The Impact of Instagram Use on Mental Health: A Study of the Moderating Effect of Social Anxiety

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Abstract

Instagram has been a growing social media platform and has currently more than a billion users. There is a lot of debate among researchers about the influence that Instagram has on its users. This study investigated the impact of Instagram use on mental well-being, with a particular focus on the moderating effect of social anxiety. The study targeted individuals between the ages of 18 and 30 residing or studying in Western Europe, as this demographic group is known to prefer Instagram above other social networking sites and they are considered high users of Instagram. Existing research indicated that high or extreme Instagram use can lead to problems regarding mental health. Therefore this study hypothesised: "High or extreme Instagram use, among individuals between the ages of 18 and 30, leads to lower levels of mental well-being". This study also hypothesised that: "Social anxiety negatively moderates the effect of Instagram use on mental well-being". To test these hypotheses, participants consisting of mostly Dutch university students ($N = 101$), were asked to complete an online survey that included measures of Instagram use, social anxiety, and mental well-being. This showed that the participants were on average high users of Instagram and scored slightly above average on mental well-being. However, no significant effect was found on the relationship of Instagram use on mental well-being ($p = .293$). Moreover there was not enough statistical evidence to support the hypothesis that social anxiety has a moderating effect on the relationship between Instagram use and mental well-being ($p = .077$). To conclude, this study did not find a negative effect of Instagram use on mental well-being. Further research has to be conducted on why this research is contradicting to earlier findings from other researchers.

Keywords: Instagram use, Mental well-being, Social anxiety, Young adults, Cross-Sectional Survey

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Effect of Social Anxiety

In this modern age, people are using many social networking sites to connect with people, share experiences, witness and place comments on other people's experiences, and for amusement/entertainment (Kircaburun & Griffiths, 2018). Since the beginning and during the development of social networking sites, several studies have investigated the influence of social networking sites on people (Faelens et al., 2021). Researchers have conducted studies on the influence of social networking sites on societies, politics, marketing, and individuals (Pierri, 2023). This study will focus on the effect of one social networking site, namely Instagram, and its effect on mental well-being.

Instagram

Instagram is one of the largest social networking sites, with over one billion users (Carlos et al., 2020). Instagram was initially launched as a platform for sharing pictures. However, due to updates, Instagram can be used in multiple ways. On Instagram, users can follow other profiles and connect with them through pictures, text and videos (Ting et al., 2015). According to Martínez-Cardama and Gómez-López (2023)moderate Instagram use can lead to better connections and overcoming time and distance constraints in maintaining social contacts. This is also supported by a meta-analysis by Valkenburg (2022), which found no correlation between general moderate social media use and mental well-being. Therefore, Instagram can be a useful tool to be socially active.

However, there is also a potential downside to using Instagram, as the same meta-analysis by Valkenburg (2022) showed that high Instagram use under certain circumstances can affect mental well-being. For those effects to occur, other factors were included, like time spent on Instagram, the way and to what purpose Instagram is used, and the underlying mental processes of the individual using Instagram.

Instagram Use

As mentioned previously, Instagram can be used in several ways. As concluded by Valkenburg (2022) specific factors need to be considered when measuring Instagram use. This is in line with research by (Faelens et al., 2021), which shows that there is a correlation between the way Instagram is used and the frequency in which Instagram is used and mental health. Firstly, time spent on the app seems to be an important indicator of Instagram use and its potential harmful effect on the individual (He & Liu, 2021). Excessive use of Instagram can lead to symptoms of depression, feelings of loneliness, and a negative self-image (McCrae et al., 2017).

Secondly, the setting in which time is spent on Instagram is important because it helps to determine whether someone can resist the urge to spend time on Instagram. For example, in some cases it is more appropriate to use Instagram alone at home, compared to being in a conversation or while attending a lecture. Therefore, the combination of the setting and the time spent in that setting seems to provide a better understanding of Instagram use than time alone (Sigerson & Cheng, 2018).

Furthermore, not only time and setting indicate possible problematic Instagram use. The research by Chen et al. (2022) showed that Instagram can be used actively and passively. Active use is described as engaging in online contact, posting pictures, sending messages, responding to pictures, and building an online community. Passive use is the phenomenon of scrolling endlessly through the feed or reels, also described as the broadcasting features of Instagram (Chen et al., 2022). This entails short videos of a maximum of one minute that are provided by Instagram based on your interests without really engaging in social contact online (Chen et al., 2022). Research has shown that especially passive users are more prone to problematic use, and are more likely to suffer from negative side effects of social media use

such as lower levels of self-esteem, distorted self-image, and social anxiety (Escobar-Viera et al., 2018)

Instagram Use and Mental Well-Being

Research has demonstrated that high intensity Instagram use and passive Instagram use can have negative effects on mental well-being (Chen et al., 2022; Valkenburg, 2022). To indicate in what way the individual might struggle with these negative effects, this research will focus on the term mental well-being. The World Health Organisation states that mental health or mental well-being is a state where someone can handle different daily stresses, improve oneself through work or learning, build social relationships, and contribute to their community (WHO, 2022). Other sources also include other factors such as having a positive self-image, having high levels of self-esteem, and/or being able to control anxiety (Kang et al., 2023).

