

To What Extent can Extraversion Moderate the Relation Between Time Spent on Image-based Social Media Platforms and Self-Esteem?

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Abstract

Self-esteem is an essential concept for individuals' mental health that is associated with social media and personality factors. This study investigates whether the personality factor of extraversion moderates the relation between image-based social media platforms and self-esteem, in hopes of gaining more insight into the association between personality, social media and self-esteem. An online questionnaire was created to measure participants' image-based social media screen times, as well as extraversion and self-esteem scores. The results indicate that extraversion moderated the relation between image-based social media screen time and self-esteem. However, the individual correlations between those variables show contrary results to previous research. Further exploration of the results as well as limitations and recommendations are discussed.

Keywords: self-esteem, image-based social media, extraversion, social comparison

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Introduction

Over the last two decades social media has become increasingly popular. Individuals create profiles, connect with friends, share and access information and impressions of their lives. This is mainly done for entertainment, socialisation, communication or to play games (Allen et al., 2014). Social media user numbers are constantly increasing and are expected to reach 4.41 billion users worldwide by 2025 (Statista, 2020). It seems that age is correlated with the frequency of social media use. The age groups between 14-34 have the highest number of users using social media twenty or more times a day (CG Selecties, 2019). Whereas the age groups 55-65+ had the highest number of users who did not use social media daily. It also becomes apparent that the platform is a relevant factor in the distribution of age. As shown in a study by eMarketer (2020), older adults' mostly used social media platform is Facebook, directly followed by Instagram and Twitter. However, 14 to 22-year-olds' most used social media platforms are WhatsApp, Instagram and Snapchat (Ruigrok NetPanel, 2021).

According to Pittman and Reich (2016), social media types are commonly referred to as image-based or text-based platforms. Image-based platforms are e.g. Instagram, Snapchat or Pinterest, whereas text-based platforms are e.g. Twitter and WhatsApp. Facebook, which incorporates image-, and text-based elements similarly, can be included in both categories (Pittman & Reich, 2016). Image-based platforms seem to become more popular nowadays (Li & Xie, 2020). This is suggested to happen because it can be easier and more expressive to share a picture than a text. Known as the “Is a picture worth a thousand words?” question that has been investigated by several studies (Gropper, 1963; Martin, 2020). According to Martin (2020), humans are visual beings that have communicated visually through cave paintings, using symbols and painting pictures to tell stories and share knowledge. Humans think in pictures and experience the so-called Picture Superiority Effect which shows that information from pictures and images can be understood better than information conveyed through text. This is supported by Gropper's (1963) findings that information in pictures can be understood faster than in text.

Besides the difference in conveying information, text-based and image-based platforms can also affect feelings differently. According to Pittmann and Reich (2016), both types of platforms can reduce loneliness. However, image-based platforms can reduce loneliness to a greater degree than text-based platforms. This is thought to be the case as pictures or videos of a friend signal more effectively to a social media user that this friend is in a conversation with them.

Thereby the perceived distance between individuals can feel smaller compared to communicating solely via text messages (Pittmann & Reich, 2016). Concluding, image-based platforms are geared toward connecting and sharing feelings with a higher level of intimacy, while text-based platforms are geared towards developing and maintaining relationships with less perceived intimacy (Pittmann & Reich, 2016).

Although social media platforms offer a great way of connecting with others, people can compare themselves to a multitude of profiles. Image-based social media platforms have therefore been linked with feelings of distress (Lup et al., 2015) and body dissatisfaction (Tiggemann & Anderberg, 2020). Those negative aspects are generally attributed to the process of social comparison. In this process, individuals evaluate their abilities and attitudes in comparison to others' abilities and attitudes (American Psychological Association, n.d.). This plays a role in one's self-image and subjective well-being. Social comparison can be differentiated between upward and downward comparisons. Downward comparison is when the compared person is judged to be not as good as oneself, while upward comparison is when the compared person is judged to be better than oneself (American Psychological Association, n.d.). According to Festinger's (1954) social comparison theory individuals are more likely to compare themselves to similar peers than to dissimilar peers. Social media platforms offer the ability to compare oneself to an extensive number of similar peers, which facilitates the social comparison process (Vogel et al., 2014).

