-0.14**	-0.12*	-0.15**	0.08	0.08	0.07	0.16***	-0.09	0.06	0.05								
12. US residents	0.02	0.05	0.04	-0.02	0.00	-0.12*	-0.19***	0.00	-0.02	0.05	-0.74***							
13. Active social	0.16***	0.14**	0.33***	0.06	-0.11*	-0.07	-0.13**	0.15***	-0.09	-0.14**	-0.26***	0.12*						
14. Active non-social	0.19***	0.08	0.30***	0.11*	0.02	-0.17***	-0.07	0.10*	-0.04	-0.12**	-0.18***	0.08	0.66***					
15. Passive	0.03	0.02	0.22***	0.09*	-0.12**	-0.07	-0.11*	0.06	-0.02	-0.09	-0.27***	0.17***	0.53***	0.42***				
16. Persistence	0.18***	0.06	0.26***	0.12*	-0.13**	-0.08	-0.07	0.10*	-0.08	-0.04	-0.16***	0.02	0.61***	0.57***	0.42***			
17. Boredom	0.19***	0.15**	0.23***	-0.01	-0.21***	-0.06	-0.14**	0.16***	-0.13**	-0.07	-0.15**	-0.01	0.57***	0.36***	0.47***	0.61***		
18. Overuse	0.02	-0.09*	0.08	0.23***	-0.10*	-0.20***	0.02	0.08	-0.06	-0.06	0.03	-0.15***	0.36***	0.35***	0.31***	0.67***	0.53***	
19. Self-expression	0.22***	0.19***	0.31***	0.08	0.02	-0.11*	-0.05	0.06	-0.01	-0.10*	-0.23***	0.13**	0.62***	0.55***	0.36***	0.68***	0.44***	0.41***

Marital categories are binary variables with 1 denoting marital status. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the October 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States

Table 4.6 Life Satisfaction, Facebook Engagement and Intensity OLS Regressions

	Dependent variable: Life satisfaction	
	Engagement (1)	Intensity (2)
Male	0.41 (0.69)	0.45 (0.68)
Age	-0.35 (0.20)	-0.49* (0.20)
Age <sup>2</sup>	0.004 (0.002)	0.01* (0.002)
University education or higher	1.44* (0.67)	1.71* (0.66)
Never married	-5.35*** (0.75)	-5.55*** (0.73)
Previously married	-3.20* (1.47)	-3.24* (1.44)
April 2017	-3.37*** (1.01)	-2.94** (0.99)
US residents	-1.97 (1.03)	-2.16* (1.02)
Active social	0.11 (0.12)	-0.20 (0.13)
Active non-social	0.35* (0.15)	0.29 (0.15)
Passive	-0.23 (0.13)	-0.28* (0.13)
Persistence		0.10 (0.10)
Boredom		0.38*** (0.11)
Overuse		-0.39*** (0.10)
Self-expression		0.31** (0.11)
Constant	31.32*** (4.67)	33.84*** (4.62)
Observations	473	473
R <sup>2</sup>	0.18	0.23
Adjusted R <sup>2</sup>	0.16	0.20
Residual Std. Error	7.03 (df = 461)	6.82 (df = 457)
F Statistic	8.91*** (df = 11; 461)	9.11*** (df = 15; 457)

*Note:* \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < 0.001$ . Regression table shows unstandardized regression coefficients with standard errors in parentheses. Marital categories are in comparison to respondents who are married or cohabiting, University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the October 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.

**Eudaimonic well-being.** The results for the first model with eudaimonic well-being and engagement revealed a significant positive association between eudaimonic well-being and active social use ( $B = 0.41$ ,  $p < .01$ , Table 4.7, column 1). No other types of engagement had significant results in this sample. The first model explained 9% of the variance in eudaimonic well-being (adjusted  $R^2$ ).

The results for the second model (Facebook intensity) showed similar results as were found for Facebook intensity and life satisfaction, revealing positive associations between

eudaimonic well-being and using Facebook to alleviate boredom ( $B = 0.54, p < .001$ , Table 4.7, column 2), and using Facebook for self-expression ( $B = 0.53, p < .001$ , Table 4.7, column 2). Eudaimonic well-being was further negatively associated with Overuse ( $B = -0.46, p < .001$ , Table 4.7, column 2). In regards to the control variables, I found significant associations with age, education and marital status. The results show a positive association between eudaimonic well-being obtaining a university degree ( $B = 1.77, p < .05$ , Table 4.7, column 2). Respondents who were currently married or cohabiting had higher eudaimonic well-being than those who had never been married ( $B = -2.09, p < .05$ , Table 4.7, column 2). Adding Facebook intensity in model 2 significantly improved the fit of the model to the data compared to model 1 for eudaimonic well-being ( $F(4, 457) = 8.99, p < .001$ ). The final model explained 15% of the variance in eudaimonic well-being (adjusted  $R^2$ ).

Table 4.7 Eudaimonic Well-being, Facebook Engagement and Intensity OLS Regressions

	Dependent variable: Eudaimonic well-being	
	Engagement (1)	Intensity (2)
Male	1.29 (0.91)	1.07 (0.89)
Age	0.47 (0.26)	0.29 (0.26)
Age <sup>2</sup>	-0.003 (0.003)	-0.002 (0.003)
University education or higher	1.43 (0.88)	1.77* (0.86)
Never married	-1.77 (0.98)	-2.09* (0.96)
Previously married	-0.23 (1.93)	0.20 (1.88)
April 2017	-2.20 (1.33)	-1.75 (1.29)
US residents	-0.06 (1.35)	-0.58 (1.34)
Active social	0.41* (0.16)	0.07 (0.17)
Active non-social	0.06 (0.20)	0.09 (0.20)
Passive	-0.26 (0.17)	-0.30 (0.17)
Persistence		-0.15 (0.12)
Bored		0.54*** (0.14)
Overuse		-0.46*** (0.14)
SE		0.53*** (0.14)
Constant	39.39*** (6.10)	41.85*** (6.02)
Observations	473	473
R <sup>2</sup>	0.11	0.17
Adjusted R <sup>2</sup>	0.09	0.15
Residual Std. Error	9.20 (df = 461)	8.90 (df = 457)
F Statistic	5.03*** (df = 11; 461)	6.34*** (df = 15; 457)

*Note:* \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < 0.001$ . Regression table shows unstandardized regression coefficients with standard errors in parentheses. Marital categories are in comparison to respondents who are married or cohabiting, university education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the October 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.

**Positive affect.** In the first model, I found significant positive associations between positive affect and both types of active use; Active social use ( $B = 0.46$ ,  $p < .001$ , Table 4.8 column 1), and Active non-social use ( $B = 0.40$ ,  $p < .05$ , Table 4.8, column 1). The first model explained 17% of the variance in positive affect (adjusted  $R^2$ ).

In the second model, Positive affect was positively associated with using Facebook as a form of self-expression ( $B = 0.26$ ,  $p < .05$ , Table 4.8, column 2), and negatively associated with the Overuse of Facebook ( $B = -0.28$ ,  $p < .05$ , Table 4.8, column 2). Male respondents in

this sample had higher positive affect than female respondents ( $B = 2.57, p < .01$ , Table 4.8, column 2), and respondents from the April 2017 data collection had lower positive affect than those from the July 2016 data collection ( $B = -2.49, p < .05$ , Table 4.8, column 2). Adding Facebook intensity in model 2 significantly improved the fit of the model to the data compared to model 1 for positive affect ( $F(4, 457) = 3.25, p < .05$ ). The final model explained 18% of the variance in positive affect (adjusted  $R^2$ ).



Table 4.8 Positive Affect, Facebook Engagement and Intensity OLS Regressions

	Dependent variable: Positive affect	
	Engagement (1)	Intensity (2)
Male	2.60*** (0.78)	2.57** (0.79)
Age	-0.21 (0.23)	-0.30 (0.23)
Age <sup>2</sup>	0.004 (0.003)	0.005 (0.003)
University education or higher	-0.73 (0.76)	-0.60 (0.76)
Never married	-0.95 (0.84)	-1.15 (0.84)
Previously married	1.23 (1.66)	1.18 (1.66)
April 2017	-2.80* (1.14)	-2.49* (1.14)
US residents	-2.02 (1.16)	-2.24 (1.18)
Active social	0.46*** (0.14)	0.23 (0.15)
Active non-social	0.40* (0.17)	0.32 (0.18)
Passive	0.17 (0.15)	0.15 (0.15)
Persistence		0.10 (0.11)
Bored		0.20 (0.13)
Overuse		-0.28* (0.12)
Self-expression		0.26* (0.12)
Constant	21.16*** (5.26)	23.42*** (5.31)
Observations	473	473
R <sup>2</sup>	0.18	0.21
Adjusted R <sup>2</sup>	0.17	0.18
Residual Std. Error	7.93 (df = 461)	7.85 (df = 457)
F Statistic	9.49*** (df = 11; 461)	7.96*** (df = 15; 457)

*Note:* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < 0.001$ . Regression table shows unstandardized regression coefficients with standard errors in parentheses. Marital categories are in comparison to respondents who are married or cohabiting, university education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the October 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.

**Negative affect.** In the first model, there were no significant associations between Facebook engagement and negative affect. The first model explained 5% of the variance in negative affect.

In the second model, Negative affect was positively associated with Facebook Overuse ( $B = 0.30$ ,  $p < .001$ , Table 4.9, column 2), and negatively associated with using Facebook to alleviate boredom ( $B = -0.22$ ,  $p < .01$ , Table 4.9, column 2). In this sample, male respondents had higher negative affect than female respondents ( $B = 0.97$ ,  $p < .05$ , Table 4.9,

column 2), and respondents from the April 2017 data collection had higher negative affect than those from the July 2016 data collection ( $B = 1.31, p < .05$ , Table 4.9, column 2).

Adding Facebook intensity in model 2 significantly improved the fit of the model to the data compared to model 1 for negative affect ( $F(4, 457) = 6.93, p < .001$ ). The final model explained 9% of the variance in negative affect (adjusted  $R^2$ ).

Table 4.9 Negative Affect, Facebook Engagement and Intensity OLS Regressions

	Facebook use and negative affect	
	Engagement (1)	Intensity (2)
Male	0.98* (0.46)	0.97* (0.45)
Age	-0.10 (0.13)	-0.03 (0.13)
Age <sup>2</sup>	0.0004 (0.002)	-0.0002 (0.002)
University education or higher	0.39 (0.45)	0.16 (0.44)
Never married	0.38 (0.49)	0.54 (0.49)
Previously married	1.11 (0.97)	0.86 (0.95)
April 2017	1.40* (0.67)	1.31* (0.66)
US residents	0.56 (0.68)	0.94 (0.68)
Active social	0.02 (0.08)	0.07 (0.09)
Active non-social	0.10 (0.10)	0.03 (0.10)
Passive	0.16 (0.09)	0.15 (0.09)
Persistence		0.005 (0.06)
Bored		-0.22** (0.07)
Overuse		0.30*** (0.07)
Self-expression		-0.02 (0.07)
Constant	10.27*** (3.08)	8.97** (3.06)
Observations	473	473
R <sup>2</sup>	0.07	0.12
Adjusted R <sup>2</sup>	0.05	0.09
Residual Std. Error	4.64 (df = 461)	4.52 (df = 457)
F Statistic	3.14*** (df = 11; 461)	4.27*** (df = 15; 457)

*Note:* \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < 0.001$ . Regression table shows unstandardized regression coefficients with standard errors in parentheses. Marital categories are in comparison to respondents who are married or cohabiting, university education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. April 2017 data collection was also coded as binary, with 0 denoting that a respondent participated in the October 2016 data collection and 1 denoting that a respondent participated in the April 2017 data collection. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.

## Discussion

The purpose of study 4.2 was to conduct an in-depth investigation of the associations between different types of Facebook engagement and intensity, and the components of SWB. The results revealed several significant relationships between the three components of SWB, the factors of the Passive Active Use measure (PAUM) and the factors of multi-dimensional Facebook intensity (MFIS). As implied in previous research, some types of Facebook engagement and intensity are positively associated with SWB, while others are negatively associated with SWB. This may explain why previous studies on Facebook use and SWB which used unidimensional Facebook intensity measures and did not account for type of engagement yielded conflicting results.

The results for engagement style (PAUM) revealed some surprising findings. Contrary to my predictions, Active social use was not associated with life satisfaction in this sample. This is unexpected, as previous studies investigating life satisfaction and Facebook use have implied that the benefits of using Facebook stem from socialising on the site (Ellison et al., 2007; Grieve et al., 2013; Oh et al., 2014). However, Active social use was positively associated with eudaimonic well-being and with positive affect. The relationship between Active social use and eudaimonic well-being, while unpredicted, is unsurprising as users are more likely to ‘friend’ people they know in ‘real life’ on Facebook (Ellison et al., 2007). Recent research has found that online social support is an extension of general/offline social support (Liu & Yu, 2013), and previous research into eudaimonic well-being has found that socialisation (and thus social support) is an important source for eudaimonic well-being (Cable, Bartley, Chandola, & Sacker, 2012; Ryff & Singer, 2008). Similarly, research shows that social activity and frequent contact with friends is positively linked to positive affect (Clark & Watson, 1988; Sander, Schupp, & Richter, 2017). Additionally, sharing positive experiences with others has been found to have a positive influence on positive affect

(Lambert et al., 2013). Sharing with others is the main underlying concept of Active social use, as it includes activities such as creating status updates and using Facebook messenger, both of which would enable sharing experiences with others.

Although Active social use was not significantly associated with life satisfaction, I did find a significant positive relationship between life satisfaction and Active non-social use. This may suggest that users do not need to directly socialise with friends while using Facebook to reap the rewards of using the site. Active, but non-social activities such as posting videos and tagging photos may build the social connectedness and social capital found in previous studies (Ellison et al., 2007; Grieve et al., 2013; Vitak, Ellison, & Steinfield, 2011). This phenomenon should be investigated further in future research.

Furthermore, the regressions revealed that Passive use was negatively associated with life satisfaction, but not with any of the other aspects of SWB. This result concurs with previous findings on passive use and life satisfaction (Krasnova et al., 2013), but does not confirm past literature on passive use and affective well-being (Verduyn et al., 2015). This divergence may stem from differences in affective well-being measures, as this study employed the Positive and Negative Affect Scales, while Verduyn and colleagues asked participants to rate how they felt on a scale from 0 (very negative) to 100 (very positive). These results may suggest that Passive use is not as detrimental as previously thought, or that life satisfaction is especially sensitive to passive use. If this is the case, it may be related to social comparison, as seeing the highlights of the lives of others in a non-social, non-active way may lead users to evaluate their actual life satisfaction against the perceived life satisfaction of their Facebook friends. Earlier research in this thesis has found negative associations between social comparison on Facebook and life satisfaction (see Chapter 2), however future research should investigate if passive use plays a role in this process.

The results for multidimensional Facebook intensity revealed that Overuse was negatively associated with all three components of SWB. This suggests that simply having a 'Facebook habit' has little effect on SWB; rather, as suggested by previous studies, it is *excessive* time spent on Facebook which is negatively associated with SWB (Kross et al., 2013). These findings confirm the literature on problematic Facebook use, which found that excessive Facebook use can lead to negative consequences for the user (Bevan, Gomez, & Sparks, 2014; Satici & Uysal, 2015; Uysal, Satici, & Akin, 2013). This association may also be related to social comparison, as a previous study found that users who frequently visited Facebook and engaged in negative social comparison strategies had lower psychological well-being (Batenburg & Das, 2015). Future research should investigate if users who overuse Facebook are more prone to negative social comparison behavior.

The results also revealed positive associations between life satisfaction, eudaimonic well-being and the use of Facebook to alleviate boredom, as well as a negative association between negative affect and Boredom. These results suggest that using Facebook exclusively as a method to pass time and reduce boredom may have benefits for SWB. The negative association between Boredom and negative affect implies that using Facebook to alleviate boredom may be able to lower negative affect (thus increasing mood). This is contrary to a recent study which found that Facebook use lowers mood (Sagioglou & Greitemeyer, 2014), however, Sagioglou and Greitemeyer combined positive and negative affect to create an overall 'mood measure', and further did not account for different types of Facebook use, which obscures which types of use are associated with declines in mood. Additionally, as the first study in their article focused on time spent on Facebook, it is possible that the benefits obtained by using Facebook to alleviate boredom were overshadowed by the negative impacts of excessive use. Future research on using Facebook to alleviate boredom and SWB should seek to establish causality for these relationships.

I found positive associations between life satisfaction, eudaimonic well-being, and using Facebook as a form of self-expression. These results are consistent with previous research which found that self-presentation on Facebook is positively associated with SWB (Kim & Lee, 2011), and that users who view and update their Facebook profiles display higher self-esteem (Gonzales & Hancock, 2011).

Contrary to my predictions, Persistence was not associated with any of the components of SWB. This was surprising as studies employing the unidimensional Facebook intensity scale, which is similar to the concept of Persistence, usually report positive associations between Facebook intensity and SWB (Ellison et al., 2007; Grieve et al., 2013; Chapter 2). However, previous studies did not account for engagement style or other types of intensity. This, in combination with the above findings on engagement style and the other types of Facebook intensity suggests that simply having a 'Facebook habit' or being attached to the site has little effect on SWB; rather, it is how the site is integrated into day-to-day life and how users are engaging with it that matters.

While the results reported in this study are significant, the effect sizes and adjusted  $R^2$  values are small. This suggests that while different types of Facebook engagement styles and use play a role in SWB, there are other variables which have more influence on life satisfaction, eudaimonic well-being and positive and negative affect than Facebook use. The effect sizes and  $R^2$  values found in this study are, however, similar to previous studies on Facebook use, which typically find small effect sizes and explanation of variance for the significant relationships between SWB and Facebook use (Ellison et al., 2007; Lönqvist & Itkonen, 2014; Satici & Uysal, 2015).

The present findings extend previous research on how Facebook use may impact SWB by investigating Facebook use as a multidimensional concept, accounting for different engagement styles, and by including all three components of SWB in my analysis. The results

of this study suggest that measuring Facebook use as a unidimensional concept may conceal that some types of use and engagement display positive associations with SWB while others show negative associations. This may be contributing to the conflicting results in the literature, and implies that the commonly used Facebook intensity scale (Ellison et al., 2007) which was developed in 2007 shortly after Facebook gained popularity may no longer be sensitive enough to measure Facebook use in research. Rather, more nuanced measures which detail how users engage with the site and/or how the site has become integrated into daily life should be used in place of general Facebook use measures.

### **Chapter limitations and future work**

The studies in this chapter are correlational, and thus cannot comment on the direction of causality of the relationships found. Future research is needed to establish whether Facebook intensity and engagement indeed cause changes in SWB, or whether low or high SWB affect how people use the social media site. Additionally, these samples may suffer from self-selection bias as respondents volunteered to participate and were compensated for their efforts. The results revealed differences in SWB between samples in study 4.2, indicating that the respondents who participated in the July 2016 data collection had higher SWB than those who participated in the April 2017 data collection. This anomaly may stem from changes in US politics, as there was a presidential election in November 2016 and most of the respondents in this sample were US residents (299 US residents, 174 UK residents). This shift in SWB should be investigated in future research. Study 4.2 found a negative association between life satisfaction and passive use. While previous research has implied that this relationship may exist due to negative social comparison on Facebook, the relationship between passive use and social comparison has not (to the best of my

knowledge) been investigated. Future research should investigate whether certain types of Facebook engagement are associated with social comparison behaviour.

