

**Association Between Social Media Screen Time and Perceived Stress Moderated by the
Personality Trait Neuroticism**

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Abstract

Background. Lately, social media and its various aspects of usage has become very prominent in the society and the life of individuals and therefore spend a lot of time on them. Research shows that the screen time the people spend on social media has an influence on their perceived stress (Wolfers & Utz, 2022). An important factor that seems to have an effect on this relationship is the personality trait of neuroticism (Bowden-Green et al., 2021). The purpose of this study was to examine the relationship between the different aspects of social media screen time (total, passive, connective) and perceived stress and to find out whether neuroticism moderates this relationship.

Methods. The relationship between social media screen time, perceived stress and neuroticism was based on a cross-sectional survey investigated. (Under)graduate students ($N=149$) were asked to fill out a self-developed questionnaire for the total social media screen time, the SMAQ (Ozimek et al., 2023) for passive social media screen time, and the SNS (Orchard et al., 2014) for connective social media usage. Additionally, the perceived stress level was measured based on the results of the PSS (Cohen, Kamarck & Mermelstein, 1983) and their neuroticism level based on the questions concerning neuroticism of the MINI-IPIP (Goldberg, 1992).

Results. The study showed that only the relationship between passive social media use and perceived stress is statistically significant positive ($r(df) = .203, p = .0398$). The other measured relationships and moderating effects were not statistically significant. However, results indicated that there is a strong direct relationship between neuroticism and perceived stress ($b = 1.44, p < .001$).

Conclusion and Discussion. The correlation between passive but none of the other variables of social media use demonstrate the importance to investigate how individuals use social media. The remarkably strong positive effect of neuroticism on perceived stress emphasises the importance to consider personality traits when investigating perceived stress and social media use. Importantly, further investigation is needed if a validated and reliable measurement of social media screen time (total, passive and active) would lead to a different outcome. To expand this research, an experimental and longitudinal study design with the same structure as this study, might provide further insights.

Keywords: Social media, perceived stress, neuroticism, mental health, screen time

Introduction

Social Media Screen Time

In today's world, social media is omnipresent and has revolutionised interpersonal communication. Social media has grown rapidly over the past 20 years, encompassing a wide range of websites and applications that are utilised by users of all ages worldwide (O'Day & Heimberg, 2021). Social media has become an essential part of the daily life especially for adolescence and young adults, with roughly 67.1% that use social media sites (Kemp, 2024). Particularly with younger users, other social media platforms, like Instagram, TikTok, and Snapchat, are gaining traction. According to Smith and Anderson (2018), 78% of young adults (ages 18 to 24) say they use Snapchat, while 71% say they use Instagram. The majority of these users log on to the platforms regularly or multiple times a day. Kemp (2024) also shows that especially new platforms like TikTok, have shown an increasing number of users.

According to Vannucci et al. (2017) is social media defined as the “internet applications that enable users to generate and exchange content with others”. Additionally, Carr and Hayes (2015), delivers a more complex definition of social media as “internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others”. According to a study by Ellison and Boyd (as cited in O'Day & Heimberg, 2021), social media refers to web-based communication platforms that have three main characteristics. Firstly, enabling users to create personal profiles and share content with other users. Secondly, establishing a visible network connection between users that other users can browse. Finally, giving users a place to broadcast content, consume information, and communicate with others in a never-ending stream of information. Numerous apps (including Facebook, Instagram, and Snapchat) meet these requirements. Social media can be used for many different purposes, such as staying in touch with friends, making connections with people who share interests or hobbies, following celebrities, finding love partners, finding new information, expressing one's identity, thoughts, and feelings, and sharing both good and bad news (Boyd & Ellison, 2007). Additionally, social media can also be used in a passive way which includes internet habits such scrolling through

news feeds, watching other people's accounts, and obtaining information rather than producing it (Winstone et al., 2022). Due to the fact that social media is present in the everyday life of individuals, provoked a growing awareness of the influence it has on the psychological adjustment, such as coping strategies, of young adults (Vannucci et al., 2017).

Interestingly, an increasing number of research examines the relationship between social media use and perceived stress (Weinstein & Selman, 2014; Marciano et al., 2022; Winstone et al., 2022). This is due to the fact that recent studies have shown that social media can contribute to stress, act as resources, and be a tool for different coping mechanisms; nevertheless, it is yet unknown under what circumstances social media influences stress (Wolfers & Utz, 2022).

Perceived Stress

When a person is unable to manage the external physiological and cognitive discomfort of daily life, stress is an inescapable life experience (Roohafza et al., 2016; Suldo et al., 2008). Perceived stress is, according to Phillips (2020), defined as “the feelings or thoughts that an individual has about how much stress they are under at a given point in time or over a given time period”. In short, perceived stress is the way a person perceives the amount of stress they experience over time (Cohen et al., 1983).

Feelings about how unpredictable and uncontrollable life is, how frequently bothersome things are in the way, how much life is changing, and self-assurance in one's ability to handle challenges are all included in perceived stress. It evaluates how someone thinks about how difficult their life is overall and how well they can manage stress rather than the kinds or frequency of stressful events that have happened to them. People may experience comparable unfavourable life events, but because of things like personality, coping mechanisms, and support, they may judge the impact or severity of them to differing degrees (Phillips, 2020). Using a questionnaire like the Perceived Stress Scale, perceived stress is typically quantified as the frequency of these emotions (Cohen et al. 1983).

Stress has the potential to induce disease in those who are biologically vulnerable due to age, genetics, or constitutional variables if they are excessively powerful and persistent. This is especially true if the individual has inadequate coping mechanisms and little psychosocial support. There is proof that some stressors can lead to certain diseases, including cardiovascular disease, upper

respiratory diseases, HIV, inflammation, and mental health disorders (Schneiderman et al., 2005). Apart from its direct impact on physical health via psychophysiological pathways (Cohen et al., 1983; McEwen, 2007), stress can also have an indirect effect on health by influencing health-related behaviours. People who smoke, drink alcohol, or eat high-calorie, heavily processed meals as a way to cope with stress may also engage in other activities that provide momentary respite (Ng & Jeffery, 2003; Pak et al., 1999; Steptoe et al., 1998). Like the direct way, the World Health Organisation (WHO) (2014), states that chronic stress and protracted behavioural responses have the most negative effects on health.

Social Media Screen Time and Perceived Stress

Firstly, it is important to mention that the relationship between social media use and perceived stress is bidirectional. That is to say, both stress causes social media use and social media use causes stress. Studies have made arguments in favour of both approaches (Wolfers et al., 2020; Beyens et al., 2016). Two hypotheses about the relationship of social media use and perceived stress made by Wolfers & Utz (2022) can serve as an example for this contradiction.

The first hypothesis predicts that social media is a beneficial response to reduce stress. This “social-media-use-buffers-stress-hypothesis” states that social media can be seen as a resource that can protect from the impact of stress (Wolfers & Utz, 2022). For example, when people experience stressful situations, a smartphone with its social media websites, can serve as a “first-aid-in-the-pocket” (Schneider et al., 2023). It can be used in a variety of different ways, for example, to avoid these stressful situations (Wang et al., 2015) or to get social support (Petrovčič et al., 2015) when needed. For that, social media can make friends, family, and acquaintances available to them so they can feel connected and get various forms of assistance (Deters & Mehl, 2012; Frison & Eggermont, 2015). Finally, since the online environment lessens the suffering associated with genuine (offline) social interactions, people tend to construct and maintain an online ideal or fake self and express themselves through social media (Marciano et al., 2022).

Interestingly, there exists also a contradicting hypothesis stating that social media use is a risk factor that can lead to stress. According to the “social-media-use-causes-stress-hypothesis” (Wolfers & Utz, 2022) social media, with its different possibilities offered for their users, can serve as a

stressor in many distinctive ways (Steele et al., 2019; Fox & Vendemia, 2016). As said by Wolfers and Utz (2022), social media can, for example, cause approval anxiety. Moreover, according to Winestone et al. (2022), social media use was associated with “expectations of perfection and sexualisation and anticipation or fear of negative evaluation” resulting from sharing content online. Furthermore, social media can cause the fear of missing out (FoMO), which is the worry that others may be enjoying fulfilling experiences while one is not (Wolfers & Utz, 2022). Moreover, according to Reinecke et al. (as cited in Wolfers & Utz, 2022), the expectation to always be available can serve as another possible stressor. Moreover, having constant access to people, even close ones that one may normally want to interact with, can cause feeling suffocated (Weinstein & Selman, 2014). Additionally, pressure to comply with requests for access is another stressor. This relates especially to the pressure of handling demands from close friends or family members for access to accounts or pictures of oneself in the nude, even when these requests are made purportedly for intimacy or connection (Weinstein & Selman, 2014). According to Reinecke et al. (as cited in Wolfers & Utz, 2022) technological stressors include, for instance, connection overload (the feeling that one cannot digest all information) and online vigilance (the cognitive salience of the online environment). Moreover, impersonation (posing as someone else by exploiting the digital environment), receiving mean and harassing personal attacks, and public shaming and humiliation (sending nude photos to uninvited recipients/posting defamatory content on social media) (Weinstein & Selman, 2014). Winestone et al. (2022) also state that social media use is associated with privacy risks, which then leads to perceived stress for individuals.