To measure mental well-being, the factors above can be categorised into three categories based on the theory of Keyes (2002). The first one being emotional well-being. Emotional well-being consists of the feeling of being happy, being interested in life, and feeling satisfied with life.

The second factor according to Keyes (2002), is social well-being; this one especially links to the use and the pleasure derived from social networking sites. Social well-being is feeling socially accepted and feeling that you have the ability to grow socially.

Finally, the third factor is psychological well-being. This indicates self-acceptance, relationships with others, the feeling that you influence your environment and that you feel like you have a purpose in life. By measuring these factors, an individual can be placed on a mental health continuum that runs from languishing to flourishing (Keyes, 2005). This continuum helps to specify not only whether a person struggles with their mental health, but also if someone is mentally thriving. Therefore this continuum can help determine whether

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there is a difference in individuals who use Instagram. This is because this continuum does not focus solely on mental illness or lack of mental well-being, but also on whether someone is thriving mentally, called flourishing (Keyes, 2005). This helps in not only determining whether Instagram use leads to a problematic state of mental health, but also whether low use leads to better mental health.

The Influence of Social Anxiety

As mentioned, Instagram use can affect mental well-being. It was also established that the amount and the way in which Instagram is used determines that effect. Social anxiety experienced by an individual, can influence the way Instagram use is experienced in three different ways. According to the American Psychology Association, social anxiety is: "fear of social situations in which embarrassment may occur (e.g., making conversation, meeting strangers, dating) or there is a risk of being negatively evaluated by others (e.g., seen as stupid, weak, or anxious). Social anxiety involves apprehensiveness about one's social status, role, and behavior" (APA, 2023).

The first way that social anxiety can affect Instagram use and mental well-being is that people who show higher levels of social anxiety tend to spend more time on Instagram. This is because they want to stay away from face-to-face contact with others (Toh et al., 2022). According to Hutchins et al. (2021), people with higher levels of social anxiety feel less threatened on social media than with face-to-face contact. Therefore, they might turn to social networks as an escape strategy. However, the same study also concluded that the underlying cognitive processes of social anxiety, are the same in a physical face-to-face meeting as it is in an online environment. An example of such a cognitive process is feeling afraid to be evaluated negatively. This means that although individuals with higher levels of social anxiety might search for relief from anxiety in social interactions online, they can still experience the same amount of distress online as they would have in the physical world

(Hutchins et al., 2021).

The second and third way social anxiety is deeply connected to the effect of Instagram use on mental well-being, lies in the way how people with higher levels of social anxiety are prone to use Instagram. As mentioned in the section on Instagram use, there is a difference between passive and active use. People who have higher levels of social anxiety are more prone to be a passive user which leads to a higher negative effect of social media use on their mental well-being (Valkenburg, 2022).

Next to passively scrolling through social media, people with higher levels of social anxiety are more prone to social comparisons and especially to making upward comparisons. Upward comparison is the phenomenon of comparing oneself more negatively to another person. This can be done for example, in terms of status, looks, and lifestyle (Parsons et al., 2021). According to Parsons et al. (2021), individuals with higher levels of social anxiety are more prone to passive Instagram use and social comparisons. These effects strengthen each other, where social comparison has a positive effect on passive Instagram use and passive Instagram use strengthens the level of social comparisons and especially upward comparisons (Parsons et al., 2021).

To summarize, there are three ways in which social anxiety has an effect on the way Instagram use affects mental well-being. Firstly, social anxiety leads to more time spent on Instagram to avoid the stress of face-to-face contact. However, research suggests that online social connections do not help in reducing this type of stress. Secondly, social anxiety makes an individual more prone to social comparisons, which negatively impacts mental well-being. And finally, social comparisons and social anxiety makes an individual more prone to passive Instagram use. This, in turn, leads to more social comparisons and lower levels of mental well-being. These three combined can influence the way social anxiety affects the relationship between Instagram use and mental well-being.

Present Study

The present study targets people between the ages of 18 and 30, who are mostly living or studying in Western Europe. This target group has been shown to spend the most time on Instagram and Instagram is becoming the most popular social media platform for this age group (Auxier & Anderson, 2021). Furthermore, this age group seems to be the most affected by the possible negative outcomes of Instagram use (Shannon et al., 2022).

Because of the growing popularity of Instagram worldwide, especially among young adults, the question arises what this popularity and extended usage do to this group mentally. To expand the literature and understanding of this phenomenon, the main research question is: "What is the effect of Instagram use on mental well-being and does social anxiety influence that effect?". To answer this question the following hypotheses were created:

H1: High or extreme Instagram use, among individuals between the ages of 18 and 30, is associated with lower levels of mental well-being.

H2: Social anxiety negatively moderates the effect of Instagram use on mental well-being.

Methods

Study Design

To study whether high use of Instagram has a negative effect on mental well-being when there are higher levels of social anxiety, an online survey was distributed among people in the Netherlands between the ages of 18 and 30. This study measures Instagram use (independent variable) and social anxiety (moderating variable) on mental well-being (dependent variable).

