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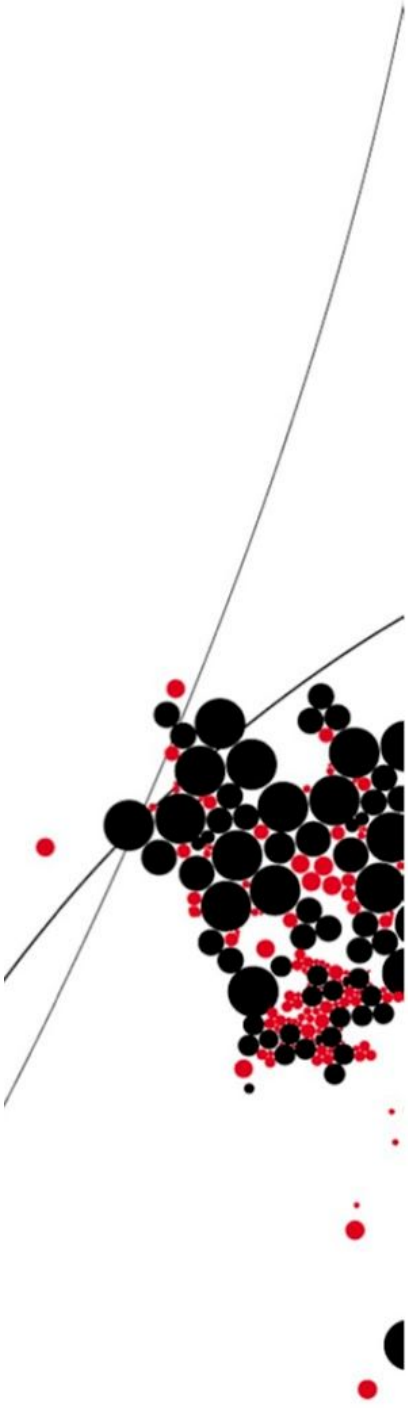

Social Media in relation to mental health and personality

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Abstract

Background. For a decade now, social media networks are expanding. Platforms like Facebook and WhatsApp show the highest user registration numbers. Especially in the age range 18 to 30 the amount of social media users is predominantly high. Previous research indicated that there may be a potential relation between social media use and mental health. More specific, a negative relation of social media use with psychological distress and a positive relation with mental well-being. Also, personality traits seem to play an important role when investigating social media behaviour patterns. The goal of this study was to examine the relationship between social media use and the two-continuums of mental health, namely the level of well-being and the level of psychological complaints, by investigating mental well-being, and the subdomain of psychological complaints, namely psychological distress. In addition, it was tested to what extent the personality traits openness, extraversion, and neuroticism pose a moderating effect on the relationship between social media use and the two continuums of mental health.

Methods. The research question was answered by applying a cross-sectional online survey-based research design. The sample consisted of 273 participants, from which 205 were female, and 68 were male. In total, there were 17 questions in the survey including demographics, and measuring the variables of social media use, mental well-being, psychological distress, and the three personality traits openness,, extraversion, and neuroticism. The data was analysed by correlational and moderation analyses using the software SPSS.

Results. Against the expectations based on past literature, the current study revealed that there is a significant positive relationship between higher social media use and higher psychological distress. Mental well-being, in contrast, is not related to social media use revealed by a correlational analysis. Furthermore, the interaction of social media use and the personality trait openness resulted in a significant interaction effect on mental well-being. The findings indicate that regardless of the level of openness, mental well-being is lower when social media is used. In contrast, when social media is not used frequently, people high in openness, experience high mental well-being when they are not using social media often. At last, no other personality trait significantly moderated the relationship between social media use and mental health.

Conclusion. The current study showed contradicting and unexpected results in the light provide of previous research. It seems as if psychological distress and social media increase themselves bidirectional as revealed by the correlation analysis. In addition, for highly open people it seems as if social media use could have a negative relation to mental well-being that could be investigated in future studies. For

instance, people using social media a lot and are high in openness may improve their mental well-being by refraining from frequent social media use.