### **Chapter summary**

In conclusion, study 4.1 highlights how individual differences impact the way users engage with Facebook, and study 4.2 demonstrates the importance of accounting for different types of Facebook engagement and intensity when investigating Facebook use and SWB. Measuring Facebook use with unidimensional measures may obscure that some types of use and engagement display positive associations with SWB while others show negative associations. Taken together, the results of this study suggest that while Facebook use may provide benefits to SWB, Facebook is best used in moderation, as a form of self-expression, and/or as a solution to boredom. It is also best to use the site with an active engagement style, creating content, even if direct social interaction does not take place. However, due to the correlational nature of the research I cannot rule out that users with high SWB are more likely to engage on the social media site in this manner. Future research should investigate the direction of causality, as it is possible that causality (to some extent) may run both ways. In the next chapter, I will investigate whether individual differences in Facebook engagement style are related to social comparison behaviour on Facebook. I will further investigate how differences in social comparison on Facebook are associated with SWB.



Chapter 5. The association  
between Facebook  
engagement style and  
Facebook social comparison,  
and its relationship with  
subjective well-being

## **Introduction**

Chapter 4 found that Facebook engagement styles were associated with individual differences in personality, and that different patterns of Facebook engagement and use were associated differently with the components of subjective well-being (SWB). In particular, active forms of Facebook use were associated differently than passive use with the components of well-being; while active engagement styles were positively associated with life satisfaction, eudaimonic well-being and positive affect, passive use was negatively associated with life satisfaction. This finding is corroborated with other research which finds negative relationships between passive use and SWB (Chen, Fan, Liu, Zhou, & Xie, 2016; Verduyn et al., 2015; Wang, Gaskin, Rost, & Gentile, 2017). Many of these studies theorise this relationship may result from passive users engaging in frequent social comparison (especially negative comparison). However, to the best of my knowledge, no research has investigated whether there is a direct association between passive Facebook use and social comparison behaviour. Therefore, this chapter first investigates whether there is a direct relationship between Facebook engagement styles and individual differences in social comparison on Facebook, and then explores how these differences in Facebook social comparison are associated with the components of SWB.

### **Study 5.1 Relationships between Facebook engagement style and individual differences in social comparison behaviour**

Thus far in regards to social comparison, this thesis has focused on social comparison valence (whether individuals compare themselves positively or negatively when engaging in social comparison on Facebook, see Chapter 2). As discussed in Chapter 1, social comparison is universal (Buunk & Gibbons, 2007), however, there are individual differences in the frequency which people engage in social comparison behaviour, known as comparison

orientation (Gibbons & Buunk, 1999). Previous research on comparison orientation on Facebook has found that there is a positive relationship between how much time an individual spends on Facebook and how frequently they compare themselves to their Facebook friends (Jang, Park, & Song, 2016; Rousseau, Eggermont, & Frison, 2017; Steers et al., 2014; Vogel et al., 2015). As research has shown that users spend more time passively browsing Facebook than actively engaging with the site (Pempek et al., 2009), and passive Facebook use is often associated negatively with SWB and correlates of SWB (Krasnova et al., 2013; Shaw et al., 2015; Verduyn et al., 2017), some researchers theorise that passive users may compare themselves to their Facebook friends more frequently than active users (Frison & Eggermont, 2016; Rousseau et al., 2017; Wang et al., 2017).

There is some evidence in passive use research to corroborate this theory. For example, in a recent study, frequent social comparison mediated the relationship between passive Facebook use and body dissatisfaction (Rousseau et al., 2017). In a study on the Chinese social media sites Qzone (a social media blogging site) and WeChat (a social media instant messaging service similar to Facebook chat), researchers found that comparison orientation moderated the relationship between passive use and upward social comparison (Wang, Wang, Gaskin, & Hawk, 2017). While research into active versus passive Facebook use is relatively recent, more general research on Facebook social comparison may also support the theory that engagement level is associated with comparison orientation. Frequent social comparison can induce the experience of other emotions, such as envy (White et al., 2006). Therefore, it may be possible to use envy as a proxy when social comparison is not measured directly. For example, previous research has found that envy (a by-product of social comparison) mediates the relationship between passive use and life satisfaction (Krasnova et al., 2013). It also mediates the relationship between passive use and affective well-being (Verduyn et al., 2015), and the between passive use and a composite SWB

measure (combined life satisfaction, positive affect and negative affect) (Ding, Zhang, Wei, Huang, & Zhou, 2017). Another recent study found that self-esteem, which can be affected by social comparison (Fuhr et al., 2015), mediates the relationship between passive Facebook use and SWB (Chen et al., 2016).

The above studies which investigate correlates of social comparison provide evidence that there is likely a relationship between passive Facebook use and social comparison behaviour. However, to the best of my knowledge, no study to date has directly investigated whether Facebook engagement style is associated with social comparison behaviour. Furthermore, research which has addressed Facebook use in general and comparison orientation has done so by investigating unidimensional comparison orientation (for examples, see: Lee, 2014; Steers et al., 2014; Wang et al., 2017). The most frequently used measure of social comparison orientation in Facebook research is the Iowa-Netherlands Comparison Orientation Measure (INCOM; Gibbons & Buunk, 1999). While Gibbons and Buunk indicated that the INCOM could be used as a single scale, it was originally conceptualised as two subscales, Ability and Opinion. Items which load on Ability are concerned with performance (e.g., “how skilled am I compared to others?”), while items which load on Opinion pertain to the thoughts or opinions of others (e.g., “what should I think?” or “how should I feel?”). Recent research has indicated that the two-factor INCOM is a better fit than the unidimensional INCOM, and using the scale as a unidimensional measure may mask significant relationships between individual differences measures and the factors of the INCOM (Appendix B). Breaking the INCOM down into its subscales may reveal new information about how social comparisons are taking place on Facebook. Festinger’s original theory (1954) introduced the comparison of abilities as the comparison of performance (“How talented am I at basketball compared to my friend?”). However, on Facebook where comparisons take place through pictures and status updates instead of in person, ability-type

comparisons are likely to do with both physical attributes (such as attractiveness, body type, etc.), and with the contemporary definition of success (“How is my career going compared to my friend’s?”, “How is my relationship going compared to my friend’s?”, “How much money do I make compared to my friend?”). While some of this information may also be available in offline comparisons, Facebook makes this information more salient than it may have been offline. In contrast, the comparison of opinions is much less competitive, and therefore the frequent comparison of opinions may have different outcomes than the frequent comparison of abilities. Festinger (1954) describes the comparison of opinions as a way for individuals to assess if their opinions are ‘correct’ or valid.

As the comparison of abilities and opinions are likely to have different associations and consequences, study 5.1 investigates the relationships between Facebook engagement and social comparison by decomposing the INCOM into its two subscales. To account for whether engagement styles are associated with differences in social comparison valence, I also investigate how users are comparing themselves on Facebook.

In line with the theoretical implications from prior research on passive use (e.g., Frison & Eggermont, 2016; Rousseau et al., 2017; Wang et al., 2017), I expect that passive users will be prone to frequent social comparison in general (both ability and opinion). Based on the negative relationship between Passive use and life satisfaction in chapter 4, and the theories described above, I also expect that passive users will be more likely to compare themselves in a negative light.

**H1.** Passive use will be positively associated with the comparison of both abilities and opinions. Passive users will be more likely to compare themselves in a negative way.

As Active social use is defined by the creation of written content (such as comments, status updates, etc.), Active social use is likely to be related to the comparison of opinions. It is possible that Active social users compare their opinions to create comments on posts by friends. Posting their own opinions as status updates could potentially stimulate feedback from friends and further discussion on their update, thus leading to more Active social use.

**H2.** Active social use will be positively associated with the comparison of opinions.

While Active non-social users do not create written content, their content creation may also be related to the comparison of opinions. Users who agree with the opinions of their friends may click like on comments and updates, or RSVP to attend events which share their opinions (such as political rallies, study groups, etc.). Conversely, Facebook now also offers reactions such as “Wow”, “Sad” or “Angry”, allowing Active non-social users to express and compare their opinions without needing to create written content.

**H3.** Active non-social use will be positively associated with the comparison of opinions.

## **Methods**

To investigate the relationships between Facebook engagement style and individual differences in social comparison behaviour, I used the sample from study 3.3 (wave 1), who, in addition to the measures required for study 3.3 (the PAUM and SWB measures), also answered questions about their social comparison behaviours on Facebook.

**Sample.** Two-hundred and forty-four respondents (106 males, 138 females,  $M_{age}=35.45$ ,  $SD=11.94$ ) who used Facebook were recruited online through Prolific Academic over a 2-day period during April 2017. Respondents were United Kingdom and United States residents, and accessed the study through a link to a survey website where they gave informed consent

and were paid £2 for participating in a 15-minute survey. The age in the sample ranged from 19 to 68 years old, with most respondents reporting full-time or part-time employment (175 employed, 22 unemployed, 2 maternity leave, 2 sick leave, 6 retired, 34 students, and 3 “other”). Over half of the sample (151 respondents) had obtained a university degree (113 had bachelor’s degrees, 28 had master’s degrees and 10 had a professional/doctoral degree).

**Measures.** To investigate how respondents were comparing themselves on Facebook (Facebook social comparison valence), respondents completed the 11-item Facebook Social Comparison Rating Scale used in chapter 2 (FBSC valence; Appendix J). See Table 5.1 for descriptive statistics.

To measure how frequently respondents were comparing themselves on Facebook (Facebook social comparison orientation), respondents completed a version of the Iowa-Netherlands Social Comparison Measure (INCOM; Gibbons & Buunk, 1999) which had previously been adapted for use with Facebook (F-INCOM; Nguyen, 2012, p. 88, Appendix P). The 11-item measure assesses differences in comparison orientation for two subscales: ability and opinion. Responses range from (1) strongly disagree to (5) strongly agree for each item. A low score on each subscale indicates that individuals are not prone to gathering information about others and/or applying such information to their own situations, and a high score indicates that individuals are prone to collecting information about others frequently, and/or regularly comparing that information to their own circumstances. Both subscales of the F-INCOM have excellent internal reliability. See Table 5.1 for descriptive statistics.

**Control variables.** As it is possible that users who compare themselves online are more prone to social comparison in general (and thus any effects found may simply be reflecting those tendencies), I included the original INCOM in the regressions to control for offline social comparison orientation (Appendix Q). The 11-item INCOM is structured the same as the F-INCOM, and was also broken down into its two subscales, Ability and Opinion. The

subscales of the INCOM demonstrated acceptable internal reliability (see Table 5.1). Also included were a variety of sociodemographic control variables including age, gender, education level and country of residence. I also include a quadratic age term in the models to investigate if age has a curvilinear relationship with any style of Facebook engagement. Descriptive statistics for all variables can be found in Table 5.1.

Table 5.1 Descriptive Statistics for Study 5.1 Variables

Variables	Mean	St. Dev.	Min	Max	$\alpha$
<b>Dependent</b>					
Active social	13.0	3.6	5	25	.75
Active non-social	7.1	2.9	4	20	.81
Passive	12.6	2.8	4	20	.69
<b>Independent</b>					
F-INCOM ability	19.6	6.7	7	35	.91
F-INCOM opinion	12.2	3.9	4	20	.85
FBSC valence (-/+)	57.1	17.0	9	110	.92
<b>Controls</b>					
Age	35.4	11.9	19	68	
University education or higher	0.6	0.5	0	1	
US residents	0.3	0.5	0	1	
Male	0.4	0.5	0	1	
Ability (offline)	22.3	5.8	7	35	.87
Opinion (offline)	14.7	2.7	6	20	.77

Note: N=244,  $\alpha$ = Cronbach's alpha for study sample. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States.

**Data analysis.** First, I ran zero-order correlations to investigate the relationships between all variables. Then, I used OLS regression in R using the factors of the PAUM as dependent variables to see if social comparison behaviours were associated with different types of Facebook engagement.



## Results

Zero-order correlations are in Table 5.2. The regression models revealed several relationships between the factors of the PAUM and individual differences in Facebook comparison behaviour.

**Active social.** The Active social use regression showed a significant positive association between Active social Facebook use and F-INCOM opinion ( $B = .43$ ,  $p < .001$ ; Table 5.3, column 1). In the control variables, there was also a significant association between Active social Facebook use and US ( $B = -1.03$ ,  $p < .05$ ; Table 5.3, column 1), suggesting that respondents residing in the UK were more likely to be Active social users than those residing in the US. This model explained 30% of the variance in Active social use.

**Active non-social.** The Active non-social use regression showed a significant positive association between Active non-social Facebook use and F-INCOM opinion ( $B = .30$ ,  $p < .001$ ; Table 5.3, column 2). There was also a significant negative association between Active non-social use and FBSC valence ( $B = -0.03$ ,  $p < .01$ ; Table 5.3, column 2), suggesting that users who engage with Facebook in an Active non-social manner are more likely to compare themselves in a positive light to their Facebook friends. In the control variables, there was also a significant association between Active non-social Facebook use and US residents ( $B = -0.77$ ,  $p < .05$ ; Table 5.3, column 2), suggesting that respondents residing in the UK were more likely to be Active non-social users than those residing in the US. This model explained 29% of the variance in Active non-social use.

**Passive.** The Passive use regression showed significant positive associations between Passive Facebook use and both subscales of the F-INCOM: opinion ( $B = .19$ ,  $p < .001$ ; Table 5.3, column 3) and ability ( $B = .14$ ,  $p < .001$ ; Table 5.3, column 3). This model explained 25% of the variance in Passive use.

Table 5.2 Zero-order Correlations for Study 5.1 Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Active social											
2. Active non-social	0.67***										
3. Passive	0.47***	0.42***									
4. Age	-0.12	-0.20**	-0.09								
5. US resident	-0.15*	-0.12	-0.06	-0.13*							
6. University education or higher	-0.02	0.04	-0.03	-0.06	-0.15*						
7. Male	-0.14*	0.04	-0.08	-0.04	0.13*	0.09					
8. Ability (offline)	0.18**	0.20**	0.35***	-0.27***	0.10	0.02	-0.08				
9. Opinion (offline)	0.21***	0.24***	0.23***	-0.12	-0.03	-0.02	-0.09	0.29***			
10. Facebook Ability	0.32***	0.30***	0.47***	-0.24***	-0.01	0.01	-0.15*	0.75***	0.29***		
11. Facebook Opinion	0.53***	0.48***	0.40***	-0.09	-0.06	-0.02	-0.12	0.21***	0.43***	0.42***	
12. FBSC (valence)	-0.07	-0.14*	0.09	-0.08	0.03	-0.09	-0.14*	0.28***	0.01	0.33***	-0.05

*Note:* \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < 0.001$ . US residents is a binary variable with 1 denoting that the respondent resides in the US and 0 denoting that they reside in the UK. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. FBSC is an abbreviation for Facebook social comparison.

Table 5.3 OLS Regression Models for Facebook Engagement and Social Comparison Behaviour

	Active social (1)	Active non-social (2)	Passive (3)
Age	-0.09 (0.11)	-0.12 (0.09)	-0.02 (0.09)
Age <sup>2</sup>	0.001 (0.001)	0.001 (0.001)	0.0002 (0.001)
US residents	-1.03* (0.44)	-0.77* (0.36)	-0.38 (0.36)
University education or higher	-0.26 (0.41)	0.04 (0.33)	-0.24 (0.34)
Male	-0.53 (0.41)	0.51 (0.33)	0.08 (0.33)
Ability (offline)	-0.01 (0.05)	0.02 (0.04)	0.03 (0.04)
Opinion (offline)	-0.07 (0.08)	0.01 (0.07)	0.01 (0.07)
Facebook Ability	0.09 (0.05)	0.06 (0.04)	0.14*** (0.04)
Facebook Opinion	0.43*** (0.06)	0.30*** (0.05)	0.19*** (0.05)
FBSC valence (+/-)	-0.02 (0.01)	-0.03** (0.01)	-0.003 (0.01)
Constant	11.37*** (2.59)	6.17** (2.08)	7.45*** (2.13)
Observations	244	244	244
R <sup>2</sup>	0.33	0.32	0.28
Adjusted R <sup>2</sup>	0.30	0.29	0.25
Residual Std. Error (df = 233)	3.00	2.41	2.47
F Statistic (df = 10; 233)	11.41***	10.82***	8.99***

*Note:* \*p < .05, \*\*p < .01, \*\*\*p < 0.001. Regression table shows unstandardized regression coefficients with standard errors in parentheses. US residents is a binary variable with 1 denoting that the respondent resides in the US and 0 denoting that they reside in the UK. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. FBSC is an abbreviation for Facebook social comparison.

## Discussion

The purpose of this study was to investigate prior claims that passive users were more prone to social comparison on Facebook than active users. To further the understanding of how Facebook engagement styles may be related to social comparison, this research broke comparison orientation down into its two subscales, ability and opinion.

The results partially confirmed the hypothesis about passive use. Passive use was associated positively with both the comparison of abilities and the comparison of opinions, suggesting that passive users compare their abilities and opinions frequently. This confirms previous theories which suggested that passive users had high comparison orientation (Frison & Eggermont, 2016; Rousseau et al., 2017; Wang et al., 2017). However, contrary to my predictions, Passive users were not more likely to compare themselves on Facebook in a

negative light. This is interesting, as previous research had also hypothesised that passive users were susceptible to negative comparison (Chen et al., 2016).

The results confirmed the hypothesis for Active social use. In this sample, Active social users frequently compared their opinions, but not their abilities. Active non-social use was also positively associated with the comparison of opinions. Comparing opinions online may allow users to generate conversations with their Facebook friends and help users identify which friends they have the most in common with, thus building social capital and social connectedness. However, the comparison of opinions on Facebook may also have a dark side. In one of Festinger's original experiments on social comparison, participants were asked to privately form an opinion on a topic, and were then allowed to compare their opinion to the opinions of a group to which they belonged. Participants whose opinions matched those of the group became highly confident in their opinion, whereas participants whose opinions deviated from the group became less confident in their opinion and when given the chance to restate their opinion, changed their opinion to match the group's response (Festinger, Gerard, Hymovitch, Kelley, & Raven, 1952). This type of behaviour could have considerable consequences in a Facebook environment where users surround themselves with people and information who are likely to confirm their opinions. When mixed with the Facebook newsfeed algorithm, which tailors itself to individual consumption habits by keeping track of what users comment on, react to (like, love, wow, sad, angry) and click on (news articles), the frequent comparison of opinions could lead users to contribute to the creation or maintenance of 'filter bubbles' and 'echo chambers'. A 'filter bubble' is an online phenomenon where personalised algorithms (such as search engine algorithms or newsfeed algorithms) make users less likely to see information that diverges from their opinions/worldview (Spohr, 2017). As 'filter bubbles' filter out divergences in opinion, the user's opinion is 'echoed' back to them, thus strengthening that opinion/worldview in the same way as the participants

in Festinger's experiment described above. For an overview on how 'filter bubbles' and 'echo chambers' contribute to ideological polarisation, see Spohr, 2017.