The American Psychological Association (n.d.) describes that the social comparison process can alter one's self-image. A concept that is very similar to self-image is self-esteem. According to Coopersmith (1965), self-esteem refers to an individual's evaluation of themselves, specifically the extent to which one sees the self as competent and worthwhile. It thereby refers to the extent to which an individual values and likes themselves and the sense of worth they place on themselves (Blascovich et al., 1991). "To esteem a thing is to prize it, to set a high mental valuation upon it; when applied to persons, esteem carries also the warmer interest of approval, cordiality, and affection." (Williams, 1979, p. 309; found in Blascovich et al., 1991, p. 115). Self-esteem has been termed the evaluative and affective dimension of self-concept, a cognitive schema that controls the processing of self-relevant information while organising the views about the self (Mann et al., 2004). Self-esteem, therefore, is the sum of individual beliefs and evaluations of oneself's qualities and attributes. Some have high self-esteem by believing to possess attributes they find endearing, like empathy and intelligence. Others have high self-esteem by believing to

be goal-oriented and having a good body. Hence, self-esteem concerns multiple social and existential functions (Heatheron & Wyland, 2003).

Self-esteem is generally thought to be a stable trait, but it has also been shown to fluctuate daily (Vogel et al., 2014). Watching a social media profile of a desirable individual with many comments and virtual “likes” decreased self-esteem due to upward comparison (Vogel et al., 2014). These so-called “likes” are a way of obtaining visual rewards and recognition on many social media platforms (Martinez-Pecino & Garcia-Gavilán, 2019). On Instagram, people can “like” a picture by tapping it twice. The likes are visible to everyone able to see the picture. They, therefore, serve as a popularity cue, the more likes, the more popular the photo and often also the social media profile/creator (Martinez-Pecino & Garcia-Gavilán, 2019). Self-esteem thus is not only affected by the profile's pictures, but also by their popularity reflected through likes (Vogel et al., 2014; Jan et al., 2017). Also, upward comparisons are made more likely as social media profiles entail a presentation bias as individuals only show the positive aspects of their lives (Vogel et al., 2014). Resulting in lower self-esteem and a negative relation between social media usage and self-esteem (Jan et al., 2017; Chen & Lee, 2013). Nonetheless, Shaw and Gant (2004) found that chatting anonymously on the internet increased feelings of social support and self-esteem. It was noted however that self-esteem seems to be indirectly affected by time spent on social media platforms, mediated by other factors.

It is generally thought that low self-esteem is linked to psychological distress (Mann et al., 2004). Further, it is associated with a self-defeating attitude, social problems and psychiatric vulnerability, thereby promoting mental illnesses. High self-esteem on the contrary serves many benefits. It is linked to good mental health and positive social behaviour and is, therefore, a part of basic mental health (Mann et al., 2004). It is an important factor in life satisfaction, coping ability and success and has been said to be one of the most influential predictors of happiness (Furnham & Cheng, 2000). High self-esteem does not only serve health benefits but can also act as a buffer against negative influences (Mann et al., 2004). High self-esteem is linked to more positive self-views, giving individuals the ability to process feedback in a more self-serving way (Cast & Burke, 2002). For virtual likes, it has been proposed that high self-esteem individuals can evaluate the importance of likes more reasonably (Martinez-Pecino & Garcia-Gavilán, 2019). Another study adds that high self-esteem results in a more stable sense of self, thereby creating emotional stability (Cast & Burke, 2002). Although it is not clear how exactly high self-esteem

acts as a buffer, it can protect from outside stressors (Cast & Burke, 2002) and has been labelled a protective factor, while low self-esteem is titled a risk factor (Fennell, 2005).

To summarise, self-esteem is an important factor in mental health and well-being. It is identified to be affected by social media through processes like social comparison. However, evidence has been found that self-esteem is also heritable (Jonassaint, 2009). Between 29% and 32% of self-esteem could be attributed to genetic factors. Leaving 68% to 71% to be affected and shaped by external factors. Closely linked to self-esteem and also somewhat based on genetics, is personality. According to Robins et al. (2001), it is necessary to investigate the links between self-esteem and personality to connect self-esteem to other psychological constructs correlated with personality and to explore whether personality and self-esteem influence each other.