By differentiating between different types of social media use, this research aims to explain the seemingly contradictory hypotheses of “social-media-use-buffers-stress-hypothesis” and “social-media-use-causes-stress-hypothesis” (Wolfers & Utz, 2022). The types of social media use focused on include browsing passively online and connective social media usage.

Passive Social Media Screen Time and Perceived Stress

Interestingly, browsing passively online was seen as an activity that was time-wasting and was associated with a sense of guilt by the users (Winestone et al., 2022). The term "passive use" describes online activities such as reading through news feeds, keeping an eye on other people's

accounts, and consuming information as opposed to creating it. Possible stressors associated with passive social media use are exposure to unsafe content, digital guilt, and time wastage (Winstone et al., 2022). Research shows a significant direct and positive correlation between using social media passively on perceived stress. The same study also indicates a significant indirect effect of passive social media use on stress through downward identification and upward contrast (Yue et al., 2022). Put differently, perusing the posts of others on social media could encourage one to identify with others who are less fortunate, leading to an increased stress level. Other research has shown that there is a correlation between high passive usage of social media across 11 different platforms and poorer felt social connection, which in turn leads to higher levels of stress (Roberts & David, 2023). Moreover, teenagers with poor mental health may be more vulnerable to the negative effects of digital stress associated with passively using the internet (Winstone et al., 2022). Concluding, there seems to be a relationship between stress and passive social media use, that is worth investigating further.

Connective Social Media Use and Perceived Stress

There is a significant amount of study that looks into the factors that lead people to use social media (Wilson et al., 2012). The need for users to stay in touch with friends was the most frequently mentioned internal motive in research (Joinson, 2008; Sheldon, 2008; Lampe et al., 2006). Therefore, one factor that is worth further investigation in relation to perceived stress is connective social media use. A substantial amount of research investigates the negative aspects of connective social media use. These aspects are mostly related to questions about privacy, how social media affect relationships with others, and the emergence of problematic usage of social media (Winstone et al., 2022; Vally & D'Souza, 2019).

Nevertheless, a growing amount of research indicates that people benefit in a variety of ways from using connective social media, despite all of these alleged disadvantages. The main advantages of using social media include enhanced social networks and the maintenance of connections since people are driven to use them to connect with others, build new relationships, maintain current relationships with friends and family, and explore others' shared information (Vally & D'Souza, 2019). Regardless of the specifics of the connection, the signals one receives, and other factors, having more friends makes one feel more connected, which in turn makes one more responsive to the

positive effects that come from perceived social support, such as lowered stress levels and improved wellbeing (Nabi et al., 2013). Lastly, social media users who utilise these sites to make connections may find that their needs for approval and belonging are met. Given that close relationships are associated with well-being and that social media can enhance intimacy in relationships, social media should decrease perceived stress (Clark et al., 2017).

Personality Trait Neuroticism, Social Media Screen Time, and Perceived Stress

In earlier years, screen time on social media and perceived stress were frequently associated with neuroticism. A study by Müller et al. (2018) claim that frequent use of social media was linked to higher levels of stress, and neuroticism aggravated this relationship, which points to a moderation effect. According to McCrae and Costa (2003), neurotic people frequently have negative emotional reactions to difficulties. Watson et al. (as cited in Marciano et al., 2020) state that they are very sensitive to criticism from others and self-critical, which contributes to their sense of inadequacy. Negative affectivity, or the propensity to feel negative emotions, cognitive tendencies, such as ruminative thoughts, abnormal reactivity to stress, such as psychophysiological anxiety or distress, and behavioural or interpersonal issues, such as recklessness or hostility, are generally considered to be core characteristics of neurotics (Thomsen, 2006; Suls & Martin, 2005; Widiger, 2017). According to a growing body of research, neuroticism is a psychological characteristic that has significant implications for public health (Jeronimus et al., 2016; Lahey, 2009; Ormel et al., 2013). Numerous unique mental and physical disorders, such as anxiety, mood, and substance use disorders, as well as their comorbidity and frequent use of health services, are predicted and correlated with neuroticism. Elevated neuroticism raises the likelihood of experiencing the costliest and most debilitating mental health issues (Lahey, 2009).

Dehle & Landers (as cited in Bowden-Green et al., 2021) state that people with high trait neuroticism do not appear to value networks or attempt to build a large online social network, which makes sense given that trait neuroticism is often linked to emotions of discontent towards a social group (Bowden-Green et al., 2021). Additionally, according to research, people who exhibit high trait neuroticism typically don't post abnormally high numbers of status updates or "like" or "comment" on other people's content. It follows that the lack of popularity or friendship base for this "passive" use is

not surprising (Bowden-Green et al., 2021). Moreover, because of their sensitivity to rejection and need for peer approval, they are worried about what other people will think of their postings and images (such as selfies) (Bowden-Green et al., 2021). Previous studies and meta-analyses (e.g., De Francisco Carvalho et al., 2018; Kayış et al., 2016) consistently discovered a link between high levels of internet addiction (including passive social media use) and neuroticism. Finally, all indicators of internet addiction, including addiction to social media, Facebook, smartphones, and online gaming, showed a significant correlation with high levels of neuroticism (Marciano et al., 2020).

As shown previously, there appears to be a relation between social media use and neuroticism and also between neuroticism and perceived stress. Research, however, did not yet test the moderating role of neuroticism on social media screen time and perceived stress statistically. Importantly, a variety of scientific results are investigating a moderating function of neuroticism in a similar context. Chow and Wan (2017), for example, found an amplifying moderating effect of neuroticism on the relationship between Facebook use and symptoms of depression. Moreover, similarly related to social media and mental health, Turel et al. (2018) found that variations in the relationship between social media addiction symptoms and wellbeing are dependent on neuroticism levels. There was a greater negative correlation between social media addiction symptoms and wellbeing when an individual had high levels of neuroticism. This shows that neuroticism does work as a moderator, this study, therefore, expects the personality trait of neuroticism to also exhibit a moderating effect on the relationship between social media screen time and perceived stress. As stated earlier, it is important to distinguish between the various types of social media use (total, passive, connective). Therefore, this study will also investigate the moderating role of neuroticism on these different types of social media and their relationship with perceived stress. It is valuable to look at this moderating role also on other relationship, to create strategies to mitigate the effects of neuroticism. The findings of this study may also contribute to the development of a fundamental understanding of the influence of neuroticism.

Present Study

This study aims to gain more information and explore the relationship between social media screen time and students' level of perceived stress. To do that, three different aspects of social media screen time are being examined. These include total social media screen time, passive social media

screen time, and connective social media use. Additionally, the moderation effect of the personality trait neuroticism on this relationship will be examined. The research question subsequently is the following: How is the perceived stress of students impacted by their social media screen time usage, and to what degree does the personality trait of neuroticism contribute to this relationship?

Followingly, six hypotheses were stated and tested.

H1: There is a positive relationship between total social media screen time and perceived stress among (under)graduate students.

H2: The time spent passively using social media is positively associated with their perceived stress level among (under)graduate students.

H3: There is a negative relationship between connective social media use and the perceived stress level among (under)graduate students.

H4: There is an amplifying moderating role of neuroticism on the relationship between social media screen time and perceived stress among (under)graduate students.

H5: There is an amplifying moderating role of neuroticism on the relationship between passive social media screen time and perceived stress among (under)graduate students.

H6: There is an attenuating moderating role of neuroticism on the relationship between connective social media use and perceived stress among (under)graduate students.

Figure 1 shows the link between social media screen time and perceived stress under investigation (Hypothesis 1 and 4). Figure 2 illustrates the relationship between passively using social media positively affects their perceived stress level (Hypothesis 2 and 5). Lastly, Figure 3 demonstrates the association between connective social media use and its negative effects on the perceived stress level (Hypothesis 3 and 6). In each hypothesised association the moderating relationship of neuroticism is included. To examine the correlation between these variables, an online quantitative survey was conducted.

Figure 1

Model of the Hypothesised Association of Total Social Media Screen Time and Perceived Stress

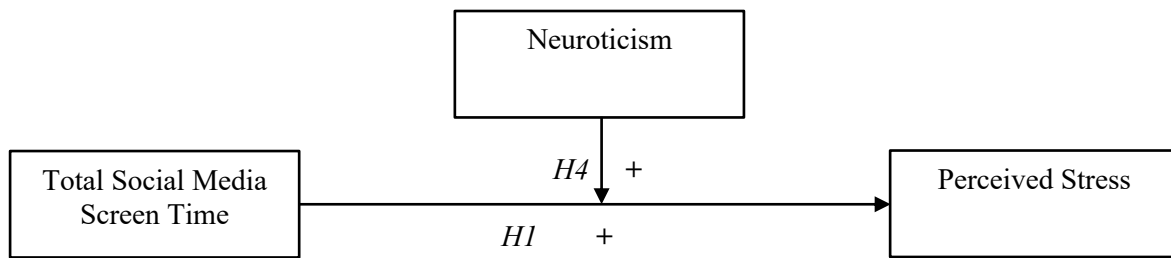


Figure 2

Model of the Hypothesised Association of Passive Social Media Screen Time and Perceived Stress