Although unpredicted, there was also a negative relationship between Active non-social use and the Facebook social comparison rating scale, suggesting that Active non-social users are more likely to compare themselves in a positive light to their Facebook friends. In chapter 4, the results showed positive relationships between Active non-social use and several BAS traits, therefore it is possible that this relationship may be driven by personality, which drives users to be both Active non-social users and to compare themselves in a positive light. Future studies are needed to delve deeper into the profile of Active non-social users.

In conclusion, this study demonstrated that Facebook engagement styles are associated with different types of social comparison behaviour. Active non-social users were more likely to compare themselves to their Facebook friends in a positive light, which may suggest they are less likely to experience lowered SWB from conducting social comparisons (unless comparison takes place frequently, see White et al., 2006). Active social and non-social users are more likely to frequently compare their opinions, while Passive users compare both their abilities and opinions. As the comparison of abilities is concerned with performance while the comparison of opinion is concerned with whether an opinion/idea is valid, it is likely that the types of comparison orientation have different relationships with SWB. If the comparison of abilities on Facebook is negatively associated with SWB, while the comparison of opinions is not, then it is possible that the comparison of abilities may be one of the underlying mechanisms contributing to the negative relationships between passive Facebook use and measures of SWB found in previous research. Therefore, study 5.2 will investigate how different types of comparison on Facebook impact SWB.

## **Study 5.2 Relationships between Facebook social comparison orientation and subjective well-being**

Study 5.1 demonstrated that there is a relationship between Facebook engagement styles and Facebook comparison orientation. Active forms of Facebook use are associated with the comparison of opinions, whereas passive use is associated with both the comparison of opinions and abilities. It is therefore possible that the results of previous research on Facebook and SWB or correlates of well-being, which find negative associations for passive forms of use (Krasnova et al., 2013; Shaw et al., 2015; Verduyn et al., 2017) and positive associations for active forms of use (Burke et al., 2010; Grieve et al., 2013) may be partially related to how different types of comparison orientation on Facebook are associated with SWB. To the best of my knowledge, no study to date has investigated how the comparison of abilities and the comparison of opinions on Facebook are associated with the components of SWB. Therefore, the purpose of study 5.2 is to investigate the relationships between types of Facebook comparison orientation and the components of SWB.

While much research has focused on social comparison on Facebook, the literature investigating how Facebook comparison orientation impacts SWB is limited. There is, however, evidence of social comparison on Facebook impacting SWB directly (see Chapter 2, p. 59) or through correlates of SWB such as depressive symptoms (Feinstein et al., 2013; Q.-Q. Liu et al., 2017; Steers et al., 2014), body image (de Vries & Kühne, 2015; Haferkamp & Krämer, 2011; Rousseau et al., 2017), and self-esteem (Hanna et al., 2017). Research on offline social comparison finds that frequent social comparison behaviour is negatively associated with correlates of SWB (White et al., 2006), therefore frequent social comparison on Facebook is also likely linked to lower SWB.

While research on Facebook comparison orientation is limited, there are a few studies which do investigate how Facebook comparison orientation is related to correlates of SWB.

A recent study found that comparison orientation and self-objectification mediate the relationship between Facebook use and self-esteem, body shame, and depressive/anxious symptoms (Hanna et al., 2017). Another study found that users with high social comparison orientation were more frequent Facebook users, and that after comparing themselves on Facebook (experimentally manipulated) these users had lower self-esteem, lower self-perceptions and higher negative affect (Vogel et al., 2015). These results would suggest that Facebook comparison orientation is likely to have a direct relationship with SWB. However, both studies used the unidimensional INCOM scale, and therefore could not comment on whether there was a difference in outcomes for those high in ability versus opinion comparison orientation.

Given the lack of literature on how the comparison of abilities and opinions on Facebook differ for SWB, hypotheses are based on the following: 1) Facebook social comparison typically finds that Facebook comparisons have negative consequences for SWB or correlates of SWB. 2) The results of chapter 2 found that negative comparison (which theoretically would be the comparison of abilities) were associated with the components of SWB. 3) A previous study (see Appendix B) found that regression results for Ability and regression results for unidimensional INCOM were similar for RST personality. This may indicate that when used as a unidimensional scale, the INCOM measures more of the comparison of ability than opinion. 4) Previous results (study 5.1 and Appendix B) find different associations with independent variables for the comparison of abilities and the comparison of opinions. I therefore hypothesise:

**H1.** The frequent comparison of abilities will be negatively associated with life satisfaction, eudaimonic well-being and positive affect, but will be positively correlated with negative affect.

**H2.** The frequent comparison of abilities will be associated differently with the components of SWB than the frequent comparison of opinions.

## Methods

To investigate the relationships between the components of SWB and Facebook social comparison orientation, I used the same sample used in study 5.1. For information on the sample, see Methods from study 5.1.

**Measures.** To measure the components of SWB, respondents filled out the Satisfaction with Life Scale (Diener et al., 1985, Appendix E), the Questionnaire for Eudaimonic Well-being (Waterman et al., 2010, Appendix F), and the Positive and Negative Affect Scale (Watson et al., 1988, Appendix G). These measures are described in chapter 2 under Measures.

To measure Facebook social comparison orientation, respondents answered the F-INCOM measure described in study 5.1 (Appendix P). Descriptive statistics for the SWB measures and the F-INCOM subscales are in Table 5.4.

**Control variables.** To control for offline social comparison, I also included the INCOM described in study 5.1 (Appendix Q), in addition to several sociodemographic variables which have previously been associated with SWB (Diener et al., 1999). These included age, gender, education, marital status, and a measure for income. As respondents are often uncomfortable answering questions about their household income, instead I chose to ask how they felt about their present income (this measure is also included in the European Social Survey, 2010). Respondents were asked which description best matched how they felt about their household income nowadays, and responded on a scale from (1) Living comfortably on present income to (4) Very difficult on present income. This measure was reverse coded in



for the regression analyses so that 1 represented income difficulties and 4 represented living comfortably on the present income. See Table 5.4.

Table 5.4 Descriptive statistics for Study 5.2 Variables

Variable	Mean	St. Dev.	Min	Max	$\alpha$
<b>Dependent</b>					
Life satisfaction	20.6	7.2	5	35	.91
Eudaimonic well-being	53.7	9.8	24	77	.85
Positive affect	27.1	7.7	11	49	.89
Negative affect	12.9	4.9	10	34	.91
<b>Independent</b>					
F-INCOM ability	19.6	6.7	7	35	.91
F-INCOM opinion	12.1	3.8	4	20	.85
<b>Controls</b>					
Age	35.5	11.9	19	68	
University education or higher	0.6	0.5	0	1	
US residents	0.3	0.5	0	1	
Male	0.4	0.5	0	1	
Married	0.5	0.5	0	1	
Single	0.4	0.5	0	1	
Previously married	0.1	0.3	0	1	
Income comfortability	2.1	0.9	1	4	
Ability (offline)	22.3	5.8	7	35	.87
Opinion (offline)	14.7	2.7	6	20	.77

Note: N=244,  $\alpha$ = Cronbach's alpha for study sample. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. US residents is a binary variable with 0 denoting that a respondent resides in the United Kingdom, and 1 denoting that a respondent resides in the United States. Income comfortability is on a scale of 1 to 4, with 1 indicating that it is very difficult on the respondent's present income and 4 indicating that a respondent is living comfortably on their present income.

**Data analysis.** First, I ran zero-order correlations to investigate the relationships between all variables. To analyse the data, I then used OLS regression in R using the components of SWB as dependent variables, and the subscales of the F-INCOM as independent variables in addition to the control variables described above.

## Results

Zero-order correlation results can be found in Table 5.5. The regression results revealed several interesting relationships between the components of SWB and individual differences in Facebook social comparison behaviour.

**Life satisfaction.** The regression results showed a significant positive association between life satisfaction and F-INCOM opinion ( $B = 0.26$ ,  $p < .05$ ; Table 5.6, column 1) and a significant negative association between life satisfaction and F-INCOM ability ( $B = -0.25$ ,  $p < .01$ ; Table 5.6, column 1). There were also several significant associations with regards to the control variables. Age was negatively associated with life satisfaction ( $B = -0.66$ ,  $p < .01$ ; Table 5.6, column 1) while Age<sup>2</sup> was positively associated with life satisfaction ( $B = 0.01$ ,  $p < .01$ ; Table 5.6, column 1). This quadratic relationship is consistent on the literature on age and life satisfaction, which finds that life satisfaction dips around middle age and then goes back up (e.g., Blanchflower & Oswald, 2008). Respondents who have never been married ( $B = -2.25$ ,  $p < .001$ ; Table 5.6, column 1) and those who have been previously married but are no longer with their partner ( $B = -3.76$ ,  $p < .05$ ; Table 5.6, column 1) were less satisfied with life than those who are currently married or cohabitating. There was also a significant negative association between life satisfaction and income comfortability ( $B = -2.45$ ,  $p < .001$ ; Table 5.6, column 1), indicating that life satisfaction is lower for respondents who are struggling on their present household income. This model explained 31% of the variance in life satisfaction.

**Eudaimonic well-being.** The results for eudaimonic well-being showed a significant negative association between eudaimonic well-being and F-INCOM ability ( $B = -0.33$ ,  $p < .05$ ; Table 5.6, column 2). With regards to the control variables, there was also a significant positive association between eudaimonic well-being and opinion ( $B = 0.98$ ,  $p < .001$ ; Table 5.6, column 2), suggesting that the frequent comparison of opinions offline may be beneficial

for eudaimonic well-being. There was also a significant negative association between eudaimonic well-being and income comfortability ( $B = -1.62$ ,  $p < .001$ ; Table 5.6, column 2), indicating that eudaimonic well-being is lower for respondents who are struggling on their present household income. This model explained 22% of the variance in eudaimonic well-being.

**Positive and negative affect.** The regression results for positive affect showed a significant positive association between positive affect and F-INCOM Opinion ( $B = 0.44$ ,  $p < .01$ ; Table 5.6, column 3). This model explained 8% of the variance in positive affect. There were no significant associations in the regression for negative affect.

Table 5.5 Zero-order Correlations for Study 5.2 Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Life satisfaction															
2. Eudaimonic well-being	0.49***														
3. Positive affect	0.29***	0.39***													
4. Negative affect	-0.22***	-0.27***	-0.07												
5. Age	0.00	0.27***	0.19**	-0.25***											
6. US residents	-0.18**	-0.07	-0.15*	0.07	-0.13*										
7. University education or higher	0.15*	0.06	0.01	-0.01	-0.06	-0.15*									
8. Male	-0.05	0.08	0.07	0.11	-0.04	0.13*	0.09								
9. Income comfortability	-0.40***	-0.18**	-0.11	0.03	-0.03	0.21***	-0.24***	-0.10							
10. Married	0.36***	0.15*	0.11	-0.14*	0.17**	-0.13*	0.04	-0.12	-0.13*						
11. Never married	-0.30***	-0.18**	-0.12	0.15*	-0.37***	0.05	0.04	0.15*	0.06	-0.86***					
12. Previously married	-0.12	0.04	0.01	-0.01	0.37***	0.16*	-0.17**	-0.06	0.13*	-0.29***	-0.24***				
13. Ability (offline)	-0.17**	-0.28***	-0.13*	0.20**	-0.27***	0.10	0.02	-0.08	0.10	-0.01	0.12	-0.20**			
14. Opinion (offline)	0.02	0.17**	0.06	0.00	-0.12	-0.03	-0.02	-0.09	0.10	0.01	0.03	-0.09	0.29***		
15. F-INCOM ability	-0.18**	-0.27***	-0.05	0.19**	-0.24***	-0.01	0.01	-0.15*	0.12	0.06	0.05	-0.20**	0.75***	0.29***	
16. F-INCOM opinion	0.08	0.10	0.19**	0.02	-0.09	-0.06	-0.02	-0.12	0.04	0.12	-0.05	-0.12	0.21***	0.43***	0.42***

Note: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < 0.001$ . US residents is a binary variable with 1 denoting that the respondent resides in the US and 0 denoting that they reside in the UK. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. Married, Never married and Previously married are binary variables with 1 denoting marital status. Income comfortability is on a scale of 1 to 4, with 1 indicating that it is very difficult on the respondent's present income and 4 indicating that a respondent is living comfortably on their present income.

Table 5.6 OLS Regression Models for Facebook Engagement and Social Comparison

	Life Satisfaction	Eudaimonic Well-being	Positive Affect	Negative Affect
	(1)	(2)	(3)	(4)
Age	-0.66** (0.22)	0.33 (0.32)	-0.02 (0.27)	-0.16 (0.18)
Age <sup>2</sup>	0.01** (0.003)	-0.002 (0.004)	0.001 (0.003)	0.001 (0.002)
US residents	-1.18 (0.92)	0.75 (1.33)	-1.74 (1.13)	-0.08 (0.73)
University education or higher	1.17 (0.84)	0.75 (1.21)	-0.19 (1.03)	-0.18 (0.66)
Male	-1.17 (0.82)	1.44 (1.18)	1.62 (1.00)	1.17 (0.65)
Never married	-5.25*** (0.88)	-1.78 (1.26)	-0.83 (1.07)	0.60 (0.69)
Previously married	-3.76* (1.68)	-2.43 (2.42)	-0.73 (2.06)	2.35 (1.33)
Income comfortability	-2.45*** (0.47)	-1.62* (0.68)	-0.60 (0.58)	-0.01 (0.37)
Ability (offline)	-0.05 (0.11)	-0.23 (0.15)	-0.17 (0.13)	0.06 (0.08)
Opinion (offline)	0.11 (0.16)	0.98*** (0.24)	0.08 (0.20)	-0.11 (0.13)
F-INCOM ability	-0.25** (0.10)	-0.33* (0.14)	0.004 (0.12)	0.11 (0.08)
F-INCOM opinion	0.26* (0.12)	0.33 (0.18)	0.44** (0.15)	-0.03 (0.10)
Constant	43.04*** (5.20)	41.08*** (7.50)	24.44*** (6.37)	15.10*** (4.11)
Observations	244	244	244	244
R <sup>2</sup>	0.35	0.26	0.13	0.12
Adjusted R <sup>2</sup>	0.31	0.22	0.08	0.08
Residual Std. Error (df = 231)	6.00	8.64	7.34	4.74
F Statistic (df = 12; 231)	10.26***	6.84***	2.80**	2.66**

*Note:* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < 0.001$ . Regression table shows unstandardized regression coefficients with standard errors in parentheses. US residents is a binary variable with 1 denoting that the respondent resides in the US and 0 denoting that they reside in the UK. University education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree. Never married and previously married are in comparison to respondents who are currently married or cohabiting. Income comfortability is on a scale of 1 to 4, with 1 indicating that it is very difficult on the respondent's present income and 4 indicating that a respondent is living comfortably on their present income.

## Discussion

The purpose of this study was to explore the relationships between different types of Facebook comparison orientation and the components of SWB. Partially confirming my earlier predictions, the results of this study revealed negative associations between the comparison of abilities on Facebook and life satisfaction and eudaimonic well-being, but was not related to positive or negative affect in this sample. There were also positive associations between the comparison of opinions on Facebook and life satisfaction and positive affect, thus confirming the hypothesis that the comparison of opinions would be differently associated with SWB than the comparison of abilities.

The results for life satisfaction and eudaimonic well-being were in line with my hypothesis for the comparison of abilities on Facebook. The results showed that users who compare their abilities on Facebook had lower life satisfaction and eudaimonic well-being. This makes sense as the comparison of abilities deals with performance. While the comparison of performance can deal with physical or mental performance ('Am I a better basketball player than my friend?'; 'How did I do on my exam compared to my friend?'), it can also deal with a more general definition of performance ('Am I as successful as my friend?'). In an online context, the comparison of abilities likely manifests more often as the 'success' of the user compared to the 'success' of their Facebook friends due to the prevalence of information about the success of others. As discussed previously, the Facebook newsfeed makes it easy for users to broadcast their success to their Facebook friends (see Chapter 2, page 46). These successes may be career success, such as posts about graduations, career promotions, pictures of expensive holidays or vehicles, or about life stage success such as pictures of engagements, marriages, new babies or posts about successful romantic relationships. While these successes were probably hard earned, the Facebook user absorbing these successes does not see this hard work, which is perhaps why users feel like their friends are happier and having better lives if they 'see' these friends only on Facebook and not in 'real life' (Chou & Edge, 2012). As frequent social comparison has been linked to emotions such as envy, guilt, and shame regardless of the direction of comparison (White et al., 2006), it makes sense that frequently feeling these emotions would diminish life satisfaction and eudaimonic well-being. Additionally, a recent study (published after this study had been conducted) found that users high in ability comparison orientation were more likely to feel envy and depression from their comparisons, and less likely to feel optimism and inspiration. These comparison based emotions mediated the relationship between the comparison of abilities on Facebook and life satisfaction (Park & Baek, 2018).

Although the results for life satisfaction and eudaimonic well-being were in line with my predictions for the comparison of abilities on Facebook, I was surprised to see that positive and negative affect were not associated with the comparison of abilities on Facebook. Prior research has found that time spent passively using Facebook lowers mood, and had hypothesised that social comparison may have been part of this process as the research also revealed that this relationship was driven by envy (Verduyn et al., 2015). While these results seemingly contradict this finding, it is possible that it is not frequent comparison that impacts mood, but negative comparison (as supported by the findings in chapter 2). There may also be mediating or moderating variables which potentially change the relationship between comparison orientation and the measures of affect. For example, a previous study found that individuals with low self-esteem were more likely to compare themselves frequently on Facebook than individuals with high self-esteem, and that self-esteem moderated the relationship between motivation to compare oneself on Facebook and affect (Cramer, Song, & Drent, 2016).

The results also revealed unpredicted relationships between the comparison of opinions on Facebook and life satisfaction and positive affect. While unexpected, these associations may be related to building social capital or social connectedness on Facebook, as the comparison of opinions would enable users to identify which friends they share interests and opinions with. This theory may be supported by an older Facebook study which found that the more similarities between Facebook friends (i.e., gender, age, neighbourhood), the closer the social tie (Mesch & Talmud, 2007). It may also be related to belief confirmation, as a recent study found that the validation of opinions, positive affect, and trust sequentially mediate the relationship between attitude similarity and platonic attraction (Singh et al., 2017). When applied to Facebook, having opinions or beliefs confirmed by Facebook friends (who are likely to have similar educational and demographic backgrounds: Jang et al., 2016)

may lead to positive affect, which then would lead to trust and closer social ties. This process should be further investigated in future research. This result may also be related to comparison based emotions, as Park and Baek found that users who compared their opinions on Facebook frequently were more likely to feel inspiration and optimism, and less likely to feel depression and envy from their comparisons (2018). These emotions mediated the relationship between the comparison of opinions on Facebook and life satisfaction (Park & Baek, 2018).