An example of a personality trait model is the Big Five model. It is a general taxonomy of personality traits with five dimensions (John et al., 2008). Those “were derived from analyses of the natural-language terms people use to describe themselves and others.” (John et al., 2008, pp. 116). They consist of the traits of extraversion, agreeableness, openness, conscientiousness and neuroticism. While extraversion describes traits like sociability, positive emotionality activity, agreeableness implies a prosocial and communal orientation, such as altruism and trust. Openness concerns mental and experiential depth and originality, whereas conscientiousness is described as impulse-control, organised and task and goal-oriented behaviour (John et al., 2008). Neuroticism describes the opposite of emotional stability and even-temperedness. It is identified as a negative emotionality with feelings of sadness, anxiousness and tenseness.

According to Erdle et al. (2009), a correlation was found between self-esteem and each dimension of the Big Five. Extraversion, agreeableness, openness and conscientiousness were found to be positive predictors of self-esteem, whereas neuroticism was found to be a negative predictor of self-esteem (Amirazodi & Amirazodi, 2011; Robins et al., 2001). The association between neuroticism and extraversion with self-esteem was the most robust. The Big Five model has also been found to correlate with social media usage. A study by Gil de Zúñiga et al. (2017) concluded that there is a mild but consistent relationship between time spent on social media and personality traits. Extraversion, conscientiousness and agreeableness were positively correlated with social media. A high score on the extraversion scale was an especially strong predictor of frequent social media use (Gil de Zúñiga, 2017).

To conclude, social media platforms are becoming increasingly popular and image-based platforms specifically are rising in user numbers. These platforms lead users to participate in social comparison behaviour that can affect self-esteem. An important factor in multiple aspects of life like satisfaction, coping ability and mental health. Personality traits like the Big Five have been associated with self-esteem as well. Specifically, extraversion and neuroticism have been linked to it. The Big Five traits are additionally correlated with the use of social media. While studies have been conducted that investigate the correlation between the three aspects of social media, self-esteem and personality individually, only one was found that connects all three aspects in one study. The study investigated internet and social media use with self-esteem, self-construal and all personality factors (Hawi & Samaha, 2019). However, during this study, the focus was not placed on normal social media use, but on addictive social media use.

Therefore, a need for investigation is present. The personality traits extraversion and neuroticism showed the biggest correlation with self-esteem. However, extraversion is the most consistent predictor of active social media use of the Big Five traits (Gil de Zúñiga et al., 2017). Hence, this study will focus on extraversion. As research negatively associates social media with self-esteem (Vogel et al., 2014) and the trait extraversion is positively linked to self-esteem (Amirazodi & Amirazodi, 2011), this study will investigate whether extraversion can serve as a protective factor of self-esteem while using social media. Specifically, a focus will be placed on the time spent on image-based social media platforms, as those have been shown to trigger social comparison behaviour more than text-based platforms (Lup et al., 2015). As Instagram, Snapchat, Pinterest and TikTok are the four most used image-based social media platforms (Ruigrok NetPanel, 2021; eMarketer, 2020), this study will only include these social media platforms. Facebook will be excluded as it fits into the text- and image-based category. The research question is therefore formulated as ‘To what extent can extraversion moderate the relation between time spent on image-based social media platforms and self-esteem?’. The following hypotheses were established:

Hypothesis I: There is a relation between time spent on image-based social media platforms and self-esteem.

Hypothesis II: Extraversion moderates the relation between time spent on image-based social media platforms and self-esteem.

Methods

Participants

For this study the needed sample size was calculated using the G Power Calculation (Faul et al., 2007). According to this calculation tool, the minimum sample size needed to achieve a good statistical power with a confidence interval of 95% is 74 participants. To have a good representative sample certain inclusion and exclusion criteria were established. Participants were required to be between the ages of 18 and 30, use social media and understand English to be eligible to complete the survey. Initially, 260 participants were recruited, but as 147 did not fully answer the questionnaire, 27 did not answer the attention check right and four were not part of the sample due to being above the age of 30, 178 initial participants had to be excluded. Therefore, the final sample size consisted of 82 participants. The mean age of the sample was 22.35 ($M_{age} = 22.35$; $SD_{age} = 2.39$). 7.3% of the sample indicated a Dutch nationality, 70.7% a German nationality and 22% indicated having a different nationality. Additionally, 35.4% identified as male, 62.2% as female and 2.4% preferred not to indicate their gender.