Participants

The participants in this study were gathered through the SONA programme of the University of Twente, to make the survey available to students between the ages of 18 and 30. The SONA program is a tool used to distribute studies among the students of the University of Twente to enable and improve study participations of students. Next to the SONA programme, other nonprobability sampling methods were used. Non-probability sampling methods are sampling methods that do not ensure a fully random draw of participants from the population. One of these methods used was the convenience sampling method by asking friends and relatives. The second method used was the snowball sampling method by asking participants to forward the survey. Inclusion criteria were (1) to be between the age of 18 and 30, (2) Instagram users, and (3) having a basic understanding of the English language which was checked trough the consent form. Demographic data can be found in Table 1.

Table 1

Demographic Data

	n	*%*
Gender		
Female	65	64.4
Male	36	35.6
Nationality		
Dutch	66	65.3
German	24	23.8
Other	11	10.9
Highest educational level		
High school/some college	1	1.0
Currently a Bachelor's student	70	69.3
Completed a Bachelor's degree	15	14.9
Currently a Master's student	10	9,9
Completed a Master's degree	5	4.9
Age		
18 < 22	39	38.6
22 < 25	50	49.5
25 < 30	12	11.9

Materials

Next to the demographic questions, three additional existing questionnaires were used to test Instagram use, social anxiety, and mental well-being. Participants needed a smart

device with an internet connection to access the Qualtrics site, via this website, the questionnaires were presented to the participants.

Instagram Use

To measure Instagram use, the Social Networking Time Use Scale (SONTUS) was used (Olufadi, 2016). This is a questionnaire with 29 items measuring five components. The participants had the option to choose from an 11-point Likert scale with specific attributes to each point starting with; "1 = Not applicable to me during the past week" and ending with; "11 = I used it more than 3 times during the past week but spent more than 30 min each time" (Olufadi, 2016).

Each of the five components showed good reliability these 5 being, "relaxation and free periods" (α .93), "academic-related periods" (α .89), "public-place-related use" (α .85) "stress-related periods" (α .86) and "motives for use" (α .83) (Olufadi, 2016).

The scores of the different components were recoded by the scheme provided by Olufadi (2016) which can be found in Appendix A. These processed scores can be added to give the indication if someone is a low Instagram user, an average user, high user, or an extremely high user. According to Olufadi (2016), someone is a low user when the score is between 5 and 9, an average user between 10 and 14, a high user when he/she scores higher than 15 and an extremely high user when he/she scores higher than 19. These scores are derived by giving a specific score to each of the underlying components. The coding scheme can be found in appendix A.

Social Anxiety

To measure social anxiety, the interaction anxiousness scale developed by Leary (1983) was used. This scale measures the self-perceived level of anxiousness concerning social interactions, which is a good measurement for social anxiety. The participants were asked to answer a 15-item questionnaire with a 5-point Likert scale. The participants needed

to indicate whether a characteristic was true for them by answering with; not at all = 1, slightly =2, moderately = 3, very = 4, or extremely = 5. Items 3, 6, 10, and 15 needed to be reverse coded (Leary, 1983). The interaction anxiousness scale shows high reliability (α > .85).

Furthermore, the interaction anxiousness scale has a high correlation with the underlying subscales that measure social anxiety. The most important being 'Social avoidance and distress" (*r* .71), "Shyness" (*r* .88), and finally it correlates with the social anxiety subscale of the Self-Consciousness Scale (*r* .77), (Leary, 1993).

The scores measured by the interaction anxiousness scale are added up. The higher the score on the interaction anxiety scale, the higher the presence of social anxiety.

Mental Well-Being

To measure mental well-being the Mental Health Continuum Short Form (MHC-SF) was used (Keyes, 2005). The MHC-SF is a questionnaire with fourteen items that measure three dimensions: psychological well-being, emotional well-being, and social well-being. Participants have to answer the questions on a 6-point Likert scale, where they have to indicate how often the feeling described occurred to them in the last month. The options are: "every day", "almost every day", "about 2 or 3 times a week", "about once a week", "once or twice", or "never". "Never" scores 0 points and "every day" scores 5 points. An example of a feeling regarding psychological well-being is; "Good at managing the responsibilities of your daily life". An example of a item regarding emotional well-being is; "Interested in life". And finally, an example of a feeling regarding social well-being is; "That you belonged to a community (like a social group, your neighbourhood, your city)". After the test is conducted, the mean can be taken of the total sum score for an indication of where on the continuum an individual belongs.

According to research from Lamers et al. (2011), the MHC-SF is a good measurement

test with good psychometric properties. The three different dimensions showed good reliability with "psychological well-being" ($\alpha = .83$), "emotional well-being" ($\alpha = .83$), and "social well-being" ($\alpha = .74$). The overall internal reliability of MHC-SF was also high ($\alpha = .89$).