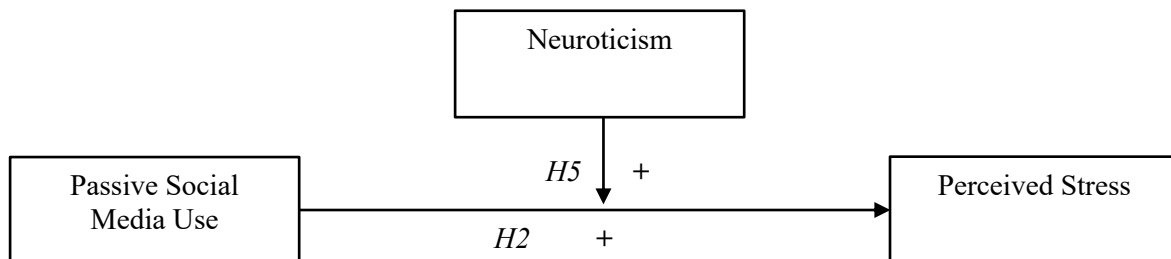
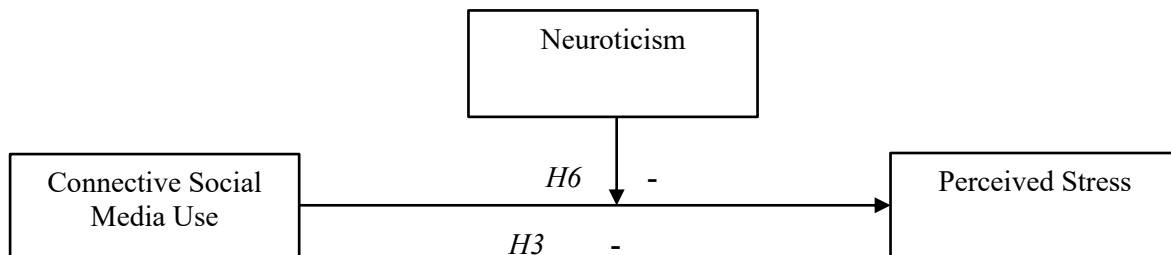


Figure 3

Model of the Hypothesised Association of Connective Social Media Use and Perceived Stress



Methods

Study Design

The association between social media screen time and perceived stress was examined using a cross-sectional survey study. It was believed that the independent variable in this case is the amount of time spent on social media, the moderator is neuroticism, and the dependent variable is perceived stress.

Participants

A total of 149 people responded to the survey. A convenience sample was employed because the majority of respondents were found via the SONA website or other social media sites (e.g.,

Instagram and WhatsApp). Additionally, students in the researchers' network for this study were also invited to participate to attract volunteers. The students were able to sign up for the study on their own, and their involvement earned them points. All participants received informed consent prior to the commencement of the study (see Appendix 1), which included comprehensive details about the purpose and methodology. Respondents had to speak English proficiently, had to be (under) graduate students, and had to be between 18 and 30 years old to be eligible to participate in the survey. The participant data is shown in Table 1.

Table 1

Characteristics of the Participants

Participants	Number (%)
Gender	
Male	36 (24.2)
Female	98 (65.8)
Non-binary/other	10 (6.7)
No answer	5 (3.3)
Nationality	
Dutch	57 (38.3)
German	44 (29.5)
Other	42 (28.2)
No answer	6 (4.0)
Education Level	
Bachelor student	110 (73.8)
Master student	16 (10.7)
PhD	2 (1.3)
HBO student	14 (9.4)
No answer	7 (4.7)
Age	

Participants	Number (%)
18-22	93 (62.5)
23-27	30 (20.1)
28-30	3 (2.1)
No answer	23 (15.4)
Total	149 (100)

Materials

Demographics

The first section of the survey asked questions about the participants' age range (18–30), gender (Female, Male, and Non-binary/Other), nationality (Dutch, German, and Other), and degree of education (Bachelor, Master, PhD student, or HBO student).

Social Media Screen Time Questionnaire

To be able to answer the different aspects of the hypotheses, various parts of questionnaires were combined into one survey that encompasses all relevant questions. To be able to answer the first hypothesis and due to a lack of an existing scale, the total time participants spent using specific media platforms on an average day was assessed (Appendix B). The response options included: not at all, 30 min. or less, 0.5 - 1h, 1 - 2h, 2 - 3h, 3 - 4h, 4 - 5h, 5 - 6h, 6 - 7h, more than 7h. The recently most used/common platforms were assessed, including Instagram, Snapchat, WhatsApp, TikTok, Pinterest, Facebook, YouTube, Twitter/X, Reddit. A last category “other” was included for every other social media platform the participants use (i.e., Treads). The total time spent on social media each day was calculated by adding the time spent on each platform.

To answer the second hypothesis about passive social media use and perceived stress, the Social Media Activity Questionnaire (SMAQ) was used (Ozimek et al., 2023). Specifically, the subscale related to passive behaviour in social media since that is the essential aspect of the hypothesis. This means that questions about active behaviour in social media were excluded as they do not apply to this research. The ten items on passive usage (i.e., “I look at the profiles/pages of other users or read through them”) are assessed on a 5-point Likert-type scale from 1 = never to 5 = very

often. The total score is calculated by adding the points that each participant had assigned to themselves on a 5-point Likert scale (answers ranging from 10 to 50). The total score is divided by the number of items to calculate a mean item score. A full list of all items that were included is provided in Appendix C. The subscale on passive items has a good internal consistency with $\alpha_{passive} = 0.853$, indicating a high level of reliability (Ozimek et al., 2023).

Lastly, parts of the SNS Questionnaire (Orchard et al., 2014) were used to assess the time spent for connective social media usage (Appendix D). The parts of the questionnaire that were used were 'new connections' (four items) and 'social maintenance' (four items). Participants were shown items on a multi-item construct on a 7-point Likert scale with 1 being "Strongly Disagree" and 7 being "Strongly Agree". Each item was asked to be rated according to how much the participants agreed or disagreed that it encouraged them to utilise social networking sites. To obtain a Cronbach's alpha level for the two components, scale reliability analyses were conducted. These were 'new connections' (.791) and 'social maintenance' (.757), which shows a high validity of variable pairings within each component (Orchard et al., 2014).

Perceived Stress Scale (PSS)

The Perceived Stress Scale (PSS) was selected in order to quantify the level of stress experienced in the last month (Appendix E). For this study, the time frame was changed to a week since that matches the time frame of the social media screen time questionnaire. A sample of 645 American citizens between the ages of 18 and 29 is served by the norm group (Cohen, Kamarck & Mermelstein, 1983). Factor analysis is used to create the 10 items on the questionnaire, which is based on information from 2,387 Americans (Lee, 2012). With a coefficient value of $>.70$, it exhibits satisfactory test-retest reliability and excellent internal consistency ($\alpha >.70$) (Lee, 2012). To generate the PSS scores, the four positively stated items (items 4, 5, 7, & 8) are reversibly answered (i.e., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0), which are then totalled across all scale items (answers ranging from 0 to 40).

Mini-IPIP Five-Factor Personality Scale for Neuroticism

To assess the extent to which an individual possesses the personality trait of neuroticism, the Mini-IPIP Five-Factor Personality Scale was used, specifically the items that measure neuroticism

(Goldberg, 1992). Donnellan et al. (2006) demonstrated that the Mini-IPIP Five-Factor Personality Scale appears to be a psychometrically reliable assessment, with reliability levels of .82, of the six main personality dimensions. In this study, the four items to measure the personality trait neuroticism (.68) were used. "Am relaxed most of the time" as a reversed item or "Get upset easily", are examples of the items in this questionnaire. Each of the four items was rated based on a 5-point Likert scale from strongly disagree (1 point) to strongly agree (5 points). To evaluate the Mini-IPIP, items 2 and 4 that are formulated in the opposite direction are being reversed (i.e., 1 = 5, 2 = 4, 3 = 3, 4 = 2 & 5 = 1). Based on that, the total score was calculated based on the points each participant indicated on a 5-point Likert scale.

Procedure

First of all, a link to a "Qualtrics Survey" (www.qualtrics.com) was sent to the participants. The goal of the study was explained to the participants at the outset of the questionnaire, and they were asked for their consent, indicating that their personal information would be processed anonymously. Students were requested to provide their demographic information (age, gender, nationality, etc.) after granting permission. Participants were asked to fill in the adapted Mini-IPIP, self-reported social media screen time, parts of the Social Media Activity Questionnaire (SMAQ), the Social Network Sites (SNS) Questionnaire, and the Perceived Stress Scale (PSS). Additionally, this study was combined with the research of others, therefore, participants also were asked to indicate their general screen time. Moreover, the study included the Short - Pittsburgh Sleep Quality Inventory (short PSQI) (Famodu et al., 2018), the Academic Procrastination Scale (McCloskey & Scielzo, 2015), the Revised Social Connectedness Scale (Lee et al., 2001), and the Quality of Life Enjoyment and Satisfaction Questionnaire - Short Form (Q-LES-Q-SF) (Riendeau et al., 2018). The participants were thanked for taking part in the survey at the end of the study. Participants were given the researchers' contact information in case they had any questions or comments. The students' participation in the study took about 15 to 30 minutes, which was within the time frame given to them. Furthermore, the study was approved by the BMS faculty ethics committee of the University of Twente (Register No. 240315).