Materials

To participate in the survey, a smartphone or laptop and internet connection were needed. The survey was established using the online survey tool Qualtrics and consisted of an information sheet, informed consent, demographic questions and questionnaires to assess time spent on image-based social media, self-esteem and extraversion. It was established in collaboration with eight other students who wrote individual bachelor theses about the effects of social media on mental health. The survey was used exclusively for the research projects of these bachelor theses. For this study's purpose, only the questionnaires relevant to this topic will be discussed. The completion of the survey took between 20 and 40 minutes.

After informing the participants about the necessary details and asking for consent, the survey asked demographic questions about age, gender and nationality. Further, participants were asked about their screen times on image-based social media. This was followed by two pre-established questionnaires which were available as a public property for non-commercial research.

Screen Time on Image-based Social Media Platforms

Each participant was asked to indicate their screen time for social media. The social media screen time questionnaire consisted of five questions. First, the social media screen time in total was asked with the question “Indicate your total screen time only on social media during the last week (Monday to Sunday)”. This was followed by questions regarding the screen time for specific image-based social media platforms. The question was “For each of the following social media platforms, please indicate your total screen time during the last week (Monday to Sunday)”. This was followed by a list of the social media platforms Instagram, Snapchat, Pinterest and TikTok under which the participants could indicate their screen time for each platform.

Rosenberg Self-Esteem Scale

Rosenberg Self-Esteem Scale (RSE) is a questionnaire that aims to measure the self-esteem level of an individual through statements of positive and negative feelings about the self (Rosenberg, 1979). The scale consists of ten statements, of which five are negatively worded. Examples of statements are “I feel that I have a number of good qualities” and “I feel I have not much to be proud of”. Participants can answer on a 4-point Likert scale ranging from strongly disagree to strongly agree, where 1 is strongly disagree, 2 is disagree, 3 is agree and 4 is strongly agree. Therefore, participants can achieve between ten and forty points. The RSE indicates a good internal consistency, validity, and test-retest reliability (Rosenberg, 1979) and therefore has acceptable psychometric properties. For this sample, the calculated Cronbach's alpha was .91. Therefore, the reliability of the scale was excellent.

Big Five Extraversion Scale

The Big Five Extraversion Scale is a subscale of the Big Five Inventory, which examines different personality dimensions in individuals (Goldberg, 1993). The subscale of extraversion consists of eight statements of which three are negatively worded. Examples of statements are “I see myself as someone who is outgoing” and “I see myself as someone who tends to be quiet”. Participants can agree or disagree on a 5-point Likert scale ranging from disagree strongly to agree strongly, where 1 is disagree strongly, 2 is disagree a little, 3 is neither agree nor disagree, 4 is agree a little and 5 is agree strongly. Therefore, participants can achieve between eight and forty points. There have been multiple studies on the psychometric properties of the Big Five Inventory

as a whole, but only a few could be found that focused on the psychometric properties of the individual subscales. In the original study by John et al. (2008) the reliability of the Big Five Inventory was high with the dimensions of extraversion, besides neuroticism and conscientiousness, being the most reliable. Additionally, the validity between three personality trait measuring scales, all including the dimension of extraversion, was calculated and substantial. For this sample, the calculated Cronbach's alpha was .87. Therefore, the reliability of the scale was good.

Procedure

The combined questionnaire was distributed via a link and, for students of the University of Twente specifically, a BMS Faculty Test Subject Pool system called Sona. By participating in the questionnaire through the Sona System students could gain 0.25 credits. First, the participants were asked to read an information sheet and agree to the informed consent. Without confirmation of the informed consent, participants were excluded from the study. After agreeing three demographic questions were asked. Next, a guide on how to access screen time on a smartphone was given, which was followed by multiple questions about social media usage as well as the screen time during the last week. Lastly, all pre-established questionnaires, which were needed by the researchers involved, were randomly shown one after another. This was followed by a 'Thank you for your participation' screen.