Procedure

The data was gathered in collaboration with another researcher. The other researcher was listed as a contact person and handled the distribution of the questionnaire through SONA. Participants were directed to the website 'Qualtrics' via a link to complete the questionnaire. This could be done on any smart device or computer/laptop with internet connection. The link was published after having received ethical approval from the BMS ethical committee on 2023-04-07 with request code 230485, and was first put on SONA. After reading the consent form, which can be found in Appendix B, and affirming that they have read and understood their rights, the questionnaire began. First, participants were asked demographic questions; Gender, Age, Current study level, and Nationality. Subsequently, the different questionnaires to measure the relevant variables for this study and those of the research partner were presented to the participant. After the participant had answered all the questions, they were thanked for participating and the contact details of the research partner were shown for possible questions about the research.

Data Analysis

The data collected using Qualtrics was processed with R. The first step was to clean up the data by excluding all participants who did not meet the age selection criteria or did not complete the questionnaire. After checking the inclusion criteria and removing the participants that did not meet these criteria, a group of 101 participants remained to be analysed. Data downloaded from the Qualtrics website, was in text and was recoded to numerical or factor data for the analysis. The code used for this and the upcoming actions

described in this section can be found in Appendix C.

The items of the SONTUS were measured across five components. First, a score had to be calculated for each component, these scores had to be assigned to a value given by Olufadi (2016). These values had to be added to create a final SONTUS score. For Leary's anxiousness scale, the 15 items were measured in a non-numerical Likert scale and had to be transformed to a numerical Likert scale. After this, items 3, 6, 10, and 15 had to be reverse-coded. Then the sum was taken for the final score on the social anxiousness scale.

And finally, the data of the MHC-SF also had to be transformed from a non-numerical Likert scale to a numerical one. The sum score across three dimensions was calculated and the mean scores of that score were the final scores on the mental health continuum.

When all scores were calculated, the data analysis was performed. For all the analyses performed, a significance level of $\alpha=.05$ was considered statistically significant. First, a Pearson's correlation analysis was conducted to check the strength between the variables. Subsequently, the first hypothesis; "High or extreme Instagram use, among individuals between the ages of 18 and 30, leads to lower levels of mental well-being." could be tested. A linear regression analysis was conducted. Before this, the assumptions of linearity, homoscedasticity and normality were checked. This was done by plotting the data and performing a Shapiro-Wilk test. The assumptions were fulfilled.

Finally, the second hypothesis was tested; "It is to be expected that social anxiety negatively moderates the effect of Instagram use on mental well-being". This was done with the PROCESS macro package for R version 4.3.1 created by Andrew F. Hayes. Through the use of this package, multiple regression analyses were conducted.

Results

Descriptive Statistics

First, the results of the descriptive analysis of the MHC-SF, measuring mental well-being, the SONTUS, measuring Instagram use, and the Social Interaction Anxiousness Scale, measuring social anxiety, were looked at. These can be found in Table 2. Starting with mental well-being, participants had slightly above average mental well-being ($M = 3.2$, $SD = 0.7$) The Instagram use group score was above average ($M = 15.4$, $SD = 3.9$), showing that according to the SONTUS, this sample comprises high Instagram users. Finally, the participants scored average on social anxiety ($M = 40$, $SD = 9.4$). Compared to when the scale was developed and tested, the mean was 39.44 (Leary, 1993).

Table 2

Descriptive statistics

	M	*SD*
Mental well-being	3.2	0.7
Instagram use	15.4	3.9
Social anxiety	40	9.4

Correlations

The correlations between the dependent variables and the independent variables were checked using Pearson's correlations. There was a weak positive but insignificant correlation between the independent variable "Instagram use" and the dependent variable "Mental well-being" ($r = .106$, $p = .293$). A moderate negative correlation was found for the variables

"Social anxiety" and "Mental well-being" (r = -.374, p < .001). Finally, a low positive

correlation was found between the variables 'Instagram use' and "Social anxiety" (r = .140, p

= .163). The results of the Pearson's correlations can also be found in Table 3.

Table 3

Pearson's Correlation Effect

Variable	1	2	3
1. Instagram use	.	.106	.140
2. Mental well-being	.106	.	-.374**
3. Social anxiety	.140	-.374**	.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Inferential statistics

To test the first hypothesis: "High or extreme Instagram use, among individuals

between the ages of 18 and 30, leads to lower levels of mental well-being", a linear regression

analysis was performed, the results of which can be found in Table 4. The data show that there

was no significant effect of Instagram use on mental well-being (r = .03, $F(1, 99)$ = 1.12, p =

.293). Therefore this hypothesis can be rejected.

Table 4

Regression Analysis Instagram Use (IV) & Mental Well-Being (DV)

	b	r	R²	F	p	95% Confidence interval Lower bound	Upper bound
Intercept	2.90	*N/A*	*N/A*	10.3	<.001	2.34	3.46
Instagram use	.02	.03	.01	1.12	.293	-.0165	.0544

Note. Dependent variable: Mental well-being

To test whether social anxiety is indeed a moderating variable and if it has a negative moderating effect on Instagram use and mental well-being, the multiple regression analysis was performed in R, the results of which can be found in Table 5. From the analysis, it was concluded that the overall model was significant ($r = .438$, $F(3, 97) = 7.69$, $p < .001$). However, the results of the PROCESS macro-analysis showed that the moderating effect of social anxiety was insignificant ($F(1, 97) = 3.21$, $p = .077$). Therefore, the second hypothesis "It is to be expected that social anxiety negatively moderates the effect of Instagram use on mental well-being" was rejected.