Keywords. *Social Media, Mental Health, Mental Well-being, Psychological Distress, Personality*

Introduction

Social Media

In today's society the topic of social media is receiving more attention than a decade ago. In 2010, 0.97 billion people were registered as social network users. Today around 2.77 billion people use social networks. (eMarketer, 2017). In the Netherlands, the most used social media platforms are WhatsApp, Facebook, Instagram, YouTube, Snapchat, Twitter, Pinterest and LinkedIn (CBS, 2019). In a forecast of CBS (2019), the share of social media network users in the population of the Netherlands increased by 2.11% from 2015 until 2019. This represents approximately 63% of the Dutch population being a social network user (CBS, 2019). In addition, specific age groups tend to use social media more extensively than others. In this regard, young adults in the age of 25 to 35 spent approximately one to three hours per day on social media. People in the age of 18 to 25 years appear to spend three to five hours per day on average on social media. (CBS, 2019).

Social media users reported personal communication, entertainment, news/current affairs, and favorite brands and personalities as their main reasons for using social media (CBS, 2019; Spotler, 2018). The most used platforms WhatsApp, Facebook, Instagram, YouTube, Snapchat, Twitter, Pinterest, and LinkedIn have these main reasons in common (Facebook, 2019; Snapchat, 2019; Twitter, 2019; WhatsApp, 2019; Youtube, 2019). While WhatsApp, Twitter, LinkedIn and Snapchat serve predominantly as a personal communication tool, they can be entertaining as well. For instance, Snapchat offers the opportunity to share pictures for a maximum of 10 seconds. Afterwards, the sent image is going to be deleted. Therefore, Snapchat can serve an entertaining and a personal communicating purpose (Snapchat, 2019). Instagram, YouTube and Pinterest predominantly serve the purpose of entertaining, news/current affairs, and following favorite brands and personalities (Instagram, 2019; Pinterest, 2019; Youtube, 2019). Furthermore, the use of social media is also associated with mental health. For instance, authentic self presenting oneself by posting or uploading photos seemed to reduce the stress the more people use social media (Grieve & Watkinson, 2016). In contrast, Oberst et al. (2016) found that there is a negative relation between social media use and mental well-being. For instance, the more people use social media, the lower their mental well-being. So, there are contradicting findings concerning the relationship of social media use and mental health.

The two-continuum model of mental health

In order to understand these contradicting findings, it is important to get to know the complex construct of mental health. Mental health is defined as “a state of well-being in which the individual realizes his or her own abilities, can cope with the normal

stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2005). In other words, a person can be considered as mentally healthy if the person has faith in his/her abilities, can take on the daily challenges, is able to work efficiently and has a value for his/her social environment. This definition was enlarged by Westerhof and Keyes (2009) who introduced the mental health two continua model. This model proposes that mental health is a distinct continuum from mental illness. In this context, the first continuum of mental health refers to the existence or non-existence of symptoms indicating the degree of mental health. The second continuum of mental illness refers to the existence or non-existence of symptoms indicating the degree of mental illness (Westerhof & Keyes, 2009). Keyes (2001) was one of the firsts investigating and developing this model. The philosophical framework underlying this model is that Keyes (2001) reported that there are many people who do not suffer from depression but are also not feeling mentally well. According to Keyes (2001), mental health consist of both, the presence of positive symptoms like "positive feeling" as well as the absence of negative symptoms like "psychological distress". The presence of positive symptoms and the absence of negative symptoms is the state of "flourishing". The absence of positive symptoms and the presence of negative symptoms is the state of "languishing" (Keyes, 2001). Based on this framework, interventions should aim on preventing the negative symptoms, and at the same time facilitate positive symptoms (Keyes, 2001).

In the current study, the focus lies on the two continuums of mental health, namely the mental well-being and the psychological distress. Mental well-being consists of three dimensions, namely the emotional well-being, the psychological well-being and the social well-being (Franken, Lamers, Klooster, Bohlmeijer, & Westerhof, 2018). Emotional well-being refers to the hedonistic view on happiness. Hedonistic describes the striving for pleasure and self-gratification (Westerhof & Keyes, 2009). The main idea of the hedonistic view is that positive symptoms, such as pleasure and happiness, should be intensified and enhanced in individuals. In contrast, negative symptoms, such as pain, should be reduced as much as possible. The hedonistic view, in this regard, corresponds with the view of Keyes (2001) on mental health. The dimensions of psychological and social well-being rather concern the eudaimonic perspective. Eudaimonic describes the recognition of one's own potentials, optimal functioning and self-actualization with regards to oneself and in a social context. The eudaimonic view, therefore, refers to a positive functioning person (Westerhof & Keyes, 2009). Especially, the dimension of social well-being deals with an appropriate positive functioning of a person in a social environment, such as a social group or society (Franken et al., 2018). While mental well-being deals with the positive aspects of mental health, psychological distress refers to the

level of complaints an individual expresses. In this regard, general negative symptoms in the form of psychological distress are enabled to indicate the level of complaints (Sereda, & Dembitskyi, 2016). More specific, psychological distress entails the subdomains of somatization, obsessive-compulsive tendencies, interpersonal sensitivity, depression, (phobic) anxiety, hostility, paranoia, psychoticism (Sereda, & Dembitskyi, 2016).