Data Analysis

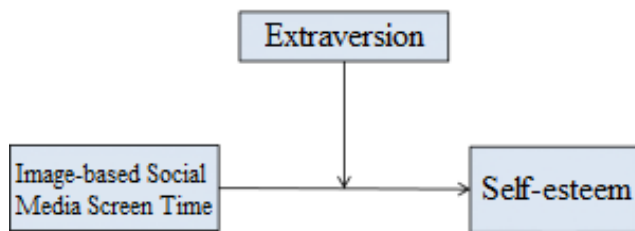
The study follows a cross-sectional research design with a quantitative measurement. After, incomplete responses, failures to correctly respond to the attention question and participants who did not meet the inclusion criteria were deleted. This was followed by a scan for demographic information. After a broad overview was obtained the sum scores of the respective questionnaires were calculated and if necessary reverse coded. This was followed by testing necessary statistical assumptions within the independent and dependent variables. Further, the descriptives were explored. For the exploration of the two hypotheses, first Pearson's correlation between the variables image-based social media screen time and self-esteem was calculated. This was followed by a moderation analysis to test the second hypothesis. Here, self-esteem is the dependent variable, image-based social media screen times the independent variable and extraversion is the continuous

moderator (see Figure 1). To explore this moderation an interaction variable of extraversion and image-based social media screen time was established.

To check whether participants' gender, nationality or age affected their image-based social media screen times, extraversion or self-esteem scores, an independent sample t-test was done.

Figure 1

Moderation Model of Extraversion on Image-based Social Media Screen Time and Self-esteem



Results

To explore the relevance of the results, the assumptions of normality, linearity, multicollinearity and homoscedasticity were explored. The Shapiro-Wilk Test is a statistical test used to measure the assumption of normality for smaller sample sizes ($p > 0.05$). According to this test, a score of 0.05 or greater indicates a normal distribution of the data. The Rosenberg Self-esteem Scale does not violate the assumption of normality with an achieved score of .18. Additionally, the Q-Q Plot chart, which provides a visual representation of the distribution of the data, shows a normal distribution. For the Big Five Extraversion Scale, the Shapiro-Wilk Test score of .11 indicates a normal distribution of the data and therefore no violation of the assumption of normality. The Q-Q Plot chart also shows a normal distribution. The data is normally distributed. Next, it needs to be examined whether a linear relationship between the independent variables and the dependent variable is given. Therefore, a scatter plot is drawn for each independent variable of extraversion and image-based social media screen time in combination with the dependent variable of self-esteem. On each scatterplot, it is visible that the relationship between each independent variable in combination with the dependent variable can be modelled by a straight line. Therefore, the assumption of linearity has not been violated.

Further, the assumption of multicollinearity is tested. Here, a multiple regression analysis is performed. In the table displaying the correlations between the different variables, no correlation is higher than .45. This means that the two independent variables image-based social media screen time and extraversion are not too highly correlated. Additionally, in the collinearity statistics, all tolerance scores are above a necessary score of 0.2, while the VIF scores are below 10. This means that the assumption of multicollinearity is not violated. For the last assumption of homoscedasticity, the variation in the residuals is looked at. As the standardised residuals and standardised predicted values are roughly similar, it can be said that the assumption of homoscedasticity is not violated. Concluding, no assumption has been violated.

Participants indicated to have spent between zero and thirty-one hours on image-based social media platforms during a time period of seven days with a mean of 9.75 ($SD = 7.38$) hours (see Table 1). For the RSE scale, a mean of 20.18 ($SD = 5.46$) was observed. On the extraversion scale participants scored a mean of 26.60 ($SD = 6.86$).

Table 1*Descriptives Statistics of Image-based Social Media Screen Time, Self-esteem and Extraversion*

	<i>N</i>	<i>M</i>	<i>SD</i>	Min.	Max.
Image-based Social Media Screen Time	82	9.75	7.38	0	31
Self-esteem	82	20.18	5.46	10	35
Extraversion	82	26.60	6.86	12	40

Hypothesis I: There is a relation between time spent on image-based social media platforms and self-esteem.