Table 5

Multiple Regression Analysis

	b	se	t	p	95% confidence interval Lower bound	Upper bound
constant	1.589	1.370	1.160	.249	-1.130	4.308
Instagram use * Social anxiety	-.004	.002	-1.791	.077	-.008	.0004

Note. Dependent variable: Mental well-being

Discussion

This study was conducted to test whether Instagram use is associated with mental well-being, and if social anxiety has a moderating effect between those variables. The study was conducted on a sample group consisting of 101 participants all between the ages of 18 and 30. The sample group consisted almost entirely of individuals whose lowest level of education was currently a bachelor's student (99%). The sample group had a slightly above average level of mental well-being (M= 3.2, SD=.7). When the MHC-SF was tested among a representative sample of the Dutch population, a mean score of 2.98 was found (Lamers et al., 2011). Furthermore this sample group scored a mean score of 15.4 on Instagram use. According to the standards of Olufadi (2016), this can be considered "high Instagram use". Finally this sample group scored (M=40, SD =9.4) on social anxiousness, which is comparable to the mean found by Leary (1993).

When testing the first hypothesis: "High or extreme Instagram use, among individuals between the ages of 18 and 30, leads to lower levels of mental well-being", the descriptive analysis showed that the sample group was considered high Instagram users. Therefore, in line with the hypothesis, a lower level of mental well-being was expected. However, in the descriptive statistics, a slightly above-average level of mental well-being was found. This contradicts the expectations of the first hypothesis.

After the descriptive analysis, the correlations show that there was no significant correlation between Instagram use and mental well-being. The inference statistics followed the same line of findings. The results of the analysis looking at the main effect of Instagram use on mental well-being showed, that this effect while slightly positive was insignificant. Therefore, the first hypothesis can be rejected.

The insignificant slightly positive effect can be caused by the descriptive statistics of this sample group. While the participants were considered high Instagram users with a mean of 15.4, the cutoff point of average usage is 15 (Olufadi, 2016). Because this mean score of

the sample group lies close to average/moderate use the participants might have experienced positive effects of Instagram use. This in line with the findings by Martínez-Cardama and Gómez-López (2023) who stated that moderate Instagram use leads to better social well-being.

For the second hypothesis, it was expected that social anxiety had a negative moderating effect on the relationship between Instagram use and mental well-being. This study did find a significant negative effect of social anxiety on mental well-being. However, using the significance level of $\alpha=.05$, social anxiety had a marginally insignificant effect on the relationship between Instagram use and mental well-being. Therefore, this study has to conclude that the moderating effect that was expected was not found and that the second hypothesis was rejected. This might be due to the average level of social anxiety present in this sample. Had the average level of social anxiety been higher, the underlying factors that would predict a negative experience of Instagram use would be more prominent and could have made this moderating effect significant. Especially because the effect found was only slightly insignificant.

Strengths and Limitations

This study has several strengths and limitations. A strength of this research lies in the measurement tools that were used to measure the three variables included. The SONTUS, the Interaction Anxiousness Scale and the MHC-SF are widely used valid measuring tools and have great psychometric qualities. This enhances the reliability of the findings of this study. Furthermore, this research adds to the broader spectrum of research on Instagram use and social media use in general and its effect on mental health. As the previously mentioned meta-analysis by (Valkenburg, 2022) indicates, existing research on the topic of social media use and its influences on mental well-being often include other underlying factors like mental dispositions. This study expands that body of research by exploring the underlying factor of

social anxiety. Therefore this research, while not finding a significant effect, helps to better understand the way Instagram affects mental well-being. Additionally, this research helps to give a better insight into Instagram use and mental well-being among highly educated people between the ages of 18 and 30, since the vast majority of the sample had a bachelor's degree or is currently a bachelor's student.

While it is a strength that more data was gathered about highly educated people, it is also a limitation of this study. This study started out to find the effect of Instagram use on mental well-being of people between the ages of 18 and 30. However, trough the gathering of participants through the SONA-system and non-probability sampling methods, an overwhelming portion of the sample group consisted of people who have a Bachelor's degree or are currently pursuing one. This is not a representative sample of all the people between the ages of 18 and 30.

A second limitation of this study is the way the in which the moderating effect was measured. Certain assumptions were made on the basis of existing literature. These were that social anxiety is associated with underlying factors such as being prone to passive use, being more susceptible to social upward comparisons, and unsuccessfully trying to avoid the stress of face to face contact. According to existing literature, all these factors negatively influence the way Instagram use affects mental well-being. However, these underlying assumptions have not been separately measured in the present study. Therefore assumptions made and built upon in this study cannot be confirmed nor denied by this research.

Finally, there were more women than men participating in the study, which might affect the results. Instagram can be experienced and used differently by different genders. For example women have shown to be more at risk for addictive tendencies towards social media. Furthermore women report significantly higher life satisfaction when they quit social media

compared to men (Andreassen et al., 2017; Fioravanti et al., 2019). So more equality between the genders would have been preferable.