Data Analysis

To be able to analyse the social media screen time the participants indicated, a coding scheme was created (Table 2). To create this scoring key, a score indicating the time was assigned to the time frame that would represent the middle of each time frame. That means that “Not at all” is represented as zero, “30 min. or less” would be 15 min. (0.25), “0.5 – 1 h” would be 45 min. (0.75), “1 – 2 h” would be one and a half hour (1,5), etc. For the last time frame, “More than 7h”, the score 8 was used since this could also be used when a participant nine hours or even more, so 8 would indicate a middle for that.

Table 2

Scoring Key of the Total Time Spend on Social Media

Time Frame	Score
Not at all	0
30 min. or less	0.25
0.5 – 1 h	0.75
1 – 2 h	1.5
2 – 3 h	2.5
3 – 4 h	3.5
4 – 5 h	4.5
5 – 6 h	5.5
6 – 7 h	6.5
More than 7h	8

The data of the participants was imported into a CSV file, which was then opened in RStudio. Descriptive statistics, such as the mean, standard deviation, and minimum and maximum, were derived. After that the following correlations will be tested: total social media screen time and perceived stress, passive social media screen time and perceived stress, and connective social media use and perceived stress. After that, the normality of each variable was examined independently before any analyses were performed. The normality was inspected by firstly looking at the distribution of the residuals in a histogram and Q-Q Plot (Appendix G). The results indicate that all correlations are normally distributed. Lastly, a moderation analysis with the personality trait of neuroticism on the relationship between the different aspects of social media use and perceived stress was conducted. To

determine the moderating effect the RStudio extension "PROCESS 4.0 by Andrew Hayes" (Hayes, n.d.) was utilised. With that a multiple linear regression analysis will be carried out to check for moderation. The total social media screen time, passive social media screen time, and connective social media use are the independent factors in the regression. Perceived stress functions as a dependent variable. Within this linear regression analysis, the data was bootstrapped 10.000 times. Additionally, important statistical parameters like the coefficient, standard error, t-value, and p-value were calculated. Finally, it will be investigated if the interaction effect between the different social media screen times (independent variable) and neuroticism (moderator) is significant to support a moderation.

Results

Based on the results from the questionnaires, the different subcategories of social media screen time that were investigated and the descriptive statistics thereof, including the mean, standard deviation, variance and the lower and upper limits of the confidence interval (0.95), are shown in Table 3. To test for the level of perceived stress and neuroticism of the participants, the mean scores, standard deviation, variance, and confidence interval from the Perceived Stress Scale (PPS) and the MINI-IPIP five-factor personality scale are also shown in Table 3.

Table 3

Descriptive Statistics of the Five Variables

	M	SD	Variance	Confidence Interval	
				Lower	Upper
Total Social Media Screen Time	6.61	4.26	18.14	5.77	7.45
Passive Social Media Screen Time	28.55	5.97	35.66	27.40	29.70
Connective Social Media Use	39.73	7.76	60.27	38.23	41.24
Perceived Stress	19.78	7.25	52.52	18.37	21.19

	M	SD	Variance	Confidence Interval	
				Lower	Upper
Neuroticism	12.79	3.23	10.43	12.23	13.35

Note. M = Mean; SD = Standard Deviation; Confidence Interval = 0.95

Overall, the descriptive statistics imply that the scores for perceived stress ($\sigma^2=52.52$) and total social media screen time ($\sigma^2=18.14$) vary widely. Additionally, participants exhibit moderate degrees of neuroticism ($M=12.79$) and perceived stress ($M=19.78$).

Correlation between Social Media Screen Time and Perceived Stress

To investigate whether a relationship exists between the different aspects of social media screen time and perceived stress the correlations are shown in a correlation matrix (Table 4).

Additionally, this provides input to determine the magnitude and action of the relationship between the two variables.

Table 4

Intercorrelations Between the Five Variables

Variable	1	2	3	4	5
1. Total Social Media Screen Time	-				
2. Passive Social Media Screen Time	.041	-			
3. Connective Social Media Use	.154	.288**	-		
4. Perceived Stress	.162	.203*	.045	-	
5. Neuroticism	-.005	.115	.195*	.645**	-

* $p < .05$. ** $p < .01$.

First of all, a weak positive relationship between total social media screen time and perceived stress, but no statistically significant correlation, was found, $r(df) = .16, p = .108$. The first hypothesis can therefore be rejected. Secondly, for the relationship between students' level of perceived stress and passive social media screen time, a small statistically significant positive correlation was

discovered, $r(df) = .20, p = .040$. The second hypothesis is consequently retained. Lastly, no correlation was found between student's perceived stress and connective social media use, $r(df) = .05, p = .653$. Therefore, the third hypothesis is rejected.

Moderating Role of Neuroticism on the Relationship Between Social Media Screen Time and Perceived Stress

First, the overall model of total social media screen time and perceived stress was found to be significant ($F(3, 96) = 25.27, p < .001, R^2 = .44$). Second, it was demonstrated that the effect of overall social media screen time ($b = 0.26, p = 0.05$) has a slightly significant effect on perceived stress (Table 5). The impact of neuroticism was then investigated. Neuroticism, as an independent factor, produced a strong direct effect on perceived stress, which was shown to be significant ($b = 1.44, p < .001$). But it was determined that the moderating impact under investigation was not significant ($b = 0.01, p = 0.71$). It can therefore be concluded that neuroticism has no moderating effect. However, as no moderator effect of neuroticism was discovered, hypothesis four is disproved.

Table 5

Moderation Analysis for the Interaction Effect of Neuroticism on the Relationship Between Total Social Media Screen Time and Perceived Stress

	b	SE	t	p
Perceived Stress	19.72	0.56	35.23	0.00
Total Social Media Screen Time	0.26	0.13	1.98	0.05
Neuroticism	1.44	0.18	8.21	0.00
Interaction	0.01	0.03	0.37	0.71

Note. b = coefficient; SE = Standard Error; t = t-value; p = p-value

Next, the moderating role of neuroticism on the relationship between passive social media screen-time and perceived stress was investigated. The overall model of passive social media screen time and perceived stress was found to be significant ($F(3, 99) = 25.30, p < .001, R^2 = .43$).

Subsequent, the effect of passive social media screen time ($b = 0.16$, $p = 0.09$) is non-significant, meaning that it has no relationship with perceived stress (Table 6). Since the impact of neuroticism created strong and significant results ($b = 1.41$, $p < .001$), it appears to predict perceived stress. The moderating impact under investigation was not significant ($b = 0.01$, $p = 0.81$). In conclusion, there is no moderating effect of neuroticism on the relationship between the amount of passive social media screen time and perceived stress and hypothesis five is therefore rejected.

Table 6

Moderation Analysis for the Interaction Effect of Neuroticism on the Relationship Between Passive Social Media Screen Time and Perceived Stress

	b	SE	t	p
Perceived Stress	19.73	0.55	35.85	0.00
Passive Social Media Screen Time	0.16	0.09	1.72	0.09
Neuroticism	1.41	0.17	8.25	0.00
Interaction	0.01	0.03	0.24	0.81

Note. b = coefficient; SE = Standard Error; t = t-value; p = p-value

Lastly, the moderating role of neuroticism on the relationship between connective social media use and perceived stress was investigated.

Table 7

Moderation Analysis for the Interaction Effect of Neuroticism on the Relationship Between Connective Social Media Use and Perceived Stress

	b	SE	t	p
Perceived Stress	19.63	0.56	34.86	0.00
Connective Social Media Use	-0.08	0.07	-1.10	0.27
Neuroticism	1.50	0.18	8.57	0.00

	b	SE	t	p
Interaction	0.02	0.02	1.05	0.30

Note. b = coefficient; SE = Standard Error; t = t-value; p = p-value

There is no correlation between connective social media use and perceived stress (Table 7). Additionally, as shown in the previous moderation analyses, the effect of neuroticism on perceived stress was strongly positive significant. The moderating effect of neuroticism was insignificant. In summary, the moderation of neuroticism on the relation between amount of time spent for connective social media usage and perceived stress was not found, disproving hypothesis 6.

Discussion

The purpose of the current cross-sectional survey study was to investigate and gain a deeper understanding of the relationship between social media screen time and perceived stress. For that, the different aspects of social media screen time, including total social media screen time, passive social media screen time, and connective social media use, were examined in a sample of (under)graduate students ($N=149$). Moreover, the moderating effect of neuroticism on this relationship was studied. The results indicate that, only for passive social media use an effect on perceived stress was found. However, no moderation effect was found for neuroticism. Nonetheless, a remarkably strong positive effect of neuroticism on perceived stress was found.

First, the hypothesis *H1*, which suggested a potential relationship between total social media screen time and perceived stress, was disproved. The results contradict the findings of Weinstein and Selman (2014) and Wolfers and Utz (2022) that there is a possible positive relation between social media screen time and perceived stress. These studies indicated that there are several aspects of social media that result in perceived stress. This different results in this study could be explained by the fact that their studies do not directly examine the correlation of social media use and perceived stress. Rather, Wolfers and Utz (2022) looked at the different effects social media can have on how people cope with stress. Weinstein and Selman (2014) examined the various stressors people experience when using social media, including “feeling smothered”, “receiving mean and harassing personal

attacks”, and “feeling pressure to comply”. They both indicate that there is a correlation between social media use and perceived stress, however, they do not test this relationship directly.