The results of this study suggest that how frequently individuals compare themselves on Facebook may matter for SWB. As the results of this study showed differences for SWB components based on whether users were comparing their abilities or opinions, the results of this study also corroborate the findings of Appendix B, which suggest that INCOM is more sensitive when split into its subscales, as opposed to a unidimensional measure. The results also showed different associations for SWB for online and offline comparison orientation, thereby further validating the claim that online and offline social comparison are separate constructs (Cramer et al., 2016; Feinstein et al., 2013). In conclusion, the results of this study demonstrate that individual differences in Facebook ability and Facebook opinion comparison orientation are associated differently with the components of SWB.

### **General discussion**

Taken together, the results of this chapter reveal some interesting findings. Study 5.1 found that passive users compare abilities and opinions, whereas active users compare only opinions. The results from study 5.2 indicate that the comparison of abilities is negatively associated with SWB, whereas the comparison of opinions is positively associated with SWB. As the Facebook literature indicates that passive use is usually associated with lower SWB, while active use is not (Burke et al., 2010; Grieve et al., 2013; Verduyn et al., 2015), it



is possible that the results of these two studies are related. Comparison orientation may mediate the relationship between engagement style and SWB. Future studies should investigate whether the comparison of abilities on Facebook mediates the relationship between passive use and SWB (especially life satisfaction and eudaimonic well-being). Additionally, as chapter 2 revealed that personality traits can moderate the relationship between Facebook social comparison and components of SWB, it may be appropriate to run a moderated-mediation model, where the comparison of abilities on Facebook mediates the relationship between Passive use and SWB, and the comparison of abilities is moderated by personality traits. However, this type of analysis would require a large sample size with longitudinal data (required for mediation). As the data collected for the studies run in this chapter is cross-sectional, this analysis is beyond the scope of the thesis. Future studies should also investigate whether comparison-based emotions mediate or moderate these relationships as they did in Park and Baek's recent study on life satisfaction (2018).

### **Chapter limitations and future work**

The research conducted in this chapter is cross-sectional and correlational, and thus the direction of causality cannot be determined. It is possible that users who compare their abilities frequently are more likely to be passive users (and users who compare their opinions are more likely to be active users), or to some extent, causality may run both ways. It is also possible that personality moderates this process, or that individual differences which were not controlled or accounted for are (at least) partially responsible for the relationships found in the results. While the studies in this chapter controlled for frequency of offline comparison, they did not control for offline social comparison valence. Future research seeking to replicate and extend these results should include a control for offline social comparison valence in addition to controlling for offline comparison orientation. Future work should

further investigate the relationship between Facebook engagement styles and the comparison of opinions on Facebook; especially in relation to the creation and maintenance of filter bubbles.

Although the associations in this chapter were significant, the effect sizes for both studies were small. This suggests that while Facebook engagement style does play a small role in social comparison behaviour, and online social comparison does play a small role in users' SWB, there are other variables which may have more of an impact on how individuals engage with the site and their SWB.

### **Chapter summary**

In conclusion, this chapter contributes to the literature on active and passive Facebook use by establishing that (at least in this sample) there is a relationship between Facebook engagement style and individual differences online comparison orientation. Active social users and Active non-social users are more likely to compare their opinions on Facebook, while Passive users compare both abilities and opinions. This chapter further suggests that these relationships may be involved in the previously found relationships between active and passive use and SWB by investigating how individual differences in Facebook comparison orientation are associated with the components of SWB. The results identify the comparison of abilities (associated with Passive use) to be negatively related to SWB, and the comparison of opinions (associated with Active use) to be positively related to SWB. Although further studies are needed to confirm that these findings are related, this chapter takes a first step in identifying why active and passive use may have different impacts to SWB.

# **Chapter 6. General discussion**

## **Introduction**

In summary, the work in this thesis has investigated how individual differences in personality, comparison orientation and Facebook use are associated with subjective well-being (SWB). The thesis therefore contributes to the ongoing work on how social media use can contribute to or lower SWB. Throughout the thesis, I have presented evidence that individual differences are associated with how Facebook is used, and subsequently how Facebook use is associated with SWB. I first demonstrated that personality can moderate the relationship between aspects of Facebook use and SWB. I then created and validated a new measure to quantify individual differences in Facebook engagement, and demonstrated that personality traits are associated with different patterns of Facebook engagement. Additionally, I showed that individual differences in Facebook engagement and intensity have unique associations with the components of SWB. Finally, I presented new evidence that there may be a relationship between different types of Facebook engagement and individual differences in social comparison behaviour, and that these differences in comparison orientation on Facebook are differently associated with the components of SWB.

In this chapter, I will summarise the major findings from each study by chapter, and discuss the practical and theoretical implications of the work. I will also consider the limitations of the thesis and make suggestions for future research.

## **Study summaries by chapter**

### **Chapter 2**

Study 2.1 in chapter 2 demonstrated that some RST personality traits moderate the relationship between the components of SWB and Facebook social comparison valence. The

results revealed that Goal-Drive Persistence moderated the relationship between Facebook social comparison and eudaimonic well-being, and that BIS moderated the relationship between Facebook social comparison and negative affect. This extends previous research which found that personality is associated with both SWB (DeNeve & Cooper, 1998; Diener et al., 1999) and Facebook use (Amichai-Hamburger & Vinitzky, 2010; Caci et al., 2014; Ljepava et al., 2013), and that negative social comparison on Facebook is associated with depressive symptoms (Feinstein et al., 2013; Frison & Eggermont, 2016; Steers et al., 2014).

Chapter 2 also included preliminary analyses on the relationships between the key variables in the thesis. First, I investigated the relationship between Facebook intensity and the components of SWB. Previous research on Facebook use and SWB typically focuses on life satisfaction (e.g., Ellison et al., 2007; Nabi, Prestin, & So, 2013; Oh, Ozkaya, & LaRose, 2014). While there are some exceptions which investigate other components (affect: Sagioglou & Greitemeyer, 2014; Verduyn et al., 2015; eudaimonic well-being: Liu & Yu, 2013; Park & Baek, 2018), there are no studies, to my knowledge, which investigate associations between Facebook use and all three components of SWB simultaneously. The data showed intense Facebook use was positively associated with most of the components of SWB (life satisfaction, eudaimonic well-being and positive affect). However, this chapter investigated unidimensional Facebook intensity. There is now research which suggests that Facebook use should not be considered or measured as a singular activity (Appel, Gerlach, & Crusius, 2016; Orosz et al., 2015). This is remedied in chapter 4 by accounting for Facebook engagement style and multidimensional Facebook intensity.

Next, I investigated how Facebook social comparison (valence) was associated with the components of SWB. Previous research on Facebook social comparison has tended to focus on

the direction of comparison (i.e., Liu et al., 2017; Steers et al., 2014; Wang, Wang, Gaskin, & Hawk, 2017). While direction can reveal information about how comparisons take place, research shows that both upward and downward social comparison can be beneficial or detrimental to SWB (Buunk et al., 1990), therefore, I chose to look at whether individuals were considering themselves in a positive or negative light in comparison to their Facebook friends. Prior research has demonstrated that negative Facebook social comparison is associated with depressive symptoms (Feinstein et al., 2013). Results revealed that individuals who compare themselves in a negative light to their Facebook friends report lower life satisfaction, eudaimonic well-being, positive affect and higher negative affect. This finding is corroborated by recent longitudinal research which found that negative social comparison on Facebook has a reciprocal relationship with life satisfaction. Increased rates of negative social comparison predicted reduced life satisfaction over time, and decreased life satisfaction predicted higher rates of negative comparison (Frison & Eggermont, 2016). Future research is needed to determine whether negative social comparison is also reciprocally related with the other components of SWB.

Chapter 2 also investigated preliminary relationships between SWB and RST-PQ traits. As RST-PQ is a new measure for RST, previous research on how these traits relate to SWB had (to the best of my knowledge) not been conducted in other research. The data revealed several relationships between the components of SWB and RST personality traits; Reward Interest, Reward Reactivity and Goal-Drive Persistence were positively associated with some of the components of SWB, while BIS and Impulsivity were negatively associated with some of the components of SWB (see p. 60).

### **Chapter 3**

The purpose of chapter 3 was to develop and validate a measure for Facebook engagement, so that active and passive use could be measured using an online questionnaire. In study 3.1, I used literature on active and passive Facebook use to adapt the Facebook activity questionnaire (Junco, 2012) for use as a multi-item measure. Previous research on active and passive use relied on non-validated measures (Krasnova et al., 2013; Shaw et al., 2015), manipulated engagement style experimentally (Sagioglou & Greitemeyer, 2014; Verduyn et al., 2015), or had access to Facebook's server logs which allowed user activity to be tracked (Burke et al., 2010). Exploratory factor analysis revealed three factors: Active social use, where users create content and socialise with others, Active non-social use, where users create content without socialising directly (i.e., responding to RSVPs, clicking share on content), and Passive use, where users neither create content nor socialise. I named this measure the Passive Active Use Measure (PAUM). The structure of the PAUM was then validated through confirmatory factor analysis on two samples, and further validated with test re-test reliability. The factors of the PAUM demonstrated good discriminant validity from other measures in all three samples, and acceptable test re-test reliability.

### **Chapter 4**

The purpose of chapter 4 was twofold: to investigate how individual differences in personality were associated with Facebook engagement style (study 4.1), and to assess how individual differences in Facebook use (measured as engagement style and multidimensional intensity) were associated with SWB (study 4.2). Prior research on Facebook use and personality has focused on motivations for use (Orchard et al., 2014; Seidman, 2013) and features accessed

on the site (Amichai-Hamburger & Vinitzky, 2010; Bachrach et al., 2012; Caci et al., 2014). However, as no validated measure for Facebook engagement had previously been available, to my knowledge, no research had investigated how Facebook engagement styles were associated with personality traits. The results for study 4.1 revealed that RST personality traits are associated with different types of Facebook engagement; Reward Interest and Reward Reactivity were associated with multiple types of engagement, Goal-Drive Persistence and Impulsivity were associated with Active non-social use, and FFFS was associated with Passive use.

The results for study 4.2 revealed that Active social and Active non-social were positively associated with multiple components of SWB, while Passive use was negatively associated with life satisfaction. This new information is important, as prior studies on Facebook use and SWB tend to focus on life satisfaction as a sole measure of SWB (e.g., Ellison et al., 2007; Nabi, Prestin, & So, 2013; Oh, Ozkaya, & LaRose, 2014). The results of study 4.2 may indicate that Passive use is not as negative for SWB as previous studies suggest, or that life satisfaction is especially sensitive to types of Facebook engagement. The results further revealed that individuals who use Facebook intensely to alleviate boredom or as a form of self-expression have higher SWB, while users who overuse report lower SWB. These differentiations are important, as it is common for prior research to evaluate Facebook intensity as unidimensional (i.e., Ellison et al., 2007; Grieve & Kemp, 2015; Kalpidou, Costin, & Morris, 2011). The different associations between individual differences in Facebook engagement and intensity and the components of SWB demonstrate that measuring Facebook as a singular activity can conceal differences between types of use with positive associations and types of use with negative associations.



## **Chapter 5**

The purpose of chapter 5 was to investigate whether individual differences in Facebook engagement were associated with social comparison behaviour. This relationship had been implied in previous research (Frison & Eggermont, 2016; Rousseau et al., 2017; Wang et al., 2017), but had not (to my knowledge) been investigated directly. The results from study 5.1 found that Active social and Active non-social users compared their opinions on Facebook, while Passive users compared both their opinions and abilities. Active non-social users were also more likely to view themselves in a positive light when comparing themselves to their Facebook friends. As predicted, there was a difference in social comparison behaviour between Active users and Passive users. As Passive use had been associated with lower SWB both in chapter 4 and in the literature (Krasnova et al., 2013; Shaw et al., 2015; Verduyn et al., 2017), study 5.2 was designed to investigate how individual differences in social comparison orientation on Facebook were associated with SWB. The results revealed that the comparison of opinions on Facebook was associated with higher SWB, while the comparison of abilities on Facebook was associated with lower SWB. The results also corroborated a previous study which suggested that online and offline social comparison were separate constructs (Feinstein et al., 2013).

### **Theoretical implications**

The results of this thesis have theoretical implications for future work. Overall, these implications highlight the importance of taking individual differences into account when investigating variables regarding Facebook use, and make suggestions about how these variables are best measured to understand how the use of Facebook (or other social networking sites) is associated with users' SWB.

## **Facebook intensity**

Both chapters 2 and 4 investigated the relationship between Facebook intensity and the components of SWB; however, the results for Facebook intensity from chapter 2 yield different associations with the components of SWB than chapter 4. This is likely due to how Facebook intensity was measured in both chapters; as chapter 2 investigates unidimensional Facebook intensity while chapter 4 investigates multidimensional Facebook intensity. The results of study 4.1 show that different types of Facebook intensity are associated differently with the components of SWB. While unidimensional Facebook intensity is currently one of the most common measures of Facebook use (e.g., Alhabash & Ma, 2017; de Vries & Kühne, 2015; Ellison et al., 2007; Grieve et al., 2013; Su & Chan, 2017), the results of this thesis corroborate previous findings which suggest that Facebook intensity is not a unidimensional construct and should not be measured as such (Appel et al., 2016; Orosz et al., 2015). Thus, future work in the area should be aware of the multidimensional nature of Facebook use and should not measure use of the site as a unidimensional concept; especially when considering how Facebook use is associated with users' SWB, as measuring Facebook use as unidimensional may further contribute to the mixed literature on the association between SWB and Facebook use. Researchers should also investigate whether intensive use of other social media sites is multidimensional, as most modern social networking sites offer multiple activities, which may lead to users having different intensity styles.

## **Facebook engagement**

The work in the later chapters of this thesis (chapters 3, 4 and 5) demonstrates that there are individual differences with how users engage with Facebook; and that these engagement styles are associated with user personality traits, individual differences in social comparison behaviour, and users' SWB. While more recent work is beginning to account for how users engage with Facebook (e.g., Ballantine & Stephenson, 2011; Shaw et al., 2015; Wang et al., 2017; Wang et al., 2017), many studies use Facebook intensity as the sole measure of Facebook use (e.g., Chapter 2; de Vries & Kühne, 2015; Ellison et al., 2007; Grieve et al., 2013), thus neglecting how users are engaging with the site. The results of study 4.2 show that how a user engages with Facebook plays a role in how Facebook use is associated with SWB, and the results of study 5.1 suggest that how users are engaging with Facebook may also be related to social comparison. Together, these studies demonstrate that how a user engages with Facebook is an important component to consider when investigating how users are affected by social media use. Future work should therefore consider (or at least control for) differences in engagement style when studying social media topics.

## **Social comparison**

The results of chapter 5 support previous findings that online and offline social comparison are separate constructs (Feinstein et al., 2013). This may be an important consideration for future work in online social comparison research, as some previous studies have used the Iowa-Netherlands Comparison Orientation Measure (INCOM; not adapted) to

measure online social comparison (Ozimek & Bierhoff, 2016; Vogel et al., 2015; Wang et al., 2017). Future research on social comparison on social media sites should therefore use social comparison measures which have been adapted for the social media site in question, or clearly state to the respondents that they should be considering how they compare themselves online to avoid erroneously measuring offline social comparison.

The research in Chapter 5 of this thesis also supports the work from Appendix B, which suggests that the INCOM is more sensitive to individual differences when used as a multidimensional construct. For example, the results of study 5.1 found that individual differences in Facebook engagement style yielded different associations with the factors of Facebook social comparison (ability and opinion); furthermore, the results of study 5.2 found that individual differences in Facebook social comparison orientation were associated differently with the components of SWB. As the INCOM is a popular measure for social comparison in social media research (e.g., Cramer et al., 2016; Feinstein et al., 2013; Steers et al., 2014; Vogel et al., 2015; Wang et al., 2017), and is most frequently used as a unidimensional measure (exceptions: Ozimek & Bierhoff, 2016; Park & Baek, 2018), the results of this research illustrate the importance of breaking the INCOM down into its respective subscales.

### **Subjective well-being**

Previous research on Facebook use typically operationalises SWB by measuring a single component of SWB (e.g., life satisfaction: Ellison et al., 2007; Grieve et al., 2013; affect: Shaw et al., 2015; Verduyn et al., 2015; or eudaimonic well-being: Liu & Yu, 2013; Park & Baek, 2018). The research in this thesis demonstrates that different types of Facebook use (intensity styles and engagement styles) and different types of Facebook social comparison (ability,

opinion, valence) are associated differently with the components of SWB. Thus, future work should measure multiple components of SWB, as operationalising SWB by a single component may be contributing to the mixed results in the literature as each component of SWB yields a unique association with different types of Facebook use and behaviour. Therefore, this work highlights the importance of measuring multiple components of SWB simultaneously in social media research.

## **Practical applications**

### **Applications for users**

With over 2 billion people accessing Facebook monthly (Facebook Newsroom, 2018), it is important for its users to be aware of how different types of Facebook use are associated with SWB. This research can be disseminated to the public to make Facebook users better informed about how different types of use are associated with SWB, thereby allowing users to make conscious choices about their Facebook habits.

While this research focused on adult Facebook use, there is a growing concern in today's society that spending time on social networking sites may not be beneficial for children and adolescents (Allen, Ryan, Gray, McInerney, & Waters, 2014; Blomfield Neira & Barber, 2014; Frison & Eggermont, 2016). Facebook allows users as young as thirteen to create a Facebook profile, and as technology develops (such as smartphones/tablets) it has become increasingly difficult for parents to keep track of when/how often their children are logging onto social networking sites (Ofcom, 2017, p. 186). As the ubiquity of computers makes it difficult to prevent young users from accessing Facebook entirely, parents may be able to apply the results of this research to guide their children on how best to use social networking sites. Parents could

advise their children about different types of use (active/passive, types of intensity), and about image management and social comparison to foster realistic self-expectations and healthy social media use habits.

### **Applications for Facebook**

This research could be applied to improve the Facebook newsfeed algorithms, and potentially used to further personalise these algorithms to benefit the SWB of its users. Current developments in big data online programming have identified a way to determine personality traits from a user's Facebook 'likes' (University of Cambridge Psychometrics Centre, 2015). In combination with the research from this thesis, this technology could be used to offer further customisation of the newsfeed to users who are concerned about how Facebook is affecting their SWB. Facebook could add an option to the newsfeed algorithm which allows users to 'opt in' to newsfeed personality customisation to optimise their SWB. If users opted in, Facebook could then customise the newsfeed specifically to the user's traits; for example, if a user has high Ability comparison orientation (chapter 5, study 5.2) or high BIS (chapter 2, moderation model), the newsfeed could show this user less status updates/photos about the successes of acquaintances which the user is unlikely to see in everyday life (via geographical information on friends' Facebook profiles), thereby making it less likely that this user would socially compare in a way that would be damaging to his/her SWB.

Due to recent media attention on how Facebook use can negatively impact SWB, Facebook's own research team has acknowledged that passive use can negatively affect its users (Ginsberg & Burke, 2017). This press release identifies ways Facebook have updated their software to make it better for its users, including minimising false news and clickbait headlines,

improving ranking algorithms so that Facebook shows its users posts from their close friends first, and redesigning the comments feature to promote active communication. While these new features are a step in the right direction, these improvements do not directly address passive use. As a solution to passive use, Facebook could add a subroutine to their newsfeed algorithm which prompts users to participate if they have been passively scrolling for a set amount of time. This could be as simple as a window pop-up which informs the user about passive use, forcing the user to click “OK” before going back to his/her newsfeed, similar to Netflix’s “Are you still watching?” function. Alternatively, the newsfeed algorithms could be set to only allow users to scroll through the newsfeed for a set amount of time without interacting with content. After the set time has passed without the user clicking on content or interacting with the site in some way, the newsfeed could stop loading new content, forcing the user to change activities.