Further research

Although research suggests that high Instagram use has a negative effect on mental well-being and that social anxiety negatively moderates that effect, this study did not come to the same conclusions. Further research should try to determine whether social anxiety really has an effect on Instagram use. This can be done by testing the underlying factors mentioned throughout this study on top of social anxiety. Furthermore, additional research can be done with a different sample group. Especially with a better representation of the entire public between the ages 18 and 30 and a better distribution between the genders.

Finally this target group was chosen on the basis that they show to be the biggest users of Instagram (Auxier & Anderson, 2021). And while the overall usage of this sample group can be considered high, it was slightly above the cutoff point. Further research with other sample groups should be conducted to test whether this level of Instagram use is representative of this target group.

Conclusion

The main research question of this study was: "What is the effect of Instagram use on mental well-being and does social anxiety influence that effect?". It can be concluded that by rejecting both hypotheses, this study found no significant effect of Instagram use on mental well-being. Furthermore, while this study did find social anxiety to negatively influence the level of mental well-being, no significant moderating effect on the relationship between Instagram use and mental well-being was found. These findings imply that further research needs to be conducted on the way Instagram use affects mental well-being and what other factors are potentially responsible for this effect.

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Appendices

Appendix A – Scoring of the Sontus

In scoring the SONTUS, five component scores are derived. The components scores are summed to produce a global score that ranges from 5 to 23. This approach is in line with the results of our confirmatory factor analysis, which reveals a 5 first-order factors with a 1 second-order factor as the best model for the SNOTUS construct.

Coding Instruction: each and every items in SONTUS is coded as follows:

- 1 = if a respondent select the Likert scale 1–3.
- 2 = if a respondent select the Likert scale 4– 6.
- 3 = if a respondent select the Likert scale 7–9.
- 4 = if a respondent select the Likert scale 10 or 11.

Component 1: relaxation and free periods.

Sum of items 2, 6, 7, 12, 14, 21, 22, 24 and 26 scores	Component 1 score
9–12	1
13–16	2
17–20	3
21–24	4
25–28	5
29–32	6
>32	7

Component 2: academic-related periods

Sum of items 1, 5, 10, 13, 28, and 29 scores	Component 2 score
6–9	1
10–13	2
14–17	3
18–21	4
>32	5

Component 3: public-places-related use.

Sum of items 4, 9, 17, 19, and 23 scores	Component 3 score
5–8	1
9–12	2
13–16	3
17–20	4

Component 4: stress-related Periods.

Sum of items 3, 8, 15, 16, and 27 scores	Component 4 score
5–8	1
9–12	2
13–16	3
17–20	4

Component 5: motives for use.

Sum of items 11, 18, 20, and 25 scores	Component 5 score
4–7	1
8–11	2
>11	3

Global SONTUS score: sum of the five component scores: _____

Appendix B – Informed consent

Informed Consent,

This study assesses factors influencing social media usage and well-being. The data will be obtained for the psychology bachelor thesis with the theme ''Investigating the relation between social media use and Mental health. This survey will take approximately 15 minutes to complete. The participation for this survey is voluntary and you can withdraw at any time. For the data analysis, all personal data will be handled anonymously, and will only be used for research purposes. The data will remain confidential and will be only shared with the supervisor for this thesis.

For any questions, contact the following people:
Researcher: Mats Anneveldt, email: m.m.anneveldt@student.utwente.nl
First supervisor: Martha Kreuzberg, email: m.s.kreuzberg@utwente.nl

Clicking "I agree to participate in this study" indicates that:
- You have read and understood the information of this study.
- You consent voluntarily to be a participant and you know that you can withdraw at any point during this study.
- You understand that the information you provide will be used only for research purposes and that your participation will be completely anonymous.
- You understand that by taking part in this study requires you to answer the questions honestly.
- You understand that incomplete responses might be excluded during the analysis of the data.