This absence of a correlation, however, could also be explained by the fact that the questionnaire for the total social media screen time has not been a validated psychometric measurement. It is evident that a questionnaire which provides good psychometric measurements, contributes to more meaningful and significant results. It is apparent that a non-validated questionnaire might not be able to measure the construct (in this case the total social media screen time) appropriately (Tsang et al., 2017). Therefore, a following research that uses a validated questionnaire for total social media screen time, might find an increase in perceived stress.

Interestingly, the second hypothesis *H2*, could be retained since a statistically significant positive correlation was found between passive social media use and perceived stress. This is in accordance with Yue et al. (2022), who found that passive social media use is positively related to perceived stress. This effect of passive social media screen time on perceived stress has also been confirmed by Taylor et al. (2023). Furthermore, Winestone et al. (2022) state that various consequences of passive social media use (i.e., feeling guilty due to its time-wasting characteristics) results in stress. Consequently, the found correlation between passive social media use and perceived stress support the findings of established research. The correlations, for example found by Yue et al. (2022), however, were more significant. However, that might be explained by the fact that their study had a larger sample size (1131 participants) than this study (149 participants).

Contrary to the hypothesized association between connective social media use and perceived stress in hypothesis *H3*, no significant correlation could be found. The results do not fit with the results of the study from Nabi et al. (2013) and Vally and D’Souza (2019) that showed a direct correlation between connective social media use and perceived stress. This data, however, contributes to a clearer understanding of the diversity of the aspects of active social media screen time and how important it is to differentiate between them. For example, the missing correlation in this study could be explained by the fact, that this variable might have been measured wrongly. As mentioned before, only the aspects new connections and social maintenance from the SNS were used to measure connective social media use. It could be that these aspects did not measure connective social media

use directly and that therefore no correlation was found. Additionally, looking at the studies by Nabi et al. (2013) and Vally and D'Souza (2019), compared to them, this study measured the connective part of social media use more specifically. Nabi et al. (2013), for example, measured the participants' Facebook use in general, their social network size, and perceived social support. They did not measure the connective aspect of social media use directly. Rather they draw the conclusion that the number of friends someone has on Facebook increases their connectiveness to other people and therefore, decrease their level of perceived stress. Vally and D'Souza (2019) measured social media use by investigating the number of followers on social media, the time spent on social media as a whole and they made the differentiation between active and passive usage. Here, the connectiveness aspect was also drawn from the number of followers but also included in the active part of the measurement. From the insights from this study, it might be that not the connective use of social media directly is related to perceived stress, but active social media use in general. Important to mention here, is that research shows that active social media screen time in total can improve perceived stress through enhanced perceived social support (Yue et al., 2023; Roberts & David, 2023). Interestingly, in contrast to active social media screen time, using social media passively can actually decrease social support which increases perceived stress levels (Taylor et al., 2023; Roberts & David, 2023). Therefore, it might have been an alternative to investigate active social media screen time in total and not the aspect of communication and connection separately.

In contrast to the hypothesized moderating effect of neuroticism, hypotheses *H4* – *H6* showed no moderation was found between the different aspects of social media screen time and perceived stress. For hypothesis *H4* and *H6*, considering the total and connective social media screen time, this might be explained by the non-existing correlation between the independent and dependent variable. There is no correlation between either the total social media screen time or connective social media screen use and the correlation has no antagonistic effect. This confirms that total and connective social media use is not related to perceived stress in both high and low neuroticism levels. Regarding *H5*, about the passive social media screen time and perceived stress, the missing moderating effect of neuroticism might be explained by the fact that the (small) risk passive social media use gives for

poor mental health outcomes is not driven by mechanisms originating from being a neurotic person. However, this does need to be further investigated to be able to make a significant conclusion.

Nevertheless, the results indicate a strong direct effect of neuroticism on perceived stress. In relation to this, Amestoy et al. (2023) demonstrated a substantial and even stronger correlation between higher trait neuroticism and higher perceived stress. This is also supported by the study from Ebstrup et al. (2011) who found a significant positive correlation between neuroticism and perceived stress. Therefore, the correlation between neuroticism and perceived stress is in line with the findings of existing research. This high correlation between neuroticism and perceived stress moreover confirms the explanation of the unexpected non-significant findings of a correlation of the social media variables. As explained previously, this missing correlation can be attributed to the invalidity of the measurement of social media use. Both, neuroticism, and perceived stress, are concepts that have been researched intensively and have validated and frequently applied measurements (MINI-IPI and PSS, respectively). This high correlation between the concepts of neuroticism and perceived stress that have a well-established measurement, therefore, confirms that the non-significant findings of the social media measurements can be explained by their lack of validity. Lastly, it should be mentioned that neuroticism is known to have many pathways that influence perceived stress or mental health problems in general. For example, a study by Cho et al. (2017) showed that neuroticism acted as a mediator between stress and smartphone addiction. Another study indicated that there is a relationship between neuroticism, perceived stress, and alcohol use (Carney et al., 2000). This shows that other concepts might be of more value to investigate than social media use.

Implications

This study explores the relationship between the different aspects of social media screen time and perceived stress since research established a connection between them (i.e., Wolfers & Utz, 2022; Weinstein & Selman, 2014). The significant positive correlation between passive social media screen time and perceived stress found in this research, provided support for the findings in existing research (Yue et al., 2022). This underlines the importance to further investigate this relationship and gives a reason for research to further examine the extent to which this relationship works. The results from the total social media screen time and the connective social media use should be taken into account

when considering how to measure these aspects. This study showed that a reliable and valid measurement for these social media aspects is still missing. Additionally, this study investigated the moderating role of neuroticism on the relationship between social media screen time and perceived stress, that has not received enough attention in previous studies. Importantly, it should be mentioned that the found relationship between neuroticism and perceived stress indicates that said personality trait plays a big role in perceived stress.

Limitations

Although this study has its strengths, it also faced some limitations. First of all, it is important to look at the measurements that were used in this study. As previously mentioned, the questionnaire that was used to measure the total social media screen time, was not based on any validated or reliable existing questionnaire. This might also explain why no correlation between total social media screen time and perceived stress was found. As Trifiro and Gerson (2019) state, a universal validated measures for various social media usages does not exist. To be able to measure the total social media screen time including the various possible usages of social media, it would be beneficial to have one measurement that includes all these aspects. This should include, similar to this study, the general time spend on the different social media platforms, however, with a questionnaire that is validated. Additionally, it could include the different passive and active uses of social media and combine them. Active use could involve for example as stated by Chen et al. (2022) time spend on “posting, liking, commenting on content, and interacting with others on social media”. Whereas passive use includes according to Chen et al. (2022) time spend on “browsing others’ posts or content shared by friends without any liking, commenting, or interacting”. If such validated and reliable questionnaire would exist, researchers could compare the effects of various social media usages, using a single, universal technique (Trifiro & Gerson, 2019). That would also mean, that researcher would not need to combine several different questionnaires to measure the complexity of social media use.

Another limitation, that can be included here is that the measurement of connective social media use. This study showed that the connectiveness aspect of social media use appears of lesser importance. However, it could be interesting to investigate active social media usage in total since it would give the research a broader perspective. Moreover, this would allow for a more applicable

comparison between passive and active social media screen time and then the combination of both as total social media screen time. For this the prior mentioned questionnaire would be ideal. With the insights gained from this study, that connectivity is less important, this aspect could be removed from the active part of the questionnaire. Regarding the used measurements in this study, the change of timeframe in the PSS should also mentioned as a limitation. The usual timeframe used in the PSS is a month (Cohen, Kamarck & Mermelstein, 1983), however, for this study it was more applicable to change it to a week, since the social media screen time was also measured for a week. This made the questionnaire as a whole more coherent and therefore easier to measure the relationship between social media screen time and perceived stress. Nonetheless, since this change has not been done before in research, this resulted in the PSS in this study being not validated.

Looking at some common methodological limitations, it can be said that even though the total sample size of 149 was satisfactory, a lot of participants dropped out during the questionnaire and did not fill out all parts of the sub questionnaires. This resulted in a lot lower number of participants which results in a difficulty of generalizing the results from this study. A possible reason for this is that the survey was set in such a way that the participants could leave the study at any point of the survey and that data was collected even if they did not fill out everything. This biased the results of this study due to the possibility that because the length of the study only contacts of the researcher of this study filled out the parts important for this study. This may result in a lack of diversity of the study, and therefore, the results of this study are difficult to generalize. Furthermore, regarding the moderating effect of neuroticism on the relationship between social media screen time and perceived stress, it can be said that very little research had been done on this topic. This undermines both the reliability and depth of the study.

Recommendations for Future Research

Since the results showed that neuroticism did not moderate the relationship between the two, the impact of neuroticism on social media screen time, perceived stress, and the relationship itself requires further investigation. Through the implications and the limitations, several points that future research can investigate, arise. First of all, and most importantly, future research can explore ways to create a validated and reliable questionnaire to measure the variety of social media screen time. As

mentioned before, with this, future research can replicate this study with the different measurement of the aspects of social media screen time (total, passive, and active) and might find different and significant results. Moreover, so far, most research was conducted as a cross-sectional study design, including this research. Even though this also provided valuable insights, it would be advised, for future research to look into longitudinal or experimental studies. This would provide information not only about the existence of a relationship between perceived stress and social media screen time, but also about the direction of this relationship. Consequently, it would help answer the question whether social media screen time is a cause or a predictor of perceived stress.