Previous research indicated a link between mental health and the use of social media platforms. Mental well-being, in relation to social media use was investigated by the study of Reinecke and Trepte (2014) and the study of Oberst et al. (2016). The study of Reinecke and Trepte (2014) revealed a positive relation of authentic social media use with subjective mental well-being. This study indicated that the more authentic people behave on social media platforms, the higher their subjective well-being. In contrast to these findings, the study of Oberst et al. (2016) showed a negative relationship between frequent Facebook use and well-being. Further, this study found that the self-presentation of women was more linked to well-being than for men.

The other continuum of psychological complaints entailing negative symptoms, like psychological distress, in relation to social media use were examined by Grieve and Watkinson (2016). This study revealed a negative correlation between social media use and psychological distress. More specifically, people who felt less socially connected to others on social media platforms showed higher stress levels than people who are more socially connected (Grieve & Watkinson, 2016). However, these described relations of social media use and the two continuums of mental health may differ between personalities.

The big five model of personality

As the relations between social media and mental health differ between people, some personalities might be more prone to the consequences of social media use on their mental health than others. Until now, personality has no universal definition as it is a complex construct. However, Larsen, Buss and Wismeijer (2013), tried to integrate the essential elements of personality in the following definition: “Personality is the set of psychological traits and mechanisms within the individual that are organized and relatively enduring and that influence his or her interactions with, and adaptations to, the intrapsychic, physical, and social environments.” (Larsen, Buss, & Wismeijer, 2013). Traits, in this context, can be described as stable characteristics of an individual (Larsen, Buss, & Wisjmeijer, 2013). Mechanisms are kind of analogical to traits, with the difference that mechanisms refer to the internal processes of a person. Traits and mechanisms are, according to this definition, structured so that one adapts to inner cognitive processes or to physical or social surroundings (Larsen, Buss, &

Wismeijer, 2013).

The most common model used when assessing personality traits is the Big Five personality inventory. The big five model was established by Norman (1963) and proposes that the personality consists of 5 dimensions, namely extraversion, agreeableness, conscientiousness, neuroticism and openness. Larsen et al. (2013) provided a detailed description of these five factors. A high level of extraversion refers to people who are outgoing and socially oriented on their environment. A high level of agreeableness describes a personality factor of people who tend to accommodate to their social environment, for instance, by negotiating in order to end a conflict. People with a high level of conscientiousness are ambitious and tend to get better grades than peers with a rather low level of conscientiousness. Being on a high level of the factor of neuroticism refers to people that are unable to cope with life stress in a stable manner. High levels of openness describe personalities who tend to be more open-minded and remember their dreams in a more precise manner (Larsen et al., 2013; Watson, 2003).

Which personality someone has, may provide some insight about the relationship between social media use and one's mental well-being. The study of Strickhouser, Zell and Krizan (2017) revealed a positive relation between the big five personality traits and mental health. More specifically, the traits of openness, conscientiousness, extraversion, and agreeableness are positively related to mental health symptoms. Furthermore, neuroticism is negatively related to mental health. (Strickhouser et al., 2017). These findings indicate that there is a stable relationship between the big five personality traits and the two continuums of mental health.

Given this established relationship between the personality traits and mental health, social media use adds some further insights to this framework. The study of Correa, Hinsley, and Zúñiga (2010) found that the personality traits openness, extraversion and neuroticism are positively related to frequent social media use. This finding indicates that the more social or outgoing, open to experience or emotionally labile a person is, the more frequent this person tends to use social media (Bodroza & Jovanovic, 2016; Krämer et al. 2017; Lee, Ahn, & Kim, 2014). In contrast, the personality traits of conscientiousness and agreeableness appear to be negatively related to frequency of social media use (Seidmann, 2013; Stanton, Ellickson-Larew, & Watson, 2003). These findings imply that people who are open-minded, extroverted, and emotionally labile are rather prone to use social media compared to those who are not.