○ I agree to participate in this study

○ I do not agree to participate in this study

Appendix C – Rscript

```
library(tidyverse)

library(reshape2)

library(dplyr)

library(plyr)

library(MASS)

#Clean data set

rawdata <- Questionnaire_Instagram_use_and_well_being_May_8_2023_12_02

cleandata <- subset(rawdata, select = -c(StartDate, EndDate, Status, IPAddress, RecordedDate,
ResponseId, RecipientEmail, RecipientLastName, RecipientFirstName, ExternalReference,
LocationLatitude, LocationLongitude, DistributionChannel, UserLanguage))


cleandata <- cleandata [-c(52:61)]


cleandata <- cleandata [-c(67:92)]


#multiple times
cleandata <- cleandata [-c(1)]


numericaldata <- subset(numericaldata, Progress > 75)


numericaldata <- numericaldata [-c(1)]


numericaldata <- subset(numericaldata, Age < 30)


#trying making it numerical
numericaldata <- cleandata


sapply(prdata1, class)


X <- c(1, 2, 5, 23:51)


X
```

```r
numericaldata <- prdatafactor

numericaldata[ , X] <- apply(numericaldata[ , X], 2,          # Specify own function within apply
            function(x) as.numeric(as.character(x)))
#getting the social anxiousness scale to numerical
anxiousness <- c(51:65)


numericaldata <- numericaldata %>% mutate_at(c("Social context_1...76","Social
context_2...77","Social context_3...78","Social context_4...79",
                              "Social context_5...80","Social context_6...81","Social
context_7...82","Social context_8...83",
                              "Social context_9...84","Social context_10...85","Social
context_11","Social context_12",
                              "Social context_13","Social context_14","Social context_15"),
funs(recode(., "1 = Not at all characteristic of me" = 1,

                                          "2 = Slightly characteristic
of me" = 2,

                                          "3 = Moderately
characteristic of me" = 3,                                                "4
= Very characteristic of me"= 4,

                                          "5 = Extremely
characteristic of me" = 5)))


numericaldata <- numericaldata %>% mutate_at(c("Well-being_1","Well-being_2","Well-
being_3","Well-being_4","Well-being_5","Well-being_6","Well-being_7","Well-being_8",
                              "Well-being_9","Well-being_10","Well-being_11","Well-
being_12","Well-being_13","Well-being_14"), funs(recode(., "Never" = 0, "One or twice" = 1,

                                          "About once
a week" = 2, "About 2 or 3 times a week" = 3, "Almost every day" = 4,

                                          "Every day"
= 5)))




numericaldata <- revalue(numericaldata$`Social context_2...77`, c("1 = Not at all characteristic of me"
= 1,

                  "2 = Slightly characteristic of me" = 2,

                  "3 = Moderately characteristic of me" = 3,

                  "4 = Very characteristic of me"= 4,
```

"5 = Extremely characteristic of me" = 5))

#everything is numerical now just have to change gender nationality and education into factors

numericaldata <- as.data.frame(unclass(numericaldata), stringsAsFactors = TRUE)

sapply(numericaldata, class)

Finaldataset <- subset(Finaldataset, Age < 30)

Finaldataset <- numericaldata

#comletedataset without reverse code

Finaldataset <- prdata1

summary(Finaldataset)

#coding the sontus
#Putting the sonus into 1-4 score

dataSontus <- ifelse(dataSontus >= 1 & dataSontus <= 3, 1,
                     ifelse(dataSontus >= 4 & dataSontus <= 6, 2,
                         ifelse(dataSontus >= 7 & dataSontus <= 9, 3,
                             ifelse(dataSontus >= 9 & dataSontus <= 11, 4, 0))))

dataSontus <- Finaldataset [-c(1:18)]

dataSontus <- dataSontus [-c(30:44)]