As Wolfers and Utz (2022) mentioned, the relationship between social media and perceived stress is bidirectional. It, therefore, could also be worth looking into the potential benefit of social media use to reduce stress. Another change that could be made to this study, that would be worth further investigating, would be to look at other mental health variables (i.e., anxiety or depression) and their relationship to social media screen time. Several studies already proved that there might be a correlation between social media screen time and anxiety or depression (Keleş et al., 2019; O'Day & Heimberg, 2021; Nesi & Prinstein, 2015; Dobrea & Păsărelu, 2016). Additionally, it would be interesting for future research, to examine the impact of the other personality traits (extroversion, conscientiousness, openness for experience, and agreeableness). Even though neuroticism did not show a moderating effect in this study, it would be interesting to investigate whether other personality traits do have this effect. Other variables, like life satisfaction, sleep quality or procrastination are also possible factors that might explain and influence the relationship between social media screen time and perceived stress. Lastly, since as mentioned previously, not enough research had been done on this topic, it would be an opportunity for future research to further investigate the relationship between social media screen time and perceived stress.

Conclusion

Social media, with its many possibilities, has been shown to have an influence of the well-being of students. Therefore, this study investigated the various aspects of social media use (total, passive, connective) and whether they correlate with perceived stress. Results show that it is important to investigate how individuals use social media, since only passive use had an impact on

perceived stress. Moreover, the moderating effect of neuroticism on these relationships was examined, however, no effect was found in this study. Interestingly, remarkably strong positive effect of neuroticism on perceived stress was found, emphasising the importance to consider personality traits when investigating perceived stress and social media use. This study showed that future research needs validated and reliable measurements to be able to examine the relationship between social media use and perceived stress correctly. Although there were several limitations to this study, it can be said that this study enriches existing research on the relationship between social media use and perceived stress and the influence of neuroticism on this relationship.

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Appendices

Appendix A

Informed Consent

Thank you for participating in our study centered around screen time, personality, and aspects of student life. Participation in this study is completely voluntary, and it is possible to withdraw from this study at any point without giving an explanation. While participating in this study you will be asked several questions that are related to (Social Media) Screen Time, Personality, Sleep Quality, Procrastination, Life Satisfaction, Perceived Stress.

There are no known safety risks related to participation. The estimated time to complete this questionnaire is 15-30 minutes. If you are a student participating through the SONA-system, completing this study will reward you with 0.25 SONA-point(s).

The data that is collected will be anonymised and will only be available to the researchers. Since the data is anonymised, even the researchers will not be able to identify you from your personal information. So please answer all questions as honestly as possible. Once the research is concluded, the data will be disposed in accordance with the guidelines of the University of Twente. If there are any questions or remarks, please feel free to contact the researchers:

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Appendix B

Social Media Screen Time Questionnaire

Please indicate for each social media platform how much time you spend on a daily average. For this please follow these steps on your phone:

Apple: Settings -> Screen Time -> See All App & Website Activity -> Week (on top of the screen) -> click on each social media platform you used -> Daily Average

Android: Settings -> Digital Wellness and Parental Control -> click on each social media platform you used -> Weekly (on top of the screen) -> Daily Average (...h ...min/day)

If this does not work or if you cannot find this information, take a guess at how much time on an average day in the past week you spent on each of the social media platforms you use (or look in the apps directly).

(Remember that if you fill this out at the beginning of a new week, the analysis only shows data from one or two days. In that case please look in your settings at the last week. If you do not find this, then just take a guess at how much you used the social media platform in the last week on average.)

With that information, please fill out the next items. Please also keep in mind the time on other devices (laptop, iPad, etc.) you use social media on (i.e., YouTube or Twitch).

	Not at all	30 min. or less	0.5 - 1 h	1 - 2 h	2 - 3 h	3 - 4 h	4 - 5 h	5 - 6 h	6 - 7 h	More than 7h
Instagram	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Snapchat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WhatsApp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TikTok	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Not at all	30 min. or less	0.5 - 1 h	1 - 2 h	2 - 3 h	3 - 4 h	4 - 5 h	5 - 6 h	6 - 7 h	More than 7h
Pinterest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
YouTube	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Twitter/X	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Not at all	30 min. or less	0.5 - 1 h	1 - 2 h	2 - 3 h	3 - 4 h	4 - 5 h	5 - 6 h	6 - 7 h	More than 7h
Reddit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Twitch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix C

Social Media Activity Questionnaire (SMAQ)

For each statement please indicate how often you engage in said activity online when using social media on an average day, during the last 7 days.

	Never	Rarely	Sometimes	Often	Very Often
1. I look at the photo albums of other users.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I look at the profiles/pages of other users or read through them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I look at the stories of my friends/ my subscriptions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I read private messages that other users send me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I read entries on the chronicles and personal pages of other users.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Never	Rarely	Sometimes	Often	Very Often
6. I read through the comments on other users' pictures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I read the comments on my own pictures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I look at links or video clips posted on other people's profile pages (e.g., YouTube).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I look at the profile pages of my relatives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I look at the "newsfeed" to see the latest activities of other users (e.g., if they have new friends).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix D

SNS Questionnaire

For each statement please indicate whether you agree or disagree that you use social media to...

	Stongly Disagree	Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Agree	Strongly Agree
1. ... communicate online.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. ... communicate with those I don't know.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. ... make new friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. ... to date.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. ... keep in touch.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. ... communicate with distant friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. ... communicate with those I know offline.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. ... maintain social contact.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix E

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last week. In each case, you will be asked to indicate how often you felt or thought a certain way.

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the last week, how often have you been upset because of something that happened unexpectedly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. In the last week, how often have you felt that you were unable to control the important things in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. In the last week, how often have you felt nervous and "stressed"?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. In the last week, how often have you felt confident about your ability to handle your personal problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. In the last week, how often have you felt that things were going your way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. In the last week, how often have you found that you could not cope with all the things that you had to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. In the last week, how often have you been able to control irritations in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. In the last week, how often have you felt that you were on top of things?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. In the last week, how often have you been angered because of things that were outside of your control?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. In the last week, how often have you felt difficulties were piling up so high that you could not overcome them?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix F

Mini-IPIP Five-Factor Personality Scale

Please indicate on a range of very inaccurate to very accurate how much the statements suit you as a person.

	Very inaccurate	Moderately inaccurate	Neither inaccurate nor accurate	Moderately accurate	Very accurate
I am the life of the party	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get chores done right away	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have frequent mood swings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't talk a lot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Very inaccurate	Moderately inaccurate	Neither inaccurate nor accurate	Moderately accurate	Very accurate
I often put things back in their proper place	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am relaxed most of the time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I talk to a lot of different people at parties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like order	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Very inaccurate	Moderately inaccurate	Neither inaccurate nor accurate	Moderately accurate	Very accurate
I get upset easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I keep in the background	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I make a mess of things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I seldom feel blue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix G

Normality Test Results

Figure 1

Results of Normality Test for Correlation of Total Social Media Screen Time and Perceived Stress

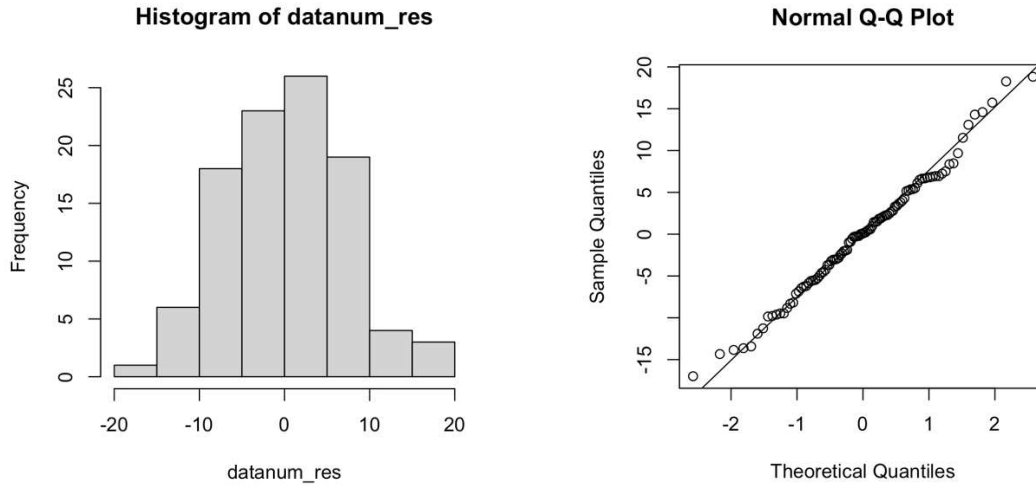


Figure 2

Results of Normality Test for Correlation of Passive Social Media Screen Time and Perceived Stress