While the research in this thesis focused on individual differences in *how* Facebook is used, there is also evidence that *when* Facebook is used is also associated with SWB. For example, recent research found that adolescents who used social networking sites before bed reported lower sleep quality, which in turn was associated with higher depression and anxiety (Woods & Scott, 2016). As depressive symptoms and anxiety are correlates of SWB, I further propose that Facebook could offer its users a ‘Cinderella’ version of the site/app. ‘Cinderella’ is a commonly used term in the US to designate that something will stop working after a certain hour, as Cinderella’s coach turns into a pumpkin (stops working) after midnight. This ‘Cinderella’ Facebook setting would prevent the user from accessing his/her account during certain hours (i.e., 12 AM – 7AM) and prevent push notifications during these times. Given previous research on how social networking before bed is negatively associated with adolescent

sleep quality and correlates of SWB (Woods & Scott, 2016), this version of the Facebook app should perhaps be mandatory for users between the ages of 13-18.

### **Limitations**

The research in this thesis is cross-sectional and correlational, therefore I cannot comment on the direction of causality. It is possible that users with low SWB are more likely to compare their abilities to others on Facebook, overuse the site, or to use passively, and that it is not how Facebook is being used which lowers SWB. While a recent longitudinal study suggests that causality does run in the direction expected (Shakya & Christakis, 2017), more longitudinal research is needed to establish the direction of causality for the relationships investigated in this thesis.

The work in this thesis relied on self-report data. While respondents knew that their data was completely anonymous, and data quality checks were added to ensure respondents were reading the questions, it is not possible to account for whether respondents were entirely honest or accurate in their responses. Inaccurate responses may have been intentional (i.e., to cast themselves in a better light), or unintentional (i.e., there is evidence that Facebook users may not be able to estimate the time they spend on the site accurately (Araujo, Wonneberger, Neijens, & de Vreese, 2017; Junco, 2013)). Furthermore, this self-report data was collected from online data collection websites including MTurk and Prolific Academic. There is debate in the academic community about the quality of data collected from sites like MTurk. Some literature suggests that Turkers (a term used to describe individuals who participate in studies on MTurk) are less attentive to study instructions (Crump, McDonnell, & Gureckis, 2013), are more likely to multitask than traditional study participants (Clifford & Jerit, 2014), and therefore may provide



low quality data. However, research has also found that Turkers were more attentive to instructions than student populations (Hauser & Schwarz, 2016), less likely to multitask than other samples (Kees, Berry, Burton, & Sheehan, 2017), and that Turkers produce equal or higher quality data than student populations (Casler, Bickel, & Hackett, 2013). Turkers also tend to provide a more diverse sample than student populations (Casler et al., 2013; Crump et al., 2013), allowing data to be more applicable to the general population. While data quality can never be guaranteed, the questionnaires in this thesis followed the advice of previous research on MTurk and included rigorous data quality checks including attention checks such as “Please select slightly disagree for this question” and the disqualification of respondents who completed the surveys in an unrealistic amount of time or selected the same answer for every item in a matrix (known in the literature as “speeders” and “cheaters”; Smith, Roster, Golden, & Albaum, 2016). Regardless, individuals who join online sites like MTurk and Prolific Academic have self-selected into taking surveys frequently, and therefore may differ from the general population.

The respondents for the studies in this thesis volunteered to participate, therefore, the samples for each study may suffer from self-selection bias. Additionally, the respondents for this thesis were mostly drawn from western samples (USA and UK), and therefore future work should investigate whether these results also apply to other cultures.

Finally, the work in this thesis focused specifically on Facebook use. While Facebook is the most popular social networking site (see Chapter 1, p. 31), each social networking site has different features, activities, and motivations for use (Alhabash & Ma, 2017; Panek, Nardis, & Konrath, 2013) and therefore likely produces different associations with SWB. Therefore, the work in this thesis cannot be generalised to other social networking sites.

**Studies not included in this thesis.** Two studies undertaken during this thesis were not included in the main text, but instead were added to the appendix.

The first study built on the previous work of Sagioglou and Greitemeyer (2014) who found that Facebook users commit an affective forecasting error; users believe using Facebook will make them feel better, when in fact, using it makes them feel worse. This study was designed to test whether memories of the time users spent on Facebook were related to this forecasting error. The results from this experiment replicated previous findings that Facebook use lowers mood (Sagioglou & Greitemeyer, 2014; Verduyn et al., 2015), but did not find any significant results regarding Facebook memories influencing mood. As the studies in this thesis were cumulative, and this study only investigated affect (and not the other components of SWB), it did not fit with the main story of the thesis and was thus moved to the appendix. See Appendix C for further details.

The second study which was undertaken but not included in the main text sought to investigate whether users' self-estimated time spent on Facebook was accurate, and how non-subjectively measured time spent on Facebook impacted the components of SWB. While a previous study (Junco, 2013) had investigated this phenomenon, Junco's study only looked at Facebook use on computers and did not include access from other devices such as tablets and smartphones. To investigate how much time users were spending on Facebook both on their computers and on mobile devices, I ran a pilot study with iPhone/iPad users since mobile Apple devices track how much time an app is open and active on the device per day and per week. Additionally, respondents installed RescueTime, a free productivity software which allows its users to track the use of specific websites. Unfortunately, due to the difficult setup process of RescueTime to only track Facebook use, and the requirement of respondents to send screenshots

of their iPhone/iPad app tracking page, very few respondents accurately recorded/sent the data correctly. Ultimately, there were not enough participants with usable data to run the analysis. See Appendix D for further details.

### **Future directions and work**

Future work should address the direction of causality for the relationships found in this thesis. While some studies have manipulated Facebook use to address causality (Sagioglou & Greitemeyer, 2014; Verduyn et al., 2015), to establish ecological validity and corroborate these findings, future work should use longitudinal data to establish the direction of causality. While a few longitudinal studies on Facebook use exist (e.g., Brandtzæg, 2012; Steinfield et al., 2008), these studies tend to collect data over a short period of time in a longitudinal context (1-2 years). Future work should seek to measure data on the relationship between social media use and SWB over longer periods of time in order to obtain a broader view of how social media use impacts SWB over time. As mentioned previously, future research could also include more diverse cultural samples to establish whether there are cross-cultural differences in Facebook use, and whether the findings of this thesis are specific to individualistic-analytic cultures or whether they can be generalised to collectivistic-holistic cultures.

The research in chapter 2 investigated whether personality traits moderate the relationship between Facebook social comparison valence and the components of SWB. Future research could expand this work by investigating whether personality moderates the relationships between Facebook ability and opinion social comparison orientation. This work could also be expanded by investigating whether personality traits moderate the relationships between multidimensional Facebook intensity (MFIS) styles and SWB; however, this analysis would

require a large sample size to generate enough power to test numerous interactions (personality traits x four MFIS factors).

The work in chapter 3 developed and validated the PAUM scales. During the original development of the PAUM scales, I was not aware that there were three forms of Facebook engagement, and thus one of the items includes both Active social and Active non-social activities (Browsing the newsfeed actively: liking and commenting on posts, pictures and updates). Future research should further distinguish these two distinct, but related factors by separating activities which are social and non-social into their own items (i.e., comments and likes should be separate items). The PAUM scales will also likely need to be updated in the future in order to remain current with Facebook's features.

Furthermore, more work is needed to investigate the relationship between Passive use and the comparison of Abilities on Facebook, as it is possible that the comparison of Abilities mediates the relationship between Passive Facebook use and its impact on life satisfaction. Research is also needed to evaluate how the comparison of opinions on Facebook impacts online and offline social networks, as the research in Chapter 5 suggested that the comparison of opinions may be related to the formation and/or maintenance of filter bubbles. This is increasingly important as social media is now capable of playing a role in political activity, and was recently highlighted in the media for potentially influencing the outcome of democratic elections in the US and UK (Hern, 2017).

Additionally, future work should also evaluate how accurate users are at self-evaluating time spent on sites like Facebook (both computers and mobile devices). This is especially important as many Facebook studies rely on this self-report data as a measure of Facebook use

(i.e., Alhabash & Ma, 2017; Ellison et al., 2007; Kross et al., 2013; Vigil & Wu, 2015), and inaccurate reporting may skew results.

The work in this thesis focused on the RST as opposed to the Five-Factor Model of personality (e.g., Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism; Costa & McCrae, 1992). Although there are similarities between the two theories of personality, more work is needed to compare these theories. To the best of my knowledge, the work in this thesis is the only research to date which investigates Facebook behaviour using the RST of personality, and therefore more work should be done to study how RST traits are related to Facebook and social media behaviour.

Ultimately, Facebook is a tool for human interaction, and as such has the potential to both be beneficial and harmful to SWB. The research in this thesis demonstrates the importance of considering the individual differences users bring into the virtual environment with them, and the importance of how users engage with the site when studying its associations with SWB.

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# Appendices

## Table of appendices

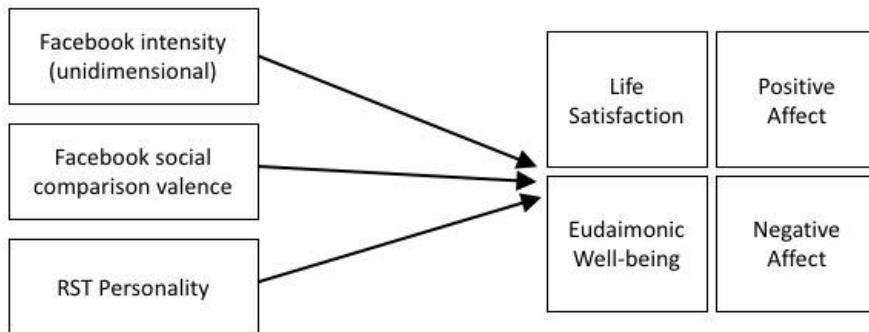
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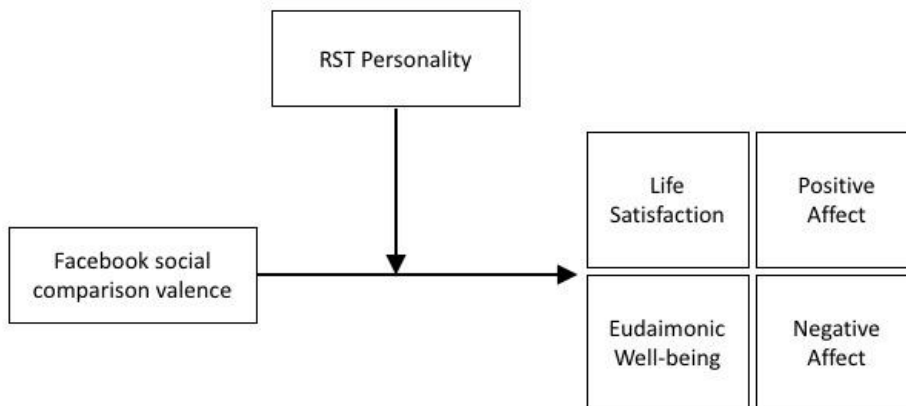
## Appendix A: Relationship diagrams for thesis chapters

### Chapter 2: Relationships Diagram

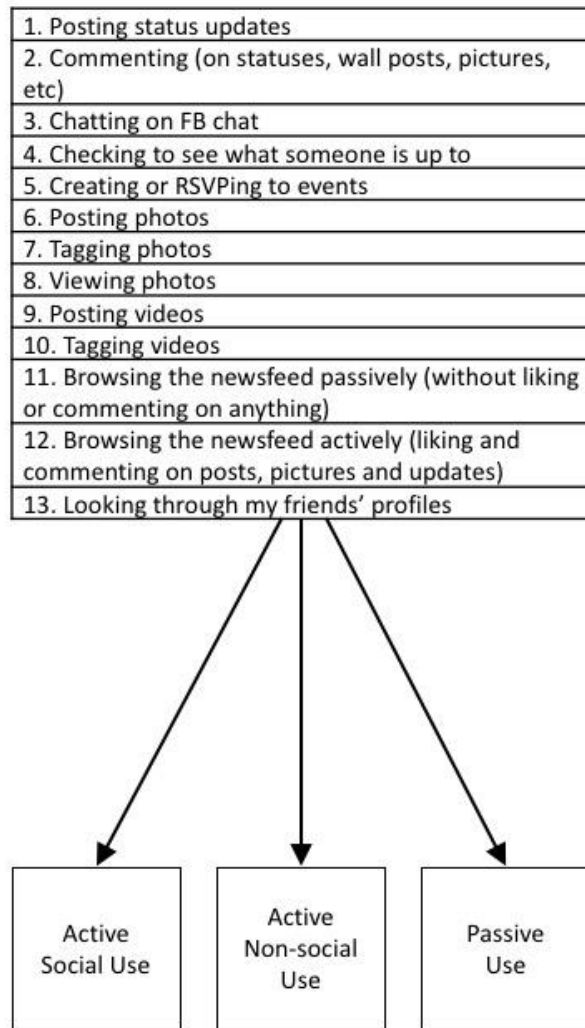
#### Models 1-3



#### Model 4

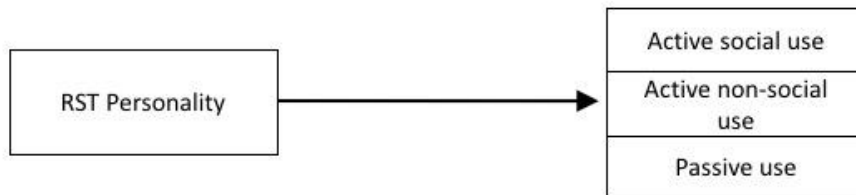


### Chapter 3: Relationships Diagram



## Chapter 4: Relationships Diagram

### Study 4.1

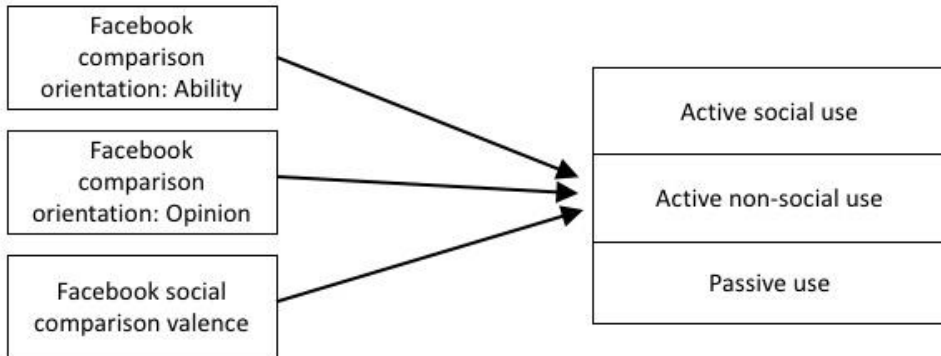


### Study 4.2

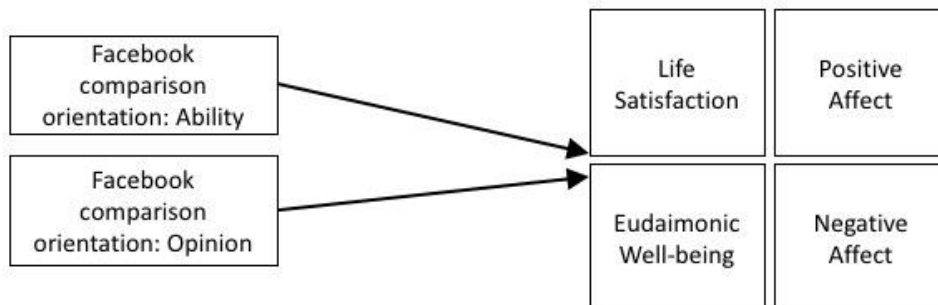


## Chapter 5: Relationships Diagram

### Study 5.1



### Study 5.2



## Appendix B: Dimensionality of the Iowa-Netherlands Comparison Orientation Measure and its relationship to RST personality

### Abstract

The aims of this study were, first, to reassess the factor structure of the Iowa-Netherlands Social Comparison Orientation Measure (INCOM) and, second, to explore the associations of its factors with the Reinforcement Sensitivity Theory (RST) of personality. Data from 337 respondents were collected via online questionnaire. Structural equation models were used to assess the factor structure of the INCOM and test for relationships with RST traits. The results confirmed previous findings that the INCOM contains two factors: Ability, which relates to the comparison of performance, and Opinion, which relates to the comparison of thoughts and emotions. The two-factor model was found to be superior to the commonly used 1-factor solution. The models further revealed significant relationships with RST factors: positive associations between the Ability factor and the Behavioural Inhibition System (BIS) and Behavioural Approach System (BAS) Reward Reactivity; positive associations between the Opinion factor and BAS Reward Reactivity and Goal-Drive Persistence, and a negative association with BAS Impulsivity. These findings indicate that using the INCOM as a single scale is likely to miss significant unique relationships. These findings also provide new insight into how individual differences in personality may influence social comparison behaviour.

### Introduction

Social comparison theory was first introduced in the 1950s (L. Festinger, 1954), and has since become a central concept in the social psychological literature (Buunk & Gibbons, 2007). The theory describes the process by which individuals compare themselves to others in order to self-assess their abilities and opinions (L. Festinger, 1954). While social comparison is broadly recognised as a basic attribute of human socialisation (Gilbert et al., 1995), research indicates that the frequency of such comparisons vary from individual to individual – these individual differences are known as ‘comparison orientation’ (Gibbons & Buunk, 1999). Differences in comparison orientation may be related to personality (E. Diener & Fujita, 1997), however, there is little research on this point. The present study is designed to fill this gap by investigating how individual differences in comparison orientation are related to the Reinforcement Sensitivity Theory (RST) of personality (Corr & Cooper, 2016). As a first step, I evaluated the factor structure of the Iowa-Netherlands Social Comparison Orientation Measure (INCOM) – a commonly used measure of comparison orientation. After confirming the factor structure of the INCOM, I explored how its factors relate to RST personality traits. Understanding if and how personality traits make an individual more prone to social comparison is important as frequent social comparison behaviour has been negatively linked to subjective well-being (Steers et al., 2014; Tesser et al., 1988; Thwaites & Dagnan, 2004; White et al., 2006).

### The Iowa-Netherlands Comparison Orientation Measure

The INCOM was developed to measure individual differences in comparison orientation (Gibbons & Buunk, 1999). As Festinger’s original theory emphasised the comparison of abilities and opinions, Gibbons and Buunk focused on these two concepts. The INCOM has become a widely-used measure to test an individual’s propensity to collect information about others and/or compare that information to their own situation. Although the scale is often used as a single measure, Gibbons and Buunk’s (1999) validation of the scale confirmed that the 11-item scale comprises two subscales: Ability and Opinion. Items which load on Ability are concerned with performance (e.g., “how skilled am I compared to others?”), while items which load on Opinion pertain to the thoughts or opinions of others (e.g., “what should I think?” or “how should I feel?”). Gibbons and Buunk’s analysis stated that a single factor scale was viable as, in their analysis, the two subscales were highly correlated; nevertheless, statistical fit was improved with a two-factor model. Jenny – elsewhere, you say ‘1-factor’ but here ‘two’ – check for consistency of use throughout

This high correlation probably explains why the INCOM scale is frequently used as a single factor. While previous research has investigated how personality impacts global comparison orientation (Gibbons & Buunk, 1999; van der Zee, Buunk, & Sanderma, 1996), to the best of my knowledge, no study has yet decomposed comparison orientation into its two factors and, then, compared their association with personality measures.