Finaldataset$f1Sontus <- rowSums(dataSontus[, c(2, 6, 7, 12, 14, 21, 22, 24, 26)])

```r
Finaldataset$f2SOntus <- rowSums(dataSontus[ , c(1, 5, 10, 13, 28, 29)])

Finaldataset$f3SOntus <- rowSums(dataSontus[ , c(4, 9, 17, 19, 23)])

Finaldataset$f4SOntus <- rowSums(dataSontus[ , c(3, 8, 15, 16, 27)])

Finaldataset$f5SOntus <- rowSums(dataSontus[ , c(11, 18, 20, 25)])

#data$row_sum <- rowSums(data[ , c(1,3)], na.rm=TRUE)

#creating componment scores
#my_data$new_col <- ifelse(my_data$old_col >= 9 & my_data$old_col <= 12, 1, 0)

Finaldataset$componmentS1 <- ifelse(Finaldataset$f1Sontus >= 9 & Finaldataset$f1Sontus <= 12, 1,
                ifelse(Finaldataset$f1Sontus >= 13 & Finaldataset$f1Sontus <= 16, 2,
                    ifelse(Finaldataset$f1Sontus >= 17 & Finaldataset$f1Sontus <= 20, 3,
                        ifelse(Finaldataset$f1Sontus >= 21 & Finaldataset$f1Sontus <= 24, 4,
                            ifelse(Finaldataset$f1Sontus >= 25 & Finaldataset$f1Sontus <=
28, 5,
                                ifelse(Finaldataset$f1Sontus >= 29& Finaldataset$f1Sontus
<= 32, 6,
                                    ifelse(Finaldataset$f1Sontus > 32, 7, 0)))))))

Finaldataset$componmentS2 <- ifelse(Finaldataset$f2SOntus >= 6 & Finaldataset$f2SOntus <= 9, 1,
                ifelse(Finaldataset$f2SOntus >= 10 & Finaldataset$f2SOntus <= 13, 2,
                    ifelse(Finaldataset$f2SOntus >= 14 & Finaldataset$f2SOntus <= 17, 3,
                        ifelse(Finaldataset$f2SOntus >= 18 & Finaldataset$f2SOntus <= 32, 4,
                            ifelse(Finaldataset$f2SOntus > 32, 5, 0)))))

Finaldataset$componmentS3 <- ifelse(Finaldataset$f3SOntus >= 5 & Finaldataset$f3SOntus <= 8, 1,
                ifelse(Finaldataset$f3SOntus >= 9 & Finaldataset$f3SOntus <= 12, 2,
                    ifelse(Finaldataset$f3SOntus >= 13 & Finaldataset$f3SOntus <= 16, 3,
                        ifelse(Finaldataset$f3SOntus > 16, 4, 0))))
```

```
Finaldataset$componmentS4 <- ifelse(Finaldataset$f4SOntus >= 5 & Finaldataset$f4SOntus <= 8, 1,
                ifelse(Finaldataset$f4SOntus >= 9 & Finaldataset$f4SOntus <= 12, 2,
                    ifelse(Finaldataset$f4SOntus >= 13 & Finaldataset$f4SOntus <= 16, 3,
                        ifelse(Finaldataset$f3SOntus > 16, 4, 0))))


Finaldataset$componmentS5 <- ifelse(Finaldataset$f5SOntus >= 4 & Finaldataset$f5SOntus <= 7, 1,
                ifelse(Finaldataset$f5SOntus >= 8 & Finaldataset$f5SOntus <= 11, 2,
                    ifelse(Finaldataset$f5SOntus > 11, 3, 0)))


Finaldataset$sontusttotal <- rowSums(Finaldataset[ , c(68:72)] )


#including final levels mental health


datamentalhealth <- subset(Finaldataset[ , c(5:18)])


Finaldataset$emotionalWB <- rowMeans(datamentalhealth[ , c(1,2,3)])


Finaldataset$SocialWB <- rowMeans(datamentalhealth[ , c(4:8)])


Finaldataset$psyWB <- rowMeans(datamentalhealth[ , c(9:14)])


Finaldataset$MentaWBtotal <- rowMeans(datamentalhealth[ , c(1:14)])


#preparing laerys anxious scale
#reversecode 3 6 10 15


reverse_cols = c("Social context_3...78", "Social context_6...81", "Social context_10...85", "Social context_15")


datasocialanxiety <- Finaldataset[ , c(50, 53, 57, 62)]


Finaldataset[ , c(50, 53, 57, 62)] = 6- Finaldataset[ , c(50, 53, 57, 62)]
```

```
Finaldataset[ , c(48:62)]


datasocialanxiety <- (Finaldataset[ , c(48:62)])


Finishedvariables <- Finaldataset[ , c(73, 78, 77)]


#datafinished so far watch out with going from numericaldata to finisheddata and from clean to
numerical


summary(datasocialanxiety)


modelregression <- lm(MentaWBtotal ~ sontusttotal * Anxietytotal, data = Finishedvariables)


Finaldataset %>%
  ggplot(aes(x = "", y = Age)) +
  geom_boxplot() +
  xlab("")


Finaldataset %>%
  mutate(Age = factor(Age, ordered = TRUE)) %>%
  ggplot(aes(x = Age)) +
  geom_bar(30)


summary(Finaldataset$Age)


Finishedvariables %>%
  ggplot(aes(x = Anxietytotal, y = MentaWBtotal)) +
  geom_point()


model <-  lm( MentaWBtotal ~ sontusttotal, data = Finishedvariables)


modelregression %>%
  tidy(conf.int = 95)
```

```
library(broom)
model <- Finishedvariables %>%
  lm(MentaWBtotal ~ sontusttotal, data = .)
model %>%
  tidy()

summary(modelregression)

cor_matrix <- cor(Finaldataset[c("sontusttotal", "MentaWBtotal", "Anxietytotal")], method =
"pearson")

print(cor_matrix)

LMmodel <- lm(MentaWBtotal ~ Anxietytotal, data = Finaldataset)

summary(LMmodel)

plot(Finaldataset$MentaWBtotal, Finaldataset$Anxietytotal)

count(Finaldataset, "Age")

summary(Finaldataset)

mean(Finaldataset$sontusttotal)

sd(Finaldataset$Anxietytotal)

Descriptivedata <- subset(Finaldataset[ , c(76, 80, 81)])

view(rawdata, "Well-being_5")

mean(Finaldataset$sontusttotal)

abline(modelregression, lwd=5, col= "red")
```

```
plot(Lmodel)

shapiro.test(x_transformed)

corSOMH <- cor.test(Finishedvariables$MentaWBtotal, Finishedvariables$sontusttotal,
                method = "pearson")

corMHAT <- cor.test(Finishedvariables$Anxietytotal, Finishedvariables$MentaWBtotal,
              method = "pearson")

corSOAT<- cor.test(Finishedvariables$Anxietytotal, Finishedvariables$sontusttotal,
          method = "pearson")

corSOAT

HYP1 <- Finishedvariables %>%
  lm(MentaWBtotal ~ sontusttotal, data = .)

summary(numericaldata)

summary(HYP1)

HYP2 <- Finishedvariables %>%
  lm(MentaWBtotal ~ Anxietytotal, data = .)

plot(Finishedvariables)

HYP1 %>%
  tidy(conf.int = 0.95)

0.0189

sqrt(0.001197)
```

process(data = Finishedvariables, y = "MentaWBtotal", x = "sontusttotal", w = "Anxietytotal", model = 1)

Martínez-Cardama, S., & Gómez-López, E. (2023). *Impact of Social Media on Self-esteem and Emotions: An Instagram-Based Case Study* Information for a Better World: Normality, Virtuality, Physicality, Inclusivity: 18th International Conference, iConference 2023, Virtual Event, March 13–17, 2023, Proceedings, Part II, https://doi.org/10.1007/978-3-031-28032-0_9