Therefore, the current study gains in importance as it contributes new insights to the current research framework in that the interaction of social media use and personality traits in relation to the two continuums of mental health is examined. Based on the established framework there is a positive relationship between the

personality traits openness, extraversion, and neuroticism and the frequency of social media use (Bodroza & Jovanovic, 2016; Krämer et al. 2017; Lee, Ahn, & Kim, 2014). The personality traits of conscientiousness and agreeableness seem to use social media use less frequent (Seidmann, 2013; Stanton, Ellickson-Larew, & Watson, 2003). That is why this study only focuses on the personality traits of openness, extraversion, and neuroticism. Additionally, past research found a positive relationship between the frequency of social media use and mental well-being as well as a negative relationship between the frequency of social media use and psychological distress (Grieve & Watkinson, 2016; Oberst et al., 2016; Reinecke & Trepte, 2014). So, the expectation concerning the present study is that people high in openness, extraversion and neuroticism use social media more frequently. That is the reason why it is expected that these traits also positively moderate the relationship between social media use and mental well-being as the more they use social media, the higher their well-being or vice versa. The other way around accounts for the negative relationship between the frequency of social media use and psychological distress. So, as people high in openness, extraversion and neuroticism tend to use social media more often, they negatively moderate the relationship between social media use and psychological distress. The reason for that expectation is that the more these personality traits use social media, the less their psychological distress. Still, these are only expectations formulated in the light of the established relationships between social media use and personality traits, and social media use and the two continuums of mental health as there was no moderation analysis taking these relationships into consideration.

The current study

Keeping the previous research framework in mind, the aim of this study is to examine the relationship between the frequency of use of social networking sites and mental well-being. In addition, openness, extraversion, and neuroticism are expected to moderate this relationship. Therefore, the current research question reads *"Is there a relationship between the daily social media use of adults aged 18 to 35 and their mental health, and is this relationship moderated by their personality traits openness, extraversion, and neuroticism?"* Based on the established theoretical framework described above, hypotheses can be formulated concerning the relation between social media usage, mental well-being and psychological distress.

H_1: Social media use is positively correlated with mental well-being.

H_2: Social media use is negatively correlated with psychological distress.

Based on previous research concerning the personality traits associated with social media usage and the positive continuum of the mental health model, namely mental well-being, the following hypotheses can be formulated.

H_{3A}: Social media use is positively correlated with mental well-being and this relationship is moderated by the personality trait openness in a way that people with high openness experience more well-being than people with low levels of openness when using social media.

H_{3B}: Social media use is positively correlated with mental well-being and this relationship is moderated by the personality trait extraversion in a way that people with high extraversion experience more well-being than people with low levels of extraversion when using social media.

H_{3C}: Social media use is positively correlated with mental well-being and this relationship is moderated by the personality trait neuroticism in a way that people with high neuroticism experience more well-being than people with low levels of neuroticism when using social media.

Furthermore, based on previous research taking the personality traits into account and examining the other continuum of the mental health model, namely psychological distress, the following hypotheses can be formulated.

H_{4A}: Social media use is negatively correlated with psychological distress and this relationship is moderated by the personality trait openness in a way that people with high openness experience less psychological distress than people with low openness when using social media.

H_{4B}: Social media use is negatively correlated with psychological distress and this relationship is moderated by the personality trait extraversion in a way that people with high extraversion experience less psychological distress than people with low extraversion when using social media.

H_{4C}: Social media use is negatively correlated with psychological distress and this relationship is moderated by the personality trait neuroticism in a way that people

with high neuroticism experience less psychological distress than people with low neuroticism when using social media.