To test this hypothesis Pearson's correlation was calculated. Consistent with the hypothesis a positive correlation between time spent on image-based social media screen time and self-esteem has been found $r(80) = .44, p < .001$. Therefore, Hypothesis I can be accepted.

Hypothesis II: Extraversion moderates the relation between time spent on image-based social media platforms and self-esteem.

For this hypothesis to be tested a moderation analysis was conducted. The outcome variable was self-esteem, while the predictor variable was time spent on image-based social media. The moderating variable was extraversion. A significant positive moderation effect was observed [$r^2 = .40, F(3, 77) = 16.84; p < .001$] (see Table 2). Without the moderation effect an r^2 value of .34 was observed [$r = .34, F(2, 78) = 20.45; p < .001$]. This indicates that 34% of the variance of the Rosenberg self-esteem scale scores can be explained by the variables of extraversion and image-based social media screen times. However, 40% of the variance on the Rosenberg self-esteem scale scores can be explained by including the interaction variable of image-based social media screen time and extraversion. This is an increase of explained variance of 6% when including the interaction variable of image-based social media screen time and extraversion.

Table 2*Moderation Analysis of Extraversion on Image-based Social Media Screen Time and Self-esteem*

	r^2	r^2 Change	p	F	df^*	p
Image-based Social Media Screen Time, Extraversion	.34	.34	.00	20.45	2, 78	.00
Image-based Social Media Screen Time, Extraversion, Interaction Image-Based Social Media Screen Time and Extraversion	.40	.06	.01	16.84	3, 77	.00

*. Degrees of Freedom.

A further indication of the interaction between the variables can be concluded from the coefficient table (see Appendix). Image-based social media screen times had a beta value of .28 [$B = .28$, 95% C.I. (.14, .42), $p < .05$] with a medium effect in the semipartial correlations ($r = .37$). Extraversion had a beta value of -.31 [$B = -.31$, 95% C.I. (-.46, -.16), $p < .05$] with a medium effect in the semipartial correlations ($r = -.38$). The interaction variable had a positive beta value of .03 [$B = .03$, 95% C.I. (.01, .05), $p < .05$] thereby indicating a positive moderation effect, with a small effect in the semipartial correlations ($r = .23$). The beta values and semipartial correlations indicate that all three variables are statistically significant predictors of self-esteem while the R^2 values indicate that extraversion moderates the relation between image-based social media screen times and self-esteem. Therefore, Hypothesis II can be accepted.

Further data was explored. A negative correlation between image-based social media screen time and extraversion $r(80) = -.18$, $p = > .001$, as well as extraversion and self-esteem was found $r(80) = -.45$, $p < .001$. It was additionally inspected whether differences in the demographic information of gender, age or nationality could be found in the data. Therefore, an independent sample t-test was done, however, no significant or notable differences were found.

Discussion

This study investigated the relation between image-based social media screen time and self-esteem and further explored whether the personality factor extraversion moderates this relationship. Significant correlations were found between all variables. While image-based social media screen time was positively associated with self-esteem, extraversion was negatively associated with self-esteem. Both correlations are inconsistent with previously found literature. A significant moderation effect was found for extraversion, indicating a moderation of extraversion on the relation between image-based social media screen time and self-esteem.

To test the first hypothesis a Pearson's correlation analysis was done. Self-esteem was associated with image-based social media screen times. More specifically, a positive moderate correlation has been found between image-based social media screen times and self-esteem. This indicates that an individual's self-esteem score is higher when having high image-based social media screen times. On the other hand, if someone spends less time on image-based social media, their self-esteem score will be lower. However, the directionality between the two variables, if high self-esteem influences time spent on image-based social media or if it is reversed, is unclear. This result is inconsistent with previous research that suggests a negative correlation between self-esteem and general social media usage. In a study by Chen and Lee (2013), it was found that individuals who spend more time on Facebook were linked with having low self-esteem. It is thought that through the presentation bias of profiles, users engaged more often in upward comparisons than downward comparisons (Vogel et al., 2014). In one study 88% of the participants who used Facebook engaged in social comparison, while 98% of these comparisons were upward comparisons, which are thought to negatively affect self-esteem (Jan et al., 2017).