### Individual differences and comparison orientation

Individuals with high social comparison orientation (SCO) have three common characteristics. As summarised by Gibbons and Buunk (2007, p. 14): "... those with high SCO are characterised by a combination of

(a) a high accessibility and awareness of the self, (b) an interest in what others feel and think, and (c) some degree of negative affectivity and self-uncertainty."

Based on the Big-5 personality model, there is evidence that personality traits are associated with social comparison behaviour (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee, Buunk, Sanderman, Botke, & Van Den Bergh, 1999) – as is well known, this model has five factors: Extraversion, Neuroticism, Conscientiousness, Openness to Experience, and Agreeableness (Costa & McCrae, 1992). There is a positive association between social comparison and Neuroticism, which represents an individual's propensity to experience heightened states of psychological distress, and it is related specifically to fear, anxiety and depression. Individuals who score high in Neuroticism compare themselves to others frequently, tend to interpret comparisons negatively, and are prone to negative affect from such comparisons (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee et al., 1999). Additionally, evidence indicates that individuals scoring high in Extraversion – which reflects an individual's social tendencies and their inclination to experience positive emotions – show higher comparison orientation; although, it needs to be noted, these individuals interpret comparisons differently than those high in Neuroticism (Olson & Evans, 1999; van der Zee et al., 1999). The remaining Big-5 personality traits do not display consistent associations with comparison orientation (Gibbons & Buunk, 1999; van der Zee et al., 1996; van der Zee et al., 1999).

Most previous studies have used the INCOM measure as a unidimensional scale. Therefore, they cannot account for potential individual differences between the separate factors of Opinion and Ability of comparison orientation. Furthermore, although the Big-5 of personality is commonly used, it does not provide an explanation of the causal sources of these traits (Corr, DeYoung, & McNaughton, 2013). For this reason, it is possible that a different personality framework, such as the Reinforcement Sensitivity Theory (RST; Corr 2008) may shed new light onto the putative roles played by more basic aspects of personality in comparison orientation.

### **Reinforcement Sensitivity Theory**

Reinforcement Sensitivity Theory (RST) is based on the biological and psychological processes which motivate behaviour, and underlie emotion, motivation and learning (Corr, 2008). It assumes that individual differences in personality reflect variations in three systems: the *behavioural approach system* (BAS), responsible for positive-incentive and related to anticipatory pleasure; the *fight-flight-freeze system* (FFFS), responsible for the avoidance of, and escape from, immediate harm, and related to fear; and the *behavioural inhibition system* (BIS), responsible for the detection of goal-conflict (e.g., FFFS-avoidance/escape and BAS- approach), and related to anxiety. As RST is rooted in evolutionary theory, these systems are primarily concerned with success and survival (Krupić, Gračanin, et al., 2016). Social comparison behaviour, too, may have its roots in evolution, as it may have evolved to evaluate competitors and assess which traits increase the likelihood of social and reproductive success (Gilbert, Price, & Allan, 1995). The evolutionary roots of both theories may make RST more suitable to revealing potential relationships between personality traits and comparison orientation than the previous theories used in the literature.

Recent developments in RST research (Corr & Cooper, 2016) suggest a more nuanced relationship between its personality components and those of social comparison. This is especially true for the BAS, which is activated by social rewards, such as prestige and new friendships. While the BAS was originally conceptualised as a single dimension, studies have shown that the BAS is multi-faceted, prompting revisions of the RST (Carver & White, 1994; Smederevac, Mitrović, Čolović, & Nikolašević, 2014; see Corr, 2016 for an overview). While different variations of the revised RST exist (see Krupić, Corr, Ručević, Križanić, & Gračanin, 2016 for an overview), I chose to focus on the recent Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ) operationalisation of the revised RST (Corr & Cooper, 2016).

The BAS has been re-conceptualised to reflect its multi-dimensional nature for the RST-PQ, splitting it into four sub-processes: Reward Interest, Reward Reactivity, Goal-Drive Persistence, and Impulsivity (Corr & Cooper, 2016). As people with high Reward Interest are motivated to seek out new relationships, they may be sensitive to comparing their opinions to those of others to form new relationships. Reward Reactivity is associated with the pleasure of receiving a reward or the excitement of victory; individuals who enjoy the rush of winning may be competitive and, therefore, more likely to compare their abilities. Goal-Drive Persistence is associated with focus, restraint and goal-planning, and deals with the motivation to establish global goals and supporting sub-goals. As such, individuals high in Goal-Drive Persistence should be likely to compare both their abilities and opinions, as research has found that social comparison is sometimes used as a tool for self-improvement (Mumm & Mutlu, 2011; Taylor & Lobel, 1989). Impulsivity is associated with an individual's inclination to disinhibited, thoughtless and non-planned behaviours. These can be beneficial when caution and planning are no longer appropriate and the

reward needs to be seized quickly, but it can impair adaptive behaviour that requires planning and restraint. Accordingly, I do not expect to see an association between Impulsivity and comparison orientation.

The FFFS is activated by immediate threats, such as predators or rivals, and induces, depending on the environmental contingencies, active avoidance or escape behaviours, which are accompanied by the emotions of fear, dread, and panic (based on the severity of the threat). The purpose of the FFFS is to remove the individual from perceived danger; and, for this reason, it is most likely the least relevant RST factor for social comparison. However, it is possible that such a relationship exists, as previous research has found a positive relationship between FFFS and social anxiety (Kambouropoulos et al., 2014).

The BIS is activated when there is a conflict within or between systems (i.e., between any two equally strong, but opposing, goals). The BIS can be activated when a system is in conflict with itself (i.e., the FFFS needs to decide whether to fight or flee) or when two systems are in conflict with each other (i.e., the BAS is motivating an individual to speak to a potential mate, while the FFFS is motivating the individual to flee). It is responsible for risk assessment, passive avoidance, heightened arousal and contributes to anxious behaviour (Corr, 2008; Corr et al., 2013). Although FFFS measures were traditionally included with the BIS in context of the original RST, research has demonstrated that they are separate constructs (Cooper, Perkins, & Corr, 2007). The BIS differs from the FFFS in that it is concerned with the future (although this can be the immediate future), whereas the FFFS operates strictly in the present and is concerned with unambiguous immediate threat, here-and-now. As the BIS is associated with rumination and anxiety (Corr, 2008), it is likely that individuals who are high in BIS are likely to compare both their abilities and opinions frequently.

As social comparison behaviour has been linked negatively to correlates of subjective well-being (Tesser et al., 1988; Thwaites & Dagnan, 2004; White et al., 2006), identifying if personality traits are associated with a propensity to frequent social comparison may aid in the understanding of how personality influences subjective well-being.

### **Dimensionality of the INCOM and its association with RST**

The aims of this study were two-fold. First, to confirm the structure and dimensionality of the INCOM, and, second, to relate these dimensions to the RST of personality. My hypotheses are as follows:

- H1. Individuals higher in Reward Interest will be higher in INCOM Opinion.
- H2. Individuals higher in Reward Reactivity will be higher in INCOM Ability.
- H3. Individuals higher in Goal-Drive Persistence will be higher in both INCOM Opinion and Ability.
- H4. Individuals higher in BIS will be higher in both INCOM Opinion and Ability.

## **Method**

### **Participants and procedure**

The sample from study 2.1 was used for this research (collected February to May 2015). See page 58 for sample characteristics. Data were analysed with R statistical software (R Core Team, 2015) using the *lavaan* package (Rosseel, 2012).

### **Measures**

Comparison orientation was assessed by the Iowa-Netherlands Social Comparison Measure (INCOM; Gibbons & Buunk, 1999; Appendix P). As a single scale, the INCOM has excellent internal reliability (Cronbach's  $\alpha = .90$ ).

Personality was assessed by the Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ; Corr & Cooper, 2016; Appendix H). RST-PQ factors have adequate internal reliability (Table 1).

### **Control variables**

I controlled for socio-demographic characteristics including age, gender and education. I also included a quadratic age term in the models to investigate if age has a curvilinear relationship with the outcome variables. Descriptive statistics for control variables are shown in Table A1

Table A1 Descriptive Statistics for Respondent Characteristics and Personality Traits

Variable	Mean	St. Dev.	Min	Max	Cronbach's $\alpha$
Male	0.4	0.5	0	1	
University Education	0.6	0.5	0	1	
Age	36.5	11.3	18	70	
Reward Interest	17.1	4.6	7	28	.83
Reward Reactivity	26.5	5.5	11	40	.82
Impulsivity	16.6	4.6	8	29	.76
Goal-Drive Persistence	20.2	4.7	9	28	.88
BIS	52.9	16.1	24	88	.95
FFFS	23.7	6.9	10	40	.85

*Note:* University Education was coded as a binary variable with 0 denoting that the participant did not attend university and 1 denoting that the participant obtained at least a university education. Internal reliability was measured with Cronbach's alpha. Composite measures were computed by summing up all items with equal weighting for each item.

### Data analysis

I used structural equation modelling (SEM) to conduct my analysis. The maximum-likelihood method was applied as the data are normally distributed. I included three models in my analysis. The first model tested the fit of the commonly used 1-factor solution of the INCOM, while models 2 and 3 tested different two-factor solutions of the INCOM. I included two models with different two-factor solutions to confirm the structure of INCOM factors, as prior research has found different loadings for item 11 ("I *never* consider my situation in life relative to that of other people"). In Gibbons and Buunk's original research, item 11 loads onto the Ability factor in their first sample, and onto the Opinion factor in subsequent samples (Gibbons & Buunk, 1999). In recent research, item 11 also loads onto the Opinion factor (Schneider & Schupp, 2014). The question of which factor item 11 should load onto prompted my choice to include multiple models of the two-factor solution to find the best fit of the model to the data. Each model also includes a regression to explore how the factors of comparison orientation relate to RST, using the latent factors as dependent variables.

### Results

#### Model 1: INCOM 1-factor solution

The SEM analysis was first conducted with the INCOM loading onto a single factor, which is the most commonly used configuration in the literature. The results revealed a poor model fit ( $\chi^2 = 791.95$ ,  $df(144)$ ,  $p < .001$ , CFI = .74, RMSEA = .12, SRMR = .09).

The SEM regression revealed significant associations between social comparison orientation and two RST traits: Reward Reactivity ( $\beta = 0.24$ ,  $p < .001$ ) and BIS ( $\beta = 0.34$ ,  $p < .001$ ). No other relationships with RST were significant. For a graphical representation of model 1, see Figure A1.

#### Models 2 and 3: 2-factor solutions

The first two-factor solution tested (model 2) the original configuration suggested by Gibbons & Buunk (1999), with item 11 loaded onto the Opinion factor. The results revealed an acceptable fit, although the SRMR was slightly out of the acceptable range (below .05 indicates good fit):  $\chi^2 = 352.46$ ,  $df(133)$ ,  $p < .001$ , CFI = .91, RMSEA = .07, SRMR = .06. The second two-factor solution tested (model 3) loaded item 11 onto Ability instead of Opinion, as found by Schneider & Schupp (2014). The results revealed an improved model fit compared to model 2, with all of the fit indices indicating a good fit ( $\chi^2 = 287.94$ ,  $df(133)$ ,  $p < .001$ , CFI = .94, RMSEA = .06, SRMR = .04).

The data, therefore, confirm that INCOM items load onto two factors, Ability and Opinion, and that a two-factor model should be used instead of the 1-factor model which had a poor fit. While both two-factor models displayed acceptable goodness-of-fit statistics, the fit of model 3 was somewhat better than the fit of model 2, therefore I conclude that item 11 should be loaded onto the Ability factor. The Ability and Opinion factors have adequate internal reliability (Cronbach's  $\alpha$ : Ability = .92, Opinion = .86). Pearson's product-moment correlation



reveals that the two factors are only moderately correlated,  $r = 0.46, p < .001$ , indicating that most of their variance does not overlap. These latent factors have been allowed to correlate in the SEM analysis.

The SEM regressions from models 2 and 3 yielded similar results. While the standardised betas differed slightly, the same coefficients were significant in both regressions. Therefore, I report the results from model 3 (the superior model fit) below. For a graphical representation of model 3, see Figure A2.

### **Ability**

There was a significant positive association between the Ability factor and Reward Reactivity,  $\beta = 0.20, p < .01$ . I also found a significant positive association between the Ability factor and BIS,  $\beta = 0.34, p < .001$ .

### **Opinion**

There was a significant positive association between the Opinion factor and Reward Reactivity,  $\beta = .35, p < .001$ . The results also revealed significant positive associations with Goal-Drive Persistence,  $\beta = 0.13, p < .05$ , and BIS,  $\beta = 0.19, p < .01$ , and a significant negative association between the Opinion factor and Impulsivity,  $\beta = -0.16, p < .01$ .

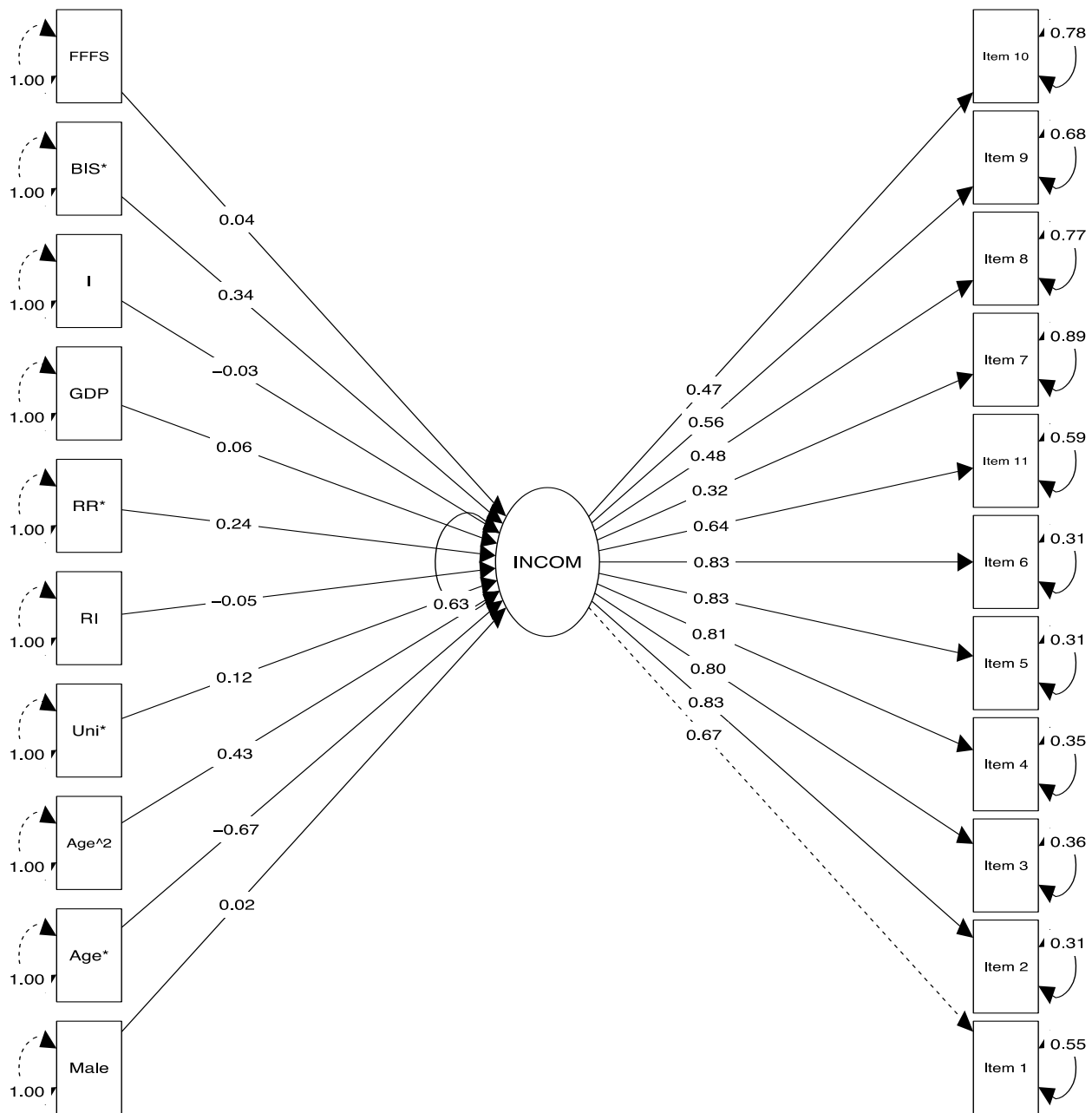


Figure A1. Standardised parameters of the SEM for model 1 with RST personality traits. Significant regression paths ( $p < .05$ ) are denoted with \*. Items 5 and 11 were reverse coded, as per INCOM instructions.



fit to the data when this item is part of the Ability factor. Furthermore, my analysis revealed several relationships between personality traits and social comparison which, to the best of my knowledge, have not been observed before. Previous studies investigating personality and social comparison have opted to use the INCOM as a single factor scale, as opposed to the two-factor approach suggested by Gibbons and Buunk (1999), which was also applied in this study. It is possible that the associations found in this study also exist between the factors of the INCOM and other personality scales, however, the use of the INCOM as a single factor may have led to these relationships being overlooked. Although the results from the Ability factor regression yielded similar results to the single factor INCOM scale regression, the Opinion factor regression revealed additional relationships with Goal-Drive Persistence and Impulsivity which were not observed in the single factor INCOM or the Ability factor regressions. This finding is important for future research interested in differences in comparison orientation, as it confirms that the INCOM scale is more sensitive when split into its two factors.

With respect to personality traits, this study revealed several significant relationships between the factors of the INCOM and the RST of personality. I found positive associations between both INCOM factors and Reward Reactivity as well as BIS in three SEM regression models (Ability, Opinion and single-factor INCOM). Individuals who are high in Reward Reactivity are likely to be competitive, and therefore may compare their abilities to size up the competition. They may further use the comparison of opinions to gain social approval. This fits with prior research as some studies have found a link between Extraversion and social comparison behaviour (van der Zee et al., 1999). Individuals high in BIS are likely to be anxious and prone to rumination, which may lead to the frequent comparison of both their abilities and opinions. It has been hypothesized that BIS is one of the underlying dimensions of FFM Neuroticism (McNaughton & Corr, 2004; Segarra, Poy, López, & Moltó, 2014), and this finding therefore corroborates past research which finds that individuals who are high in FFM Neuroticism are prone to frequent social comparison (Gibbons & Buunk, 1999; VanderZee et al., 1996).