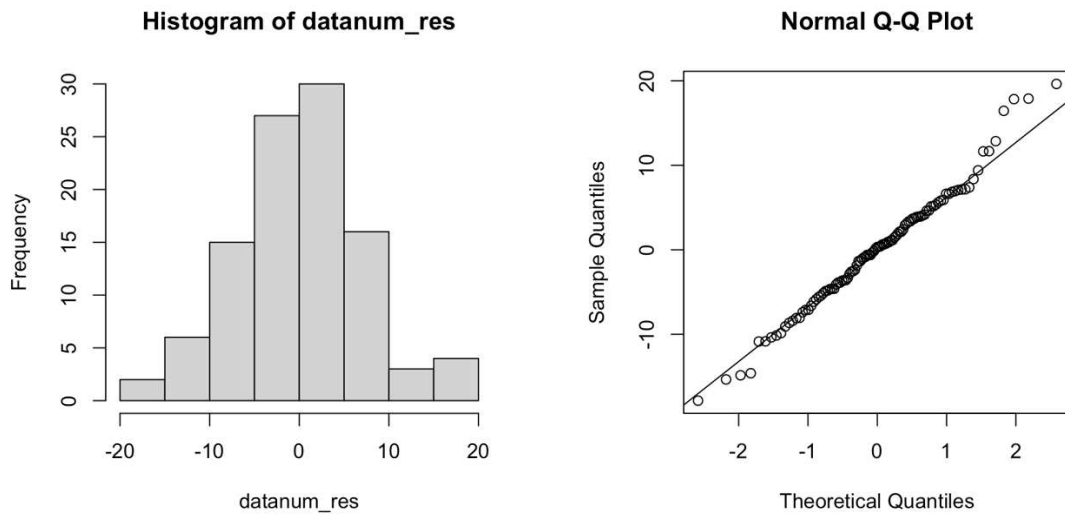
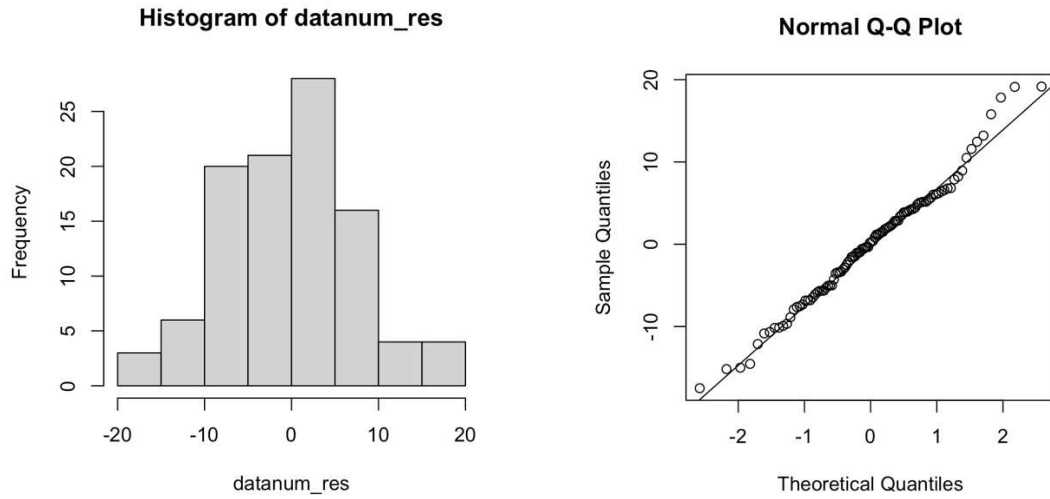
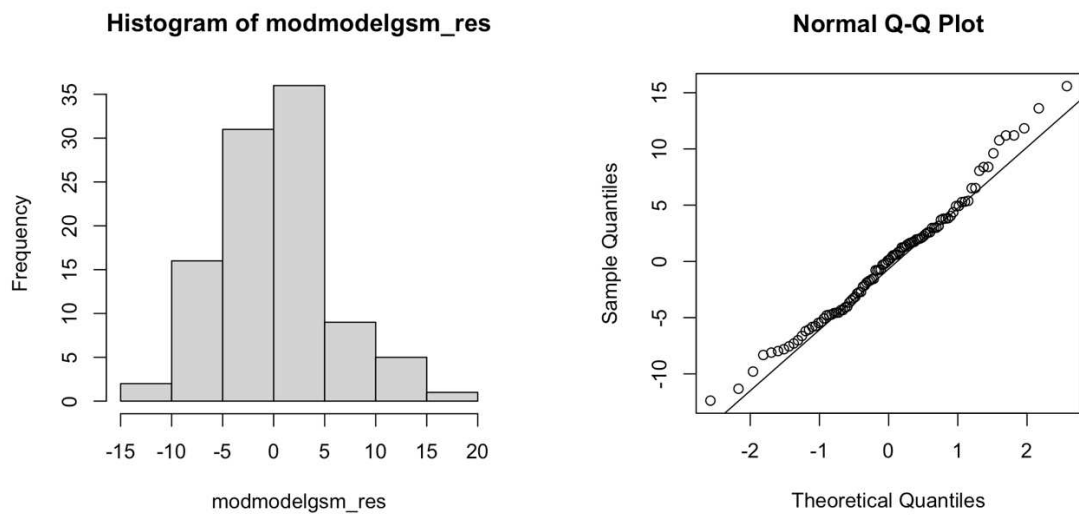


Figure 3

Results of Normality Test for Correlation of Social Media Screen Time for Connection and Communication Purpose and Perceived Stress

**Figure 4**

Results of Normality Test for Moderation of Neuroticism on Total Social Media Screen Time and Perceived Stress

**Figure 5**

Results of Normality Test for Moderation of Neuroticism on Passive Social Media Screen Time and Perceived Stress

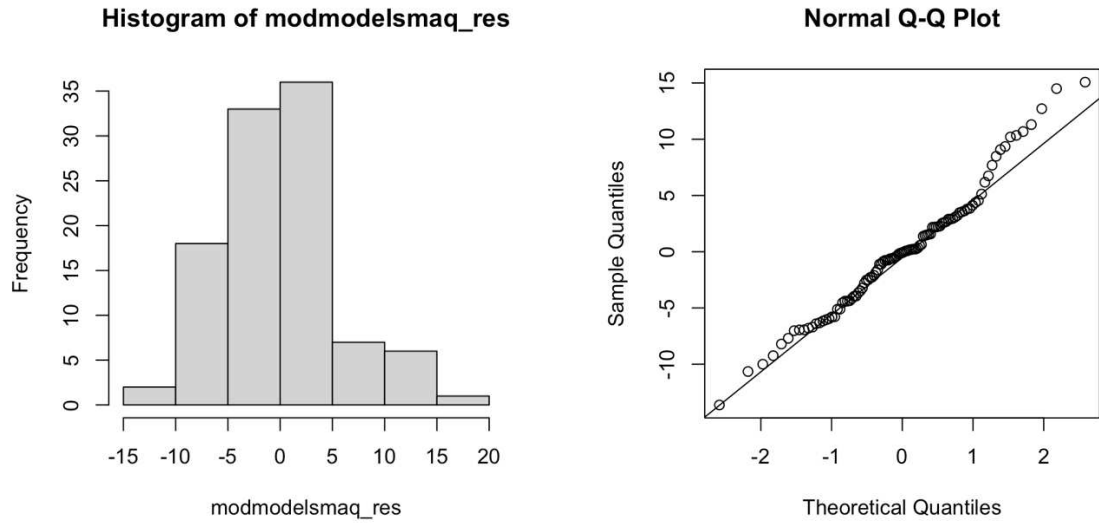
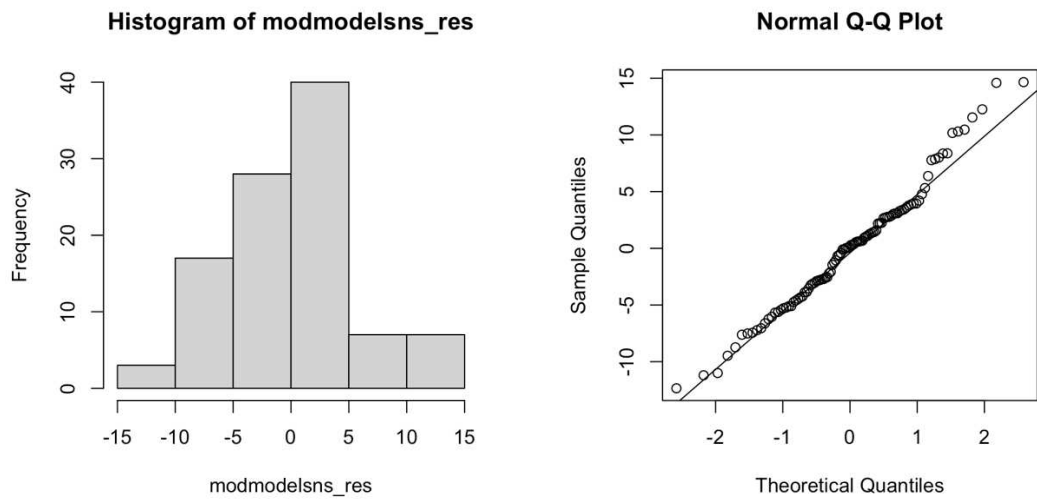


Figure 6
Results of Normality Test for Moderation of Neuroticism on Social Media Screen Time for Connection and Communication Purpose and Perceived Stress