As it was not investigated whether upward or downward comparisons have been made by participants of this study or if comparisons have been made at all, it is rather unclear why time spent on image-based social media is positively associated with self-esteem. A potential explanation for this difference in results could be the focus on image-based social media platforms. Most previous literature that investigated self-esteem and social media did not differentiate between social media platforms or focused on certain platforms individually. Image-based social media platforms have been shown to reduce loneliness to a greater degree and affect feelings differently than text-based social media platforms (Pittman & Reich, 2016). High loneliness has also been connected to low self-esteem (Ouellet & Joshi, 1986). It could be hypothesised that

individuals with high screen time on image-based social media platforms had a stronger decrease in loneliness, thereby increasing their self-esteem. Chen and Lee (2013) have described that self-esteem could be indirectly linked to social media usage through additional factors. Based on the role of loneliness, self-esteem could correlate positively with image-based social media platforms but negatively with text-based social media platforms. Therefore, unaccounted factors, like loneliness, could have caused the deviation between this study and previous literature.

The second hypothesis, that extraversion moderates the relationship between image-based social media screen time and self-esteem, has been accepted as a positive moderation effect has been observed. This means that self-esteem increases with the interaction of image-based social media screen time and extraversion. Specifically, spending more time on image-based social media while having high levels of extraversion is associated with high self-esteem. Spending less time on image-based social media while having low levels of extraversion is associated with low self-esteem. As no previous literature has been found that connects the three variables in this context, it is not possible to compare this study's findings. However, consistent with previous literature is that all concepts are related to one another. To better understand the moderation effect and to further investigate this study's purpose whether extraversion can serve as a protective factor, the correlations will be looked at individually.

The relation between image-based social media screen time and self-esteem has already been looked at. However, in this context as the correlation is positive, a potential protective factor, like extraversion, would not make sense. Since no negative influence of image-based social media on self-esteem has been found, a protection factor has nothing to protect from. This rather indicates that extraversion could not serve as a protective factor. However, to see the full picture the other correlations need to be explored. The correlation between image-based social media screen time and extraversion was found to be negative and insignificant. An individual with high image-based social media screen times would have low extraversion scores, while someone with high extraversion scores would tend to have low image-based social media screen time. This stands in opposition to previous literature. According to Bowden-Green (2020), extraversion is positively associated with time spent on social media. In support of this Gil de Zúñiga (2017) states that a positive, mild relationship between extraversion and time spent on social media was found. If the correlation between time spent on image-based social media and self-esteem would be negative, the negative correlation between extraversion and time spent on image-based social media could

indicate a protective ability of extraversion from negative influences of social media. However, as the correlation between time spent on image-based social media and self-esteem is not negative, this is not the case. Further indicates that extraversion does not serve as a protective factor.

Lastly, the correlation between extraversion and self-esteem was found to be negative. Meaning that a high extraversion is associated with low self-esteem. On the other hand, a person with low extraversion would be thought to have high self-esteem. This is, again, not consistent with previous literature. According to Amirazodi and Amirazodi (2011), extraversion was positively correlated with self-esteem. This has been supported by multiple studies that report positive moderate correlations between the two variables (Erdle et al., 2009; Robins et al., 2001; Swickert et al., 2004). A limitation in individuals' ability to compare themselves with similar peers could have caused these opposite results. According to Swickert et al. (2004), introverts and extroverts are believed to differ in their self-esteem. This is further specified by a study by Vaughan-Johnston et al. (2021) about extraversion and self-esteem maintenance strategies. The relation between extraversion and self-esteem was stronger when people could take part in social comparisons with peers performing worse than them. In other conditions, in which social comparison was not possible, extraversion was less or completely unrelated to self-esteem (Vaughan-Johnston et al., 2021). This does not specifically explain why a negative correlation between extraversion and self-esteem was found. But based on Vaughan-Johnston et al. (2021) study, it can be hypothesised that the relation between extraversion and self-esteem is mediated by additional, unaccounted factors. For example, a limitation to participate in social comparison.