This study revealed two novel relationships between the Opinion factor and personality, namely Goal-Drive Persistence and Impulsivity. Individuals who are high in Goal-Drive Persistence may be rewarded by comparing opinions, as understanding how their viewpoints compare to those of others may allow them to use shared beliefs to gain trust and social affiliation. This theory is supported by recent research which found that the concept of Goal-Drive Persistence is related to the motivation for social exchange (Krupić, Gračanin, et al., 2016). The negative association between Impulsivity and Opinion suggests that individuals who are impulsive are less likely to compare their opinions. As Impulsivity is defined by acting quickly without planning it is possible that individuals high in Impulsivity are less concerned with the opinions of others. Additionally, as individuals who are high in Impulsivity are more interested in immediate rewards (Corr et al., 2013), it is possible that the social rewards available through the comparison of opinions are too time consuming to be appealing.

### **Limitations and conclusion**

There may be a self-selection bias in the data, as respondents volunteered to participate. Also, as the sample was largely from Western societies (USA/UK), I do not know if the results generalise to other cultures.

Additional research is needed to explore whether other relationships with social comparison have been overlooked in previous research by using the INCOM as a single scale. These include social media research, and studies investigating psychological health or depressive symptoms.

In conclusion, this study contributes to the ongoing debate about whether individual differences in personality impact social comparison behaviour. Although the INCOM is frequently used as a unidimensional measure, this study indicates that a two-factor model provides a better fit and reveals associations between social comparison behaviour and relevant covariates that may otherwise be overlooked. This approach allowed us to demonstrate the relationships between RST personality factors and comparison orientation, providing new insights into what type of individuals are more likely to engage in social comparison. This may help us to understand who is prone to frequent social comparison behaviour, which is important as research has established links between frequent social comparison and negative correlates of subjective well-being (Feinstein et al., 2013; Steers et al., 2014; White et al., 2006).

## Appendix C: Do memories from time spent on Facebook influence the Facebook affective forecasting error?

### Introduction

A research study found that Facebook causes decreases in mood, but people still use it. The researchers found that this was due to an affective forecasting error; people believed using Facebook would make them feel better, but spending time on the site made them feel worse (Sagioglou & Greitemeyer, 2014). To further investigate this phenomenon, this study was designed to investigate why this affective forecasting error existed. I hypothesised that what an individual remembered from a Facebook session may be driving this relationship, as I believed that if users remembered socialising with friends or content associated with positive emotions, that this might contribute to the forecasting error.

### Methods

**Procedure and measures.** To evaluate whether Facebook “memory” was related to the affective forecasting error, respondents recruited from MTurk took part in a two-part questionnaire. The first questionnaire took about 20 minutes to complete and included a period of 8 minutes where users were asked to browse Facebook. Respondents filled out the PANAS at the beginning of the first questionnaire, and again after they spent 8 minutes on Facebook. Respondents were then asked if they would be willing to participate in the second half of the study. If they agreed, they were asked not to use Facebook for the next hour and entered their email address (which was kept anonymous from the researchers through Qualtrics). An hour after finishing the initial questionnaire, the respondents who agreed to return were emailed the second half of the questionnaire. The second half of the questionnaire asked respondents to recall what they had seen during their Facebook session, and to indicate if each memory was positive, neutral or negative, and if they considered the activity remembered as social or non-social. After recall, respondents then refilled out the PANAS. Respondents were also asked if they had used Facebook during the hour (but were reassured that they would be paid either way), and about how much stress, exercise and socialising they had experienced during the time between questionnaires. Respondents also filled out measures for other studies (see study 4.1 for additional measures). Upon completion of both parts of the survey, respondents were compensated with \$3 for their time.

**Sample.** The sample for the first half of the survey was the same sample as study 3.1 (234 respondents; 84 males, 150 females,  $M_{\text{age}}=33.80$ ,  $SD=9.31$ , collected June 2016). See page 82 for information on sample demographics. Two-hundred and twenty-nine respondents returned for part two of the questionnaire, which took place an hour after the first questionnaire (81 males, 148 females,  $M_{\text{age}}=33.96$ ,  $SD=9.29$ ). The age in the returning sample ranged from 21 to 67, with most respondents reporting full-time or part-time employment (191 employed, 19 unemployed, 1 maternity leave, 3 retired, 8 students, and 7 “other”). Less than half of the sample (107 respondents) had obtained a university degree (90 had bachelor’s degrees, 16 had master’s degrees and 1 had a professional/doctoral degree).

**Data analysis.** To assess whether positive and negative affect were changing over time, I ran two repeated measures ANOVAs (one for positive affect and one for negative affect) in JASP (JASP Team, 2018). To visualise the data, bar plots were done in R using the ggplot2 package (Wickham, 2009).

To see whether Facebook memories had impacted affect, I ran an OLS regression in R, using the positive and negative affect scores from after memory recall as the dependent variables and number of positive/neutral/negative memories and the number of social/non-social memories as independent variables. As respondents could recall up to 4 memories, and labelled each as positive, neutral or negative and as social or non-social, I arranged the memory variables as follows: Positive memories were given a value of +1, neutral memories were given a value of 0 and negative memories were given a value of -1, resulting in a variable ranging from -4 (respondent recalled all negative memories) to +4 (respondent recalled all positive memories). Non-social memories were given a value of 0, and social memories were given a value of +1, resulting in a variable ranging from 0 (recalled no social memories) to 4 (recalled all social memories). Additionally, the regressions controlled for the amount of stress, socialising and exercise experienced in the hour between questionnaires, as previous research has found that these activities are correlated with affect (Watson, 1988).

## Results

**Positive affect ANOVA.** Mauchly's test showed that the assumption of sphericity had been violated, therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ( $\epsilon = 0.97$ ). There was a significant difference in positive affect between sessions (see Table A2). Bonferroni post hoc tests revealed a small but significant differences between time 1 (before using Facebook) and time 2 (after using Facebook for 8 minutes), and time 1 (before using Facebook) and time 3 (after recalling Facebook session), but no difference between time 2 (after using Facebook) and time 3 (after recalling Facebook session), see Table A3. To further investigate these findings, I plotted the data as a bar plot (see Figure A3). Together, the data suggest that using Facebook for 8 minutes slightly lowered positive affect. Due to the design of the study, it is not possible to say whether recalling the Facebook session re-lowered positive affect, or positive affect simply did not recover after the Facebook session.

Table B1 Within-subjects effects for positive affect

	Sphericity Correction	Sum of Squares	df	Mean Square	F	p
Time	None	163.4 <sup>a</sup>	2.00 <sup>a</sup>	81.68 <sup>a</sup>	5.98 <sup>a</sup>	0.003 <sup>a</sup>
	Huynh-Feldt	163.4 <sup>a</sup>	1.93 <sup>a</sup>	84.53 <sup>a</sup>	5.98 <sup>a</sup>	0.003 <sup>a</sup>
Residual	None	5081.3	372.00	13.66		
	Huynh-Feldt	5081.3	359.46	14.14		

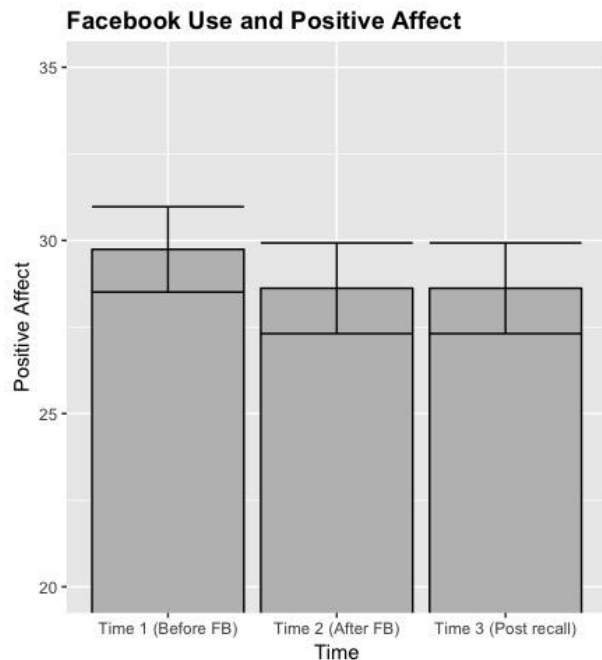
Note. Type III Sum of Squares

<sup>a</sup> Mauchly's test of sphericity indicates that the assumption of sphericity is violated ( $p < .05$ ).

Table B2 Post-hoc comparisons: Positive affect over time

	Mean Difference	SE	t	p <sub>bonf</sub>
Pre-FB Post-FB	1.128	0.420	2.686	0.024
Post-FB Post-Recall	1.160	0.354	3.280	0.004
Pre-FB Post-Recall	0.032	0.370	0.087	1.000

Figure B1 Facebook use and positive affect over time



**Negative affect ANOVA.** Mauchly's test showed that the assumption of sphericity had been violated, therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ( $\epsilon = 0.78$ ). The results show a significant difference in negative affect between sessions (see Table A4). Bonferroni post hoc tests revealed small

but significant differences between time 1 (before using Facebook) and time 2 (after using Facebook for 8 minutes) and time 2 (after using Facebook) and time 3 (after recalling Facebook session), but no difference between time 1 (after using Facebook) and time 3 (after recalling Facebook session), see Table A5. To further investigate these findings, I plotted the data as a bar plot (see Figure A4). Together, the data suggests that using Facebook for 8 minutes slightly raised negative affect. As seen in Figure A4, negative affect goes up after using Facebook, and then returns to its pre-Facebook session levels an hour later after recall.

Table B3 Within subjects effects for negative affect

	Sphericity Correction	Sum of Squares	df	Mean Square	F	p
Time	None	77.78 <sup>a</sup>	2.000 <sup>a</sup>	38.889 <sup>a</sup>	6.619 <sup>a</sup>	0.001 <sup>a</sup>
	Huynh-Feldt	77.78 <sup>a</sup>	1.568 <sup>a</sup>	49.603 <sup>a</sup>	6.619 <sup>a</sup>	0.004 <sup>a</sup>
Residual	None	2185.55	372.000	5.875		
	Huynh-Feldt	2185.55	291.655	7.494		

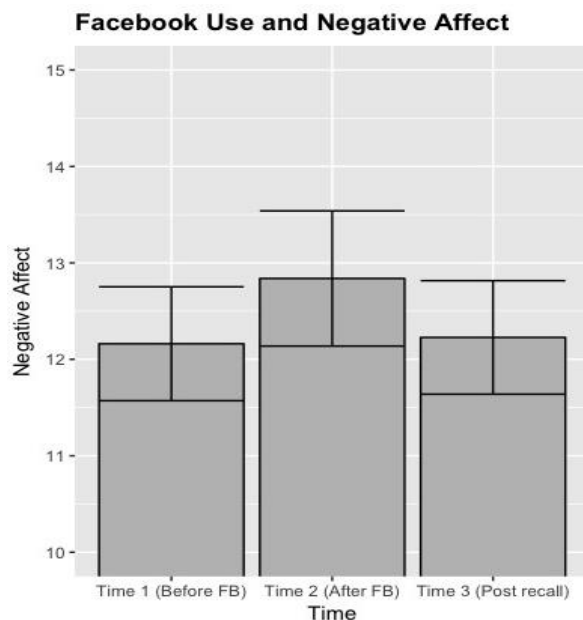
Note. Type III Sum of Squares

<sup>a</sup> Mauchly's test of sphericity indicates that the assumption of sphericity is violated ( $p < .05$ ).

Table B4 Post-hoc comparisons: Negative affect over time

	Mean Difference	SE	t	p <sub>bonf</sub>
Pre-FB Post-FB	-0.813	0.272	-2.990	0.010
Post-recall	-0.048	0.173	-0.278	1.000
Post-FB Post-recall	0.765	0.291	2.628	0.028

Figure B2 Facebook use and negative affect over time



**OLS regressions.** While some of the control variables were significant, there were no significant associations between positive and negative affect and Facebook memories recalled. See Table A6 below.

Table B5 Affective well-being and Facebook memories

	Positive affect	Negative affect
Control variables		

Male	4.31** (1.38)	1.54* (0.62)
Age	-1.00* (0.45)	-0.16 (0.20)
Age <sup>2</sup>	0.01* (0.01)	0.001 (0.002)
University education or higher	-2.77* (1.32)	0.43 (0.59)
Never married	-1.36 (1.51)	-0.29 (0.68)
Previously married	1.60 (3.14)	-1.54 (1.41)
Facebook intensity	0.19*** (0.05)	0.03 (0.02)
Time spent socialising during hour	0.01 (0.04)	-0.003 (0.02)
Other SNS use during hour	-1.26 (1.81)	-1.11 (0.81)
Exercise during hour	1.11 (1.94)	0.81 (0.87)
Stress during hour	-1.10 (0.82)	2.20*** (0.37)
<b>Independent variables</b>		
Type of memory (non-social/social)	0.31 (0.57)	-0.12 (0.26)
Type of memory (negative/neutral/positive)	0.21 (0.41)	-0.31 (0.18)
Constant	37.92*** (9.10)	11.29** (4.09)
Observations	219	219
R <sup>2</sup>	0.19	0.22
Adjusted R <sup>2</sup>	0.14	0.17
Residual Std. Error (df = 205)	9.34	4.20
F Statistic (df = 13; 205)	3.81***	4.39***

*Note:* \*p < .05, \*\*p < .01, \*\*\*p < 0.001, university education or higher is a binary variable with 1 denoting that the respondent had completed at least a university degree, marital categories are in comparison to respondents who are married or cohabiting, “hour” variables are in increments of 15 minutes from 0 minutes to 60 minutes.

### Limitations and conclusions

This study replicated the results of previous work which found that using Facebook lowered mood (Sagioglou & Greitemeyer, 2014), however, the data yielded no evidence that Facebook memories impact the forecasting error which occurs when using Facebook. It is possible that how users remember their Facebook session is not involved in the forecasting error process. Future studies should conduct exploratory research (perhaps with focus groups or interviews) to discover what may be driving the forecasting error, and base further quantitative studies on the results. If the content recalled from Facebook sessions is involved in the forecasting error process, it is possible that the design of this study was not able to detect these effects. A different design (perhaps one which does not require self-report to measure mood) may yield different results and should be investigated further in future work.



## Appendix D: How accurate is self-reported time spent on Facebook?

### Introduction

A previous study by Junco (2013) found that students overestimated the amount of time they spend on Facebook. However, this study measured only the amount of time students spent on Facebook on their computer. As Facebook is also an app for smartphones and tablets, it is possible that students were reporting their use accurately, but were not able to remember accurately where the time was spent on Facebook (which device they were using). Other research has suggested that self-reported estimates of time are not always accurate, especially regarding online activities (Araujo et al., 2017; Kahn, Ratan, & Williams, 2014). Many studies show that time spent on Facebook is associated with subjective well-being (see Chapters 1 and 2 for overview), but most of these studies use self-report, asking users to estimate how much time they spend on the site. The accuracy of these self-estimates must be assessed, as if they are inaccurate, it may alter the association between time spent on Facebook and subjective well-being.

### Methods

**Sample.** A pilot study was run to test the materials and methods needed to collect the data. Students from City, University of London were recruited through the Sona system for the two-part study in November of 2016. Students came to the lab in person to take an online questionnaire and install software. The students were paid in Sona minutes, which are a degree requirement for first-year psychology students at City, University of London. Twenty-seven students (2 males, 25 females,  $M_{age}=19.74$ ,  $SD=4.65$ ) took part in the pilot study. The age in the sample ranged from 18 to 42. The second half of the study took place online two weeks after the respondents completed the first questionnaire.

**Materials and procedure.** To compare self-reported time spent on Facebook versus actual time spent on Facebook, I needed software capable of accurately recording time spent on Facebook for all devices which a user might access Facebook on. To record time spent on the computer on Facebook, users were asked to install RescueTime, a productivity software which keeps track of which applications and websites being used on your computer. RescueTime only records time spent on applications and websites if the app/site is active by tracking mouse movement. If the mouse is not moved for more than 2 minutes, RescueTime stops recording. For this project, I asked respondents to change the privacy settings in RescueTime to only record time spent on Facebook. This application does not record what a user does or sees on Facebook, only that the tab is open and active. To record time spent on smart devices, I required users for this study to have Apple devices, as the settings app which comes preinstalled on all Apple smart devices tracks how much time is spent in each application without requiring additional software. Respondents came to the lab at City, University London and met with either myself or an undergraduate student who was also working on the project. Respondents then filled out a short survey including the subjective well-being component measures, the multidimensional Facebook intensity scale and some questions about their Facebook habits asking them to self-assess how much time they spent on Facebook during an average day and during an average week. The researchers then helped the respondent set up RescueTime on their laptops. Two weeks after the initial questionnaire, respondents were emailed a second questionnaire asking for screenshots of the battery section on their iPhones/iPads displaying how much time they had spent on Facebook that day and that week, and were given instructions on how to email the RescueTime weekly report to the researchers.

### Results

Unfortunately, due to issues with the software, the data for most respondents did not record properly. RescueTime's privacy settings were case sensitive, and so typing in that a respondent wanted to track only "Facebook.com" instead of "facebook.com" resulted in RescueTime not recording any data. I also had issues with the screenshots from iPhones/iPads. Only two participants managed to send us screenshots with useable data, as many sent us pictures of the wrong screen, or the correct screen displaying the percentage of battery that Facebook had used that day/week instead of the amount of time spent with the app open and active. While I was unable to analyse the small amount of data collected from this project, it is still an important question which needs answered. In the future, the issues encountered in this study could be worked out by involving respondents less in the data collection process. If an app was designed which could be installed on both phones and computers, that automatically emailed the data to the researchers at the end of the project, it may make the project feasible. However, as this would require a substantial amount of coding (or hiring someone to create the software), further research into this topic was beyond the resources and scope of this thesis.

## Appendix E: Satisfaction with life scale (Diener et al., 1985)

Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

1 = Strongly Disagree 2 = Disagree 3 = Slightly Disagree 4 = Neither Agree or Disagree 5 = Slightly Agree 6 = Agree 7 = Strongly Agree

\_\_\_\_\_ 1. In most ways my life is close to my ideal.

\_\_\_\_\_ 2. The conditions of my life are excellent.

\_\_\_\_\_ 3. I am satisfied with life.

\_\_\_\_\_ 4. So far I have gotten the important things I want in life.

\_\_\_\_\_ 5. If I could live my life over, I would change almost nothing.

## Appendix F: Questionnaire for eudaimonic well-being (Waterman et al., 2010)

This questionnaire contains a series of statements that refer to how you may feel things have been going in your life. Read each statement and decide the extent to which you agree or disagree with it. Try to respond to each statement according to your own feelings about how things are actually going, rather than how you might wish them to be.

Please use the following scale when responding to each statement.