Appendix H*R Script*

```
#LOADING THE LIBRARIES INTO R#
```

```
install.packages("tidyverse")
```

```
library(tidyverse)
```

```
install.packages("vosonSML")
```

```
library(vosonSML)
```

```
install.packages("tidytext")
```

```
library(tidytext)
```

```
install.packages("reshape2")
```

```
library(reshape2)
```

```
install.packages("dplyr")
```

```
library(dplyr)
```

```
install.packages("ggplot2")
```

```
library(ggplot2)
```

```
install.packages("foreign")
```

```
library(foreign)
```

```
install.packages("janitor")
```

```
library(janitor)
```

```
install.packages("stats")
```

```
library(stats)
```

```
install.packages("broom")
```

```
library(broom)
```

```
install.packages("Hmisc")
```

```
no
```

```
library(Hmisc)
```

```
install.packages("modelr")
```

```
library(modelr)
```

```
install.packages("psych")
```

```
library(psych)
```

```
install.packages("zip")
```

```
library(rockchalk)
```

```
#GET DATASET INTO R#
```

```
datanum <- read.csv("SM Screen Time_num(with NAs).csv",sep=";")
```

```
data <- read.csv("SM Screen Time_text(with NAs).csv",sep=";")
```

```
#CHARACTERISTICS OF THE PARTICIPANTS (DEMOGRAPHICS)#
```

```
#gender
```

```
gender_table <- table(data$Gender)
```

```
gender_percentage <- prop.table(gender_table) * 100
```

```
gender_summary <- data.frame(Gender = names(gender_table),
```

```
    Count = as.vector(gender_table),
```

```
    Percentage = gender_percentage)
```

```
print(gender_summary)
```

```
#nationality
```

```
nationality_table <- table(data$Nationality)
```

```
nationality_percentage <- prop.table(nationality_table) * 100
```

```
nationality_summary <- data.frame(Nationality = names(nationality_table),
```

```
    Count = as.vector(nationality_table),
```

```
    Percentage = nationality_percentage)
```

```
print(nationality_summary)
```

```
#education
```

```
education_table <- table(data$Education)
```

```
education_percentage <- prop.table(education_table) * 100
```

```
education_summary <- data.frame(Education = names(education_table),
```

```
    Count = as.vector(education_table),
```

```
    Percentage = education_percentage)
```

```
print(education_summary)
```

```

#age
age_table <- table(datanum$Age, useNA = "ifany")
age_percentage <- prop.table(age_table) * 100

age_summary <- data.frame(
  Age = names(age_table),
  Count = as.vector(age_table),
  Percentage = age_percentage)
print(age_summary)

#DESCRIPTIVE STATISTICS#

#mean#
datanum %>% select(Social.media_Total) %>% summary()
datanum %>% select(SMAQ_Total) %>% summary()
datanum %>% select(SNS_Total) %>% summary()
datanum %>% select(PSS_Total) %>% summary()
datanum %>% select(Neuroticism_Total) %>% summary()

#standard deviation#
std_devs <- datanum %>% map(~ sd(.x, na.rm = TRUE))
print("Standard Deviations:")
print(std_devs)

#variance#
variances <- datanum %>% map(~ var(.x, na.rm = TRUE))
print("Variances:")

```



```
print(variances)

#conf.interval#
t.test(datanum$Social.media_Total, conf.level = 0.95)$conf.int
t.test(datanum$SMAQ_Total, conf.level = 0.95)$conf.int
t.test(datanum$SNS_Total, conf.level = 0.95)$conf.int
t.test(datanum$PSS_Total, conf.level = 0.95)$conf.int
t.test(datanum$Neuroticism_Total, conf.level = 0.95)$conf.int

#CORRELATION ANALYSIS#

#test for normality#

##general social media screen time + perceived stress
modelgsm <- lm(PSS_Total ~ Social.media_Total, data = datanum)

datanum <- datanum %>%
  add_residuals(modelgsm)

modelgsm_res<-datanum$resid
hist(modelgsm_res)
qqnorm(modelgsm_res)
qqline(modelgsm_res)

##passive social media screen time (SMAQ) + perceived stress
modelsmaq <- lm(PSS_Total ~ SMAQ_Total, data = datanum)
```

```
datanum <- datanum %>%
  add_residuals(modelsmaq)

modelsmaq_res<-datanum$resid
hist(modelsmaq_res)
qqnorm(modelsmaq_res)
qqline(modelsmaq_res)

##connection and communication social media screen time (SNS) + perceived stress
modelsns <- lm(PSS_Total ~ SNS_Total, data = datanum)

datanum <- datanum %>%
  add_residuals(modelsns)

modelsns_res<-datanum$resid
hist(modelsns_res)
qqnorm(modelsns_res)
qqline(modelsns_res)

#correlation analysis#

corr <- cor.test(x=datanum$Social.media_Total, y=datanum$PSS_Total, method = 'pearson')
corr

corr <- cor.test(x=datanum$SMAQ_Total, y=datanum$PSS_Total, method = 'pearson')
corr
```

```
corr <- cor.test(x=datanum$SNS_Total, y=datanum$PSS_Total, method = 'pearson')

corr

#correlation matrix#

selected_data <- datanum[, c("Social.media_Total", "SMAQ_Total", "SNS_Total", "PSS_Total",
"Neuroticism_Total")]

correlation_results <- rcorr(as.matrix(selected_data))

correlation_matrix <- correlation_results$r

p_values_matrix <- correlation_results$P

# Print the correlation matrix

print("Correlation Matrix:")

print(correlation_matrix)

# Print the p-values matrix

print("P-Values Matrix:")

print(p_values_matrix)

#MODERATION ANALYSIS#

##general social media screen time + perceived stress + neuroticism

#create a linear model + run an anova#
```

```

datanum <-
lm(PSS_Total~Social.media_Total+Neuroticism_Total+Social.media_Total:Neuroticism_Total,
data= datanum)
summary(datanum)
anova(datanum)%>%
  tidy()

#testing the assumptions for moderation analysis#
modmodelgsm <-
lm(PSS_Total~Social.media_Total+Neuroticism_Total+Social.media_Total:Neuroticism_Total, data
= datanum)

datanum <- datanum %>%
  add_residuals(modmodelgsm)

modmodelgsm_res<-datanum$resid
hist(modmodelgsm_res)
qqnorm(modmodelgsm_res)
qqline(modmodelgsm_res)

#moderation analysis#
process(data = datanum, y="PSS_Total", x="Social.media_Total", w="Neuroticism_Total", model=1,
center=2, describe=1, stand=1, jn=1, moments = 1, modelbt = 1, boot = 10000, seed = 424272)

#plot Simple Slopes#
install.packages("zip")
library(rockchalk)
my_fit <- lm(PSS_Total ~ Social.media_Total * Neuroticism_Total, data = datanum)

```

```

summary(my_fit)

plotSlopes (my_fit, plotx ="Social.media_Total" , modx = "Neuroticism_Total", modxVals =
"std.dev." )

##passive social media screen time (SMAQ) + perceived stress + neuroticism
#create a linear model + run an anova#
datanum <-lm(PSS_Total~SMAQ_Total+Neuroticism_Total+SMAQ_Total:Neuroticism_Total,
data= datanum)

summary(datanum)

anova(datanum)%>%
  tidy()

#testing the assumptions for moderation analysis#
modmodelsmaq <-
lm(PSS_Total~SMAQ_Total+Neuroticism_Total+SMAQ_Total:Neuroticism_Total, data = datanum)

datanum <- datanum %>%
  add_residuals(modmodelsmaq)

modmodelsmaq_res<-datanum$resid
hist(modmodelsmaq_res)
qqnorm(modmodelsmaq_res)
qqline(modmodelsmaq_res)

#moderation analysis#
process(data = datanum, y="PSS_Total", x="SMAQ_Total", w="Neuroticism_Total", model=1,
center=2, describe=1, stand=1, jn=1, moments = 1, modelbt = 1, boot = 10000, seed = 424272)

```

```

#plot Simple Slopes#
install.packages("zip")
library(rockchalk)
my_fit <- lm(PSS_Total ~ SMAQ_Total * Neuroticism_Total, data = datanum)
summary(my_fit)
plotSlopes (my_fit, plotx ="SMAQ_Total" , modx = "Neuroticism_Total", modxVals = "std.dev." )

##connection and communication social media screen time (SNS) + perceived stress + neuroticism
#create a linear model + run an anova#
datanum <-lm(PSS_Total~SNS_Total+Neuroticism_Total+SNS_Total:Neuroticism_Total, data=
datanum)
summary(datanum)
anova(datanum)%>%
  tidy()

#testing the assumptions for moderation analysis#
modmodelsns <- lm(PSS_Total~SNS_Total+Neuroticism_Total+SNS_Total:Neuroticism_Total, data
= datanum)

datanum <- datanum %>%
  add_residuals(modmodelsns)

modmodelsns_res<-datanum$resid
hist(modmodelsns_res)
qqnorm(modmodelsns_res)
qqline(modmodelsns_res)

```

```
#moderation analysis#  
  
process(data = datanum, y="PSS_Total", x="SNS_Total", w="Neuroticism_Total", model=1,  
center=2, describe=1, stand=1, jn=1, moments = 1, modelbt = 1, boot = 10000, seed = 424272)  
  
#plot Simple Slopes#  
  
install.packages("zip")  
  
library(rockchalk)  
  
my_fit <- lm(PSS_Total ~ SNS_Total * Neuroticism_Total, data = datanum)  
  
summary(my_fit)  
  
plotSlopes (my_fit, plotx ="SNS_Total" , modx = "Neuroticism_Total", modxVals = "std.dev." )
```