Such a potential limitation that could have caused this inability is the Covid-19 pandemic. It can be hypothesized that the limited personal contact caused by the Covid-19 lockdowns has affected individuals' ability to participate in social comparison. Thereby changing the correlation between self-esteem and extraversion as well as social media. This is supported by Ruggieri et al. (2021) who found that the role of social media and social comparison in predicting psychological variables has changed when comparing before and after the pandemic.

Thus, it can be concluded that based on the negative association between extraversion and self-esteem it is clear that extraversion does not serve as a protective factor for self-esteem. Based on the negative relation between time spent on image-based social media and extraversion, extraversion could serve as a protective factor in some way, but only if self-esteem was negatively related to time spent on image-based social media. As self-esteem is positively correlated with

time spent on image-based social media, and therefore there is no need for a protective factor as no negative influence seems to be present, it is clear that extraversion cannot serve as a protective factor of self-esteem while using social media.

Limitations

Multiple limitations have been identified for this study. First, as this research is focused on image-based social media platforms only, the results cannot be generalised to all social media platforms. Additionally, the results cannot be compared to other studies, until it is clear whether and how image-based social media platforms affect self-esteem differently than text-based social media platforms. However, the focus on image-based social media platforms and its opposite results in comparison with previous literature is also a strength. It indicates that there could be a difference in the perception and usage of image- or text-based social media platforms. This is an essential indication for future research to explore further differences.

A second limitation is that of the sample itself. As this research was for academic purposes it is likely to be mostly limited to students, especially those studying at the University of Twente. The research team distributed the questionnaire to peers, thereby it could be speculated that most people filling out the questionnaire were other UT students and friends who are of similar age and likely to be students as well. Further, most participants are German and female. Nationality and gender imbalance was an additional limitation of this study. As no information was collected on ethnicity, race or gender, besides male and female, this study is not representative of such groups.

Recommendations for future research

To further explore the topic of social media usage, extraversion and self-esteem, a few recommendations have been formulated. First and foremost, a similar study approach with a different sample should be done to control for any inaccurate results that could have caused the deviation between this study's results and previous literature findings. This is especially necessary if any findings want to be generalised to the public. Second, as indicated above, one of the potential reasons for the difference in results could be the focus on image-based social media platforms. It would be useful for future research to compare image-based and text-based social media effects in relation to self-esteem and extraversion. Further, more exploration of differences between image-based and text-based social media effects in general is needed.

Third, as some studies have indicated that the variables self-esteem, social media and extraversion could be indirectly correlated, future research is needed to investigate whether and which factors moderate or mediate those relations. In this light, it would be useful to investigate whether and which effects the Covid-19 lockdowns might have had on psychological variables or the relation between such. Lastly, as the directionality of each correlation is unclear and most previous research findings did not explore this either, further studies should investigate whether social media usage and personality factors influence self-esteem or reverse.

Conclusion

According to both hypotheses, a correlation between image-based social media screen time and self-esteem and a positive moderation effect of extraversion on the relation between image-based social media screen time and self-esteem has been found. However, the positive correlation between image-based social media screen time and self-esteem, the negative correlation between image-based social media screen time and extraversion and the negative correlation between extraversion and self-esteem are inconsistent with previous literature. This could have been caused by unaccounted additional factors that mediate or moderate these relations between the three variables or the focus on image-based social media platforms. This focus has been identified as a limitation as well as a strength, with the recommendation to further research the relation and potential mediating and moderating factors.

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Appendix

**Coefficient Statistics Table of Image-based Social Media Screen Time, Extraversion, and
Interaction Image-based Social Media Screen Time and Extraversion**

			95% Confidence Interval		
	<i>B</i>	<i>β</i>	Lower	Upper	<i>p</i>
Image-based Social Media Screen Time	.28	.38	.14	.42	.00
Extraversion	-.31	-.39	-.46	-.16	.00
Interaction Image-based Social Media Screen Time and Extraversion	.03	.92	.01	.05	.01