Strongly Disagree 0 1 2 3 4 Strongly Agree

1. I find I get intensely involved in many of the things I do each day.
2. I believe I have discovered who I really am.
3. I think it would be ideal if things came easily to me in my life. (R)
4. My life is centered around a set of core beliefs that give meaning to my life.
5. It is more important that I really enjoy what I do than that other people are impressed by it.
6. I believe I know what my best potentials are and I try to develop them whenever possible.
7. Other people usually know better what would be good for me to do than I know myself. (R)
8. I feel best when I'm doing something worth investing a great deal of effort in.
9. I can say that I have found my purpose in life.
10. If I did not find what I was doing rewarding for me, I do not think I could continue doing it.
11. As yet, I've not figured out what to do with my life. (R)
12. I can't understand why some people want to work so hard on the things that they do. (R)
13. I believe it is important to know how what I'm doing fits with purposes worth pursuing.
14. I usually know what I should do because some actions just feel right to me.
15. When I engage in activities that involve my best potentials, I have this sense of really being alive.
16. I am confused about what my talents really are. (R)
17. I find a lot of the things I do are personally expressive for me.
18. It is important to me that I feel fulfilled by the activities that I engage in.
19. If something is really difficult, it probably isn't worth doing. (R)
20. I find it hard to get really invested in the things that I do. (R)
21. I believe I know what I was meant to do in life.

## Appendix G: Positive and negative affect scales (Watson et al., 1988)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word.

Indicate to what extent you feel this right now. Use the following scale to record your answers.

1: very slightly or not at all, 2: a little, 3: moderately, 4: quite a bit, 5: extremely

1. interested
2. distressed
3. excited
4. upset
5. strong
6. guilty
7. scared
8. hostile
9. enthusiastic
10. proud
11. irritable
12. alert
13. ashamed
14. inspired
15. nervous
16. determined
17. attentive
18. jittery
19. active
20. afraid

## Appendix H: Reinforcement Sensitivity Theory Personality Questionnaire (Corr & Cooper, 2016)

Below are a list of statements about everyday feelings and behaviours. Please rate how accurately each statement describes you in general. Circle only one response. Do not spend too much time thinking about the questions and please answer honestly. Your answers will remain confidential.

How accurately does each statement describe you?

1: Not at all, 2: Slightly, 3: Moderately, 4: Highly

1. I feel sad when I suffer even minor setbacks.
2. I am often preoccupied with unpleasant thoughts.
3. Sometimes even little things in life can give me great pleasure.
4. I am especially sensitive to reward.
5. I put in a big effort to accomplish important goals in my life.
6. I have found myself fighting back when provoked.
7. I sometimes feel 'blue' for no good reason.
8. When feeling 'down', I tend to stay away from people.
9. I often experience a surge of pleasure running through my body.
10. I would be frozen to the spot by the sight of a snake or spider.
11. I have often spent a lot of time on my own to "get away from it all".
12. I am a very active person.
13. I'm motivated to be successful in my personal life.
14. I think retaliation is often the best form of defense.
15. I am always 'on the go'.
16. I regularly try new activities just to see if I enjoy them.
17. I get carried away by new projects.
18. Good news makes me feel over-joyed.
19. I think you have to stand up to bullies in the workplace.
20. The thought of mistakes in my work worries me.
21. When nervous, I sometimes find my thoughts are interrupted.
22. I would run quickly if fire alarms in a shopping mall started ringing.
23. I often overcome hurdles to achieve my ambitions.
24. If I feel threatened I will fight back.
25. I often feel depressed.
26. I think I should 'stop and think' more instead of jumping into things too quickly.
27. I often feel that I am on an emotional 'high'.
28. I love winning competitions.
29. I get a special thrill when I am praised for something I've done well.
30. I take a great deal of interest in hobbies.
31. I would not tolerate bullying behaviour towards me.
32. I sometimes cannot stop myself talking when I know I should keep my mouth closed.
33. I often do risky things without thinking of the consequences.
34. My mind is sometimes dominated by thoughts of the bad things I've done.
35. I get very excited when I get what I want.
36. I feel driven to succeed in my chosen career.
37. I'm always finding new and interesting things to do.
38. I'm always weighing-up the risk of bad things happening in my life.
39. People are often telling me not to worry
40. I can be an aggressive person when I need to be.
41. I am very open to new experiences in life.
42. I always celebrate when I accomplish something important.
43. I find myself reacting strongly to pleasurable things in life.
44. I find myself doing things on the spur of the moment.

45. I usually react immediately if I am criticized at work.
46. I would defend myself if I was falsely accused of something.
47. I would instantly freeze if I opened the door to find a stranger in the house.
48. I'm always buying things on impulse.
49. I am very persistent in achieving my goals.
50. When trying to make a decision, I find myself constantly chewing it over.
51. I often worry about letting down other people.
52. I would go on a holiday at the last minute.
53. I would run fast if I knew someone was following me late at night.
54. I would leave the park if I saw a group of dogs running around barking at people.
55. I worry a lot.
56. I would freeze if I was on a turbulent aircraft.
57. My behaviour is easily interrupted.
58. It's difficult to get some things out of my mind.
59. I think the best nights out are unplanned.
60. There are some things that I simply cannot go near.
61. If I see something I want, I act straight away.
62. I think it is necessary to make plans in order to get what you want in life.
63. When nervous, I find it hard to say the right words.
64. I find myself thinking about the same thing over and over again.
65. I often wake up with many thoughts running through my mind.
66. I would not hold a snake or spider.
67. Looking down from a great height makes me freeze.
68. I often find myself 'going into my shell'.
69. My mind is dominated by recurring thoughts.
70. I am the sort of person who easily freezes-up when scared.
71. I take a long time to make decisions.
72. I often find myself lost for words.
73. I will actively put plans in place to accomplish goals in my life.

## Appendix I: Facebook intensity scale (Ellison et al., 2007)

1. About how many total Facebook friends do you have?
  - a. 0 = 10 or less, 1 = 11–50, 2 = 51–100, 3 = 101–150, 4 = 151–200, 5 = 201–250, 6 = 251–300, 7 = 301–400, 8 = more than 400
2. In the past week, on average, approximately how many minutes per day have you spent on Facebook?
  - a. 0 = less than 10, 1 = 10–30, 2 = 31–60, 3 = 1–2 hours, 4 = 2–3 hours, 5 = more than 3 hours

Please indicate the amount to which you agree or disagree with the following statements:

1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree

3. Facebook is part of my everyday activity
4. I am proud to tell people I'm on Facebook
5. Facebook has become part of my daily routine
6. I feel out of touch when I haven't logged onto Facebook for a while
7. I feel I am part of the Facebook community
8. I would be sorry if Facebook shut down

## Appendix J: Facebook social comparison rating scale (Feinstein et al., 2013)

Please circle a number at a point which best describes the way in which you see yourself in **comparison to others**.

For example:

Short    1    2    3    4    5    6    7    8    9    10    Tall

If you put a mark at 3 this means you see yourself as shorter than others; if you put a mark at 5 (middle) about average; and a mark at 7 somewhat taller.

If you understand the above instructions please proceed. Circle one number on each line according to how you see yourself in relationship to others.

When I compare myself to others on Facebook, I feel:

Inferior	0	1	2	3	4	5	6	7	8	9	10	Superior
Incompetent	0	1	2	3	4	5	6	7	8	9	10	More competent
Unlikeable	0	1	2	3	4	5	6	7	8	9	10	More likeable
Left out	0	1	2	3	4	5	6	7	8	9	10	Accepted
Different	0	1	2	3	4	5	6	7	8	9	10	Same
Untalented	0	1	2	3	4	5	6	7	8	9	10	More talented
Weaker	0	1	2	3	4	5	6	7	8	9	10	Stronger
Unconfident	0	1	2	3	4	5	6	7	8	9	10	More confident
Undesirable	0	1	2	3	4	5	6	7	8	9	10	More desirable
Unattractive	0	1	2	3	4	5	6	7	8	9	10	More attractive
An outsider	0	1	2	3	4	5	6	7	8	9	10	An insider



## Appendix K: Development and validation of a short RST-PQ

To shorten the amount of time it took respondents to participate in questionnaires, I created a shortened version of the RST-PQ. To represent each factor, 2 items were chosen from each of the BAS components and 4 items each were chosen to represent BIS and FFFS.

Items with high factor loadings were selected based on the CFA from the original paper where RST-PQ was developed (Corr & Cooper, 2016). The short RST-PQ is below:

Below are a list of statements about everyday feelings and behaviors. Please rate how accurately each statement describes you in general. Do not spend too much time thinking about the questions and please answer honestly. Your answers will remain confidential.

How accurately does each statement describe you?

1. I am always finding new and interesting things to do.
2. I regularly try new activities just to see if I enjoy them.
3. I feel driven to succeed in my chosen career.
4. I will actively put plans in place to accomplish goals in my life.
5. I get a special thrill when I am praised for something I've done well.
6. I get very excited when I get what I want.
7. I find myself doing things on the spur of the moment.
8. I often do risky things without thinking of the consequences
9. I would run fast if I knew someone was following me late at night.
10. I would not hold a snake or spider.
11. I am the sort of person who easily freezes-up when scared.
12. I would instantly freeze if I opened the door to find a stranger in the house.
13. When nervous, I find it hard to say the right words.
14. I worry a lot.
15. I am often preoccupied with unpleasant thoughts.
16. I sometimes feel 'blue' for no good reason.

To quickly validate this short scale, I ran a CFA on these items using the lavaan package (Rosseel, 2012) with the data from Chapter 2 (see page 54 for details on sample and descriptive statistics). To further validate the structure, I also ran a CFA on these items with the data from Chapter 5 (see page 140 for details on sample and descriptive statistics). The results are below.

**Confirmatory factor analysis: Chapter 2 data.** The results of the confirmatory factor analysis revealed an adequate model fit,  $\chi^2=294.40$ ,  $df(89)$ ,  $p < .001$ , RMSEA=.08, CFI=.88, SRMR=.07.

**Confirmatory factor analysis: Chapter 5 data.** The results of the confirmatory factor analysis revealed an adequate model fit,  $\chi^2=196.79$ ,  $df(89)$ ,  $p < .001$ , RMSEA=.07, CFI=.90, SRMR=.06.

## Appendix L: Multidimensional Facebook intensity scale (Orosz et al., 2015)

Below are thirteen statements with which you may agree or disagree. Using the scale below, indicate your agreement with each item. Please be open and honest in your responding.

(1=strongly disagree; 2=disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree)

1. If I could visit only one site on the Internet, it would be Facebook.
2. Watching Facebook posts is good for overcoming boredom.
3. I spent time on Facebook at the expense of my obligations.
4. My Facebook profile is rather detailed.
5. I feel bad if I don't check my Facebook daily.
6. When I'm bored, I often go to Facebook.
7. I spend more time on Facebook than I would like to.
8. Please select "somewhat disagree" for this question.
8. I like refining my Facebook profile.
9. I often search for Internet connection in order to visit Facebook.
10. If I'm bored, I open Facebook.
11. It happens that I use Facebook instead of sleeping.
12. It is important for me to update my Facebook profile regularly.
13. Before going to sleep, I check Facebook once more.

## Appendix M: Passive Active Use Measure (Gerson, Plagnol, & Corr, 2017)

How frequently do you perform the following activities when you are on Facebook? (Note: Choosing "Very Frequently" means that about 100% of the time that you log on to Facebook, you perform that activity).

	Never (0%)	Rarely (25%)	Sometimes (50%)	Somewhat frequently (75%)	Very frequently (100%)
1. Posting status updates	1	2	3	4	5
2. Commenting (on statuses, wall posts, pictures, etc)	1	2	3	4	5
3. Chatting on FB chat	1	2	3	4	5
4. Checking to see what someone is up to	1	2	3	4	5
5. Creating or RSVPing to events	1	2	3	4	5
6. Posting photos	1	2	3	4	5
7. Tagging photos	1	2	3	4	5
8. Viewing photos	1	2	3	4	5
9. Posting videos	1	2	3	4	5
10. Tagging videos	1	2	3	4	5
11. Browsing the newsfeed passively (without liking or commenting on anything)	1	2	3	4	5
12. Browsing the newsfeed actively (liking and commenting on posts, pictures and updates)	1	2	3	4	5
13. Looking through my friends' profiles	1	2	3	4	5

## Appendix N: Mini-IPIP (Donnellan, Oswald, Baird & Lucas, 2006)

Below are a list of statements about everyday feelings and behaviors. Please rate how accurately each statement describes you in general. Do not spend too much time thinking about the questions and please answer honestly. Your answers will remain confidential.

How accurately does each statement describe you?

1. I am the life of the party
2. Sympathize with others feelings
3. Get chores done right away
4. Have frequent mood swings
5. Have a vivid imagination
6. Do not talk a lot (R)
7. Am not interested in other people's problems (R)
8. Often forget to put things back in their proper place (R)
9. Am relaxed most of the time (R)
10. Am not interested in abstract ideas (R)
11. Talk to a lot of different people at parties
12. Feel others' emotions
13. Like order
14. Get upset easily
15. Have difficulty understanding abstract ideas (R)
16. Keep in the background (R)
17. Am not really interested in others (R)
18. Make a mess of things (R)
19. Seldom feel blue (R)
20. Do not have a good imagination (R)

## Appendix O: Questions about posting pictures and videos (PAUM validation)

**If respondents indicated in the PAUM that they posted photos on Facebook at least Rarely (25% of the time), they were asked:**

When you post pictures on Facebook, are they most frequently...

- Pictures I have taken myself
- Pictures of me that have been taken by my friends/family/people I know
- Pictures I found online (memes, cute/funny animals, etc)

Out of 100%, what percent of the photos you post on Facebook are...

- Pictures taken by me or someone I know
- Pictures I found online and “shared” (memes, cute/funny animals, etc)

Respondents were presented with a slider between 0 and 100 for this question. Both sliders had to sum to 100.

**If respondents indicated in the PAUM that they posted videos on Facebook at least Rarely (25% of the time), they were asked:**

When you post videos on Facebook, are they most frequently...

- Videos I have recorded myself
- Videos of me that have been taken by my friends/family/people I know
- Videos I found online (youtube videos, news clips, cute/funny animals, etc)

Out of 100%, what percent of the videos you post on Facebook are...

- Videos recorded by me or someone I know
- Videos I found online and “shared” (youtube videos, news clips, cute/funny animals, etc)

Respondents were presented with a slider between 0 and 100 for this question. Both sliders had to sum to 100.

## Appendix P: Facebook-adapted Iowa-Netherlands Comparison Orientation Measure (Steers et al., 2014)

Listed below are a number of statements concerning to what extent you compare yourself to others. Please read each statement carefully and consider the extent to which you think it is like you. There are no right or wrong answers, so please answer as honestly as you can. Indicate the extent to which each statement is true of you according to the following scale:

(1= disagree strongly; 2=disagree; 3 = neither agree nor disagree; 4 = agree; 5 = agree strongly)

1. When I am on Facebook, I compare how my loved ones (boy or girlfriend, family members, etc) are doing with how others are doing.
2. When I am on Facebook, I always pay a lot of attention to how I do things compared to how others do things.
3. When I am on Facebook, if I want to find out how well I have done something, I compare what I have done to what others have done.
4. When I am on Facebook, I compare how I am doing socially (e.g. social skills, popularity) with other people.
5. When I am on Facebook, I don't compare myself with others.
6. When I am on Facebook, I compare myself with others with respect to what I have accomplished in life.
7. When I am on Facebook, I like to interact (chat, message, post on wall, etc.) with others about mutual opinions and experiences.
8. When I am on Facebook, I try to find out what others think who face similar problems as I face.
9. When I am on Facebook, I like to know what others in a similar situation would do.
10. When I am on Facebook, if I want to learn more about something, I try to find out what others think about it.
11. When I am on Facebook, I don't compare my situation in life relative to that of other people.

## Appendix Q: Iowa-Netherlands Comparison Orientation Measure (Gibbons & Buunk, 1999)

Most people compare themselves from time to time with others. For example, they may compare the way they feel, their opinions, their abilities, and/or their situation with those of other people. There is nothing particularly “good” or “bad” about this type of comparison, and some people do it more often than others. We would like to find out how often you compare yourself with other people. To do that we would like to ask you to indicate how much you agree with each statement below, by using the following scale.

1: I strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, 5: strongly agree

1. I often compare how my loved ones (boy or girlfriend, family members, etc) are doing with how others are doing
2. I always pay a lot of attention to how I do things compared with how others do things.
3. If I want to find out how well I have done something, I compare what I have done with how others have done.
4. I often compare how I am doing socially (eg social skills, popularity) with other people.
5. I am not the type of person who compares often with others (R)
6. I often compare myself with others with respect to what I have accomplished in life.
7. I often like to talk with others about mutual opinions and experiences.
8. I often try to find out what others think who face similar problems as I face.
9. I always like to know what others in a similar situation would do.
10. If I want to learn more about something, I try to find out what others think about it.
11. I never consider my situation in life relative to that of other people (R)

## Appendix R: Demographic and filter questions for each survey

Every data collection opened with the following filter questions:

1. What year were you born? (drop down list of years, respondents who reported a year under the age of 18 were disqualified)
2. Do you use Facebook?
  - a. Yes
  - b. No (respondents who reported they did not use Facebook were disqualified)

Data collection 1 demographic questions (Chapter 2, appendix B)

1. What is your gender?
  - a. Male
  - b. Female
2. What country do you currently reside in? (drop down list of countries)
3. What is the highest level of education you have completed or are currently pursuing?
  - a. Primary school or elementary school
  - b. Secondary school or high school
  - c. A-levels
  - d. Bachelor's degree
  - e. Master's degree
  - f. Doctoral degree
4. Please choose the employment status that best reflects your current career, select as many as apply (for example, you may be both a student and working part-time)
  - a. Student
  - b. Full-time employment
  - c. Part-time employment
  - d. Homemaker
  - e. Retired
  - f. Unemployed

Data collection 2 demographic questions (Chapters 3 and 4)

1. What is your gender?
  - a. Male
  - b. Female
2. Please state your marital status.
  - a. Single
  - b. Partner, not living together
  - c. Partner, living together
  - d. Married
  - e. Separated
  - f. Divorced
  - g. Widowed
  - h. Prefer not to say
3. What is your current primary occupation?
  - a. Self-employed
  - b. Employed full-time
  - c. Employed part-time
  - d. Unemployed and looking for employment
  - e. Unemployed and not looking for employment
  - f. Maternity leave
  - g. On sick leave
  - h. Retired
  - i. Student
  - j. Other



4. What is currently your highest qualification?
  - a. High school diploma or equivalent
  - b. Associates degree or equivalent
  - c. Bachelor's degree or equivalent
  - d. Master's degree or equivalent
  - e. Advanced degree (professional, doctorate, etc)
  - f. Other

Data collections 3 and 4 (Chapters 3, 4 and 5)

Data collections 3 and 4 used the same demographic questions as data collection 2, but changed the education question to one asked in the British Household Panel Survey as the respondents were mainly UK citizens where previous studies had relied on US citizens (switched from MTurk to Prolific Academic). I also added a question about income from the European Social Survey as some literature shows that it can impact subjective well-being.

New education question:

1. What is currently your highest qualification?
  - a. Secondary school (GCSE's) or equivalent
  - b. A-levels or equivalent
  - c. Bachelor's degree (university) or equivalent
  - d. Master's degree or equivalent
  - e. Advanced degree (professional, doctorate, etc)
  - f. Other (please specify)

Income question:

2. Which of the following descriptions comes closest to how you feel about your household's income nowadays?
  - a. Living comfortably on present income
  - b. Coping on present income
  - c. Difficult on present income
  - d. Very difficult on present income
  - e. Don't know