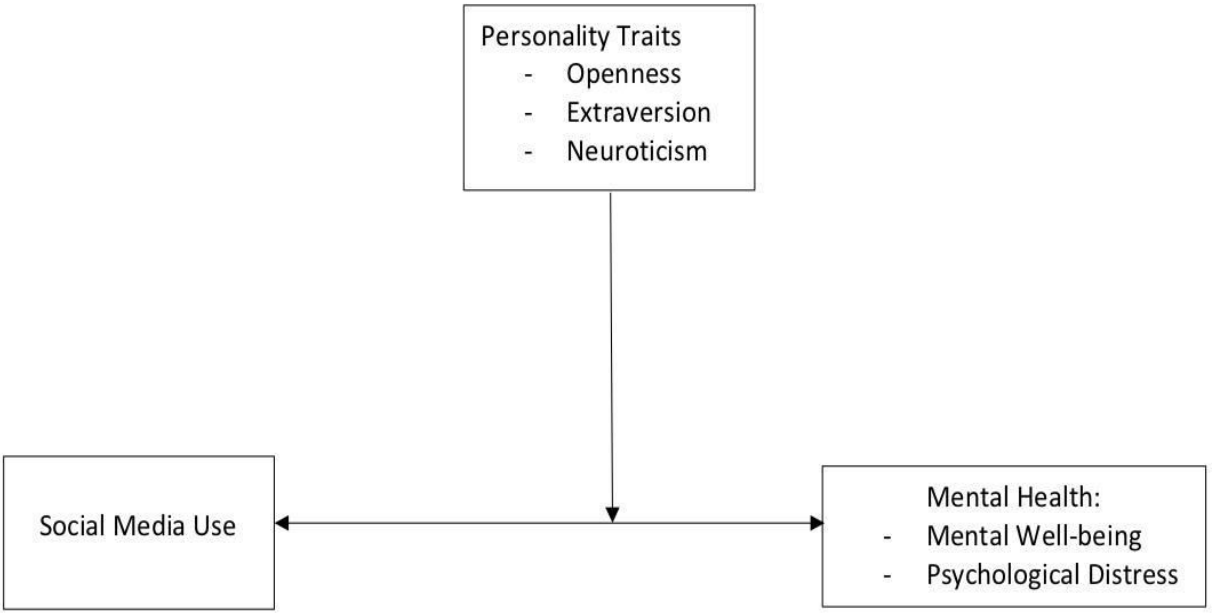

Figure 1. *The conceptual model with the relationship between social media use and mental health with the three personality traits openness, extraversion, and neuroticism as the moderator variables.*

Methods

Design

In order to investigate to what extent these personality traits moderate the relationship between mental health and social media usage, a quantitative cross-sectional online survey was conducted. The current study dealt with *social media use* as the independent variable, *mental health* as the dependent variable and the *personality traits openness, extraversion and neuroticism* as moderator variables. In this regard, a cross-sectional study appeared of advantage due to a low-cost application, small amount of resources and a sizable volume of data that can be collected in a small-time frame (Mann, 2003). Additionally, this design posed to verify the prevalence of the expected results as previous studies applied the current design (Mann, 2003).

Participants

Participants were recruited using convenience sampling. In this regard, some participants were recruited using social media platforms, specifically Facebook, Instagram, WhatsApp and Snapchat. The recruitment message appealed to the people by a short explanation of the purpose of the study, the requirements, such as sufficient English comprehension skills, the duration of the survey, and that interested people may contact the researchers at any given time. However, other participants

were recruited by means of Sona-systems, which is a study pool of the University of Twente. It is mandatory for 1st and 2nd year students from the behavioural sciences to collect credits, awarded for participation in studies. In contrast, participants addressed via social media platforms did not receive such a reward. Still, every participant may receive the full study report if a contact mail address was provided during the study.

Not every participant, however, was included in the data set and were consequently selected according to whether participants met the inclusion criteria. In total, 330 individuals participated in the study. The inclusion criteria for the current study were that participants needed to be: (1) At least 18 years old, (2) capable of sufficient English comprehension skills, (3) using social media applications, (4) did complete the survey, (5) having a screen time application and (6) showed a higher motivation for participating in the current study than 2 on a scale from 1 to 5.

After screening and cleaning the data, 164 participants remained in the study as only these fulfilled the inclusion criteria mentioned above. From these 164 participants, 118 were female, 46 were male. The age ranged from 18 to 26 (M= 20.80; SD= 1.87). The full list of demographics may be viewed in Table 1 provided below.

Table 1

Overall demographics of the participants of the current study.

Item	Category	Frequency	%
Gender	Male	46	28.0
	Female	118	72.0
Occupation	Employed Full Time	5	3.0
	Employed Part Time	8	4.9
	Unemployed	2	1.2
	Retired	1	0.6
	Student	146	89.0
	Other	2	1.2
Nationality	Dutch	19	11.6
	German	133	81.1
	Other	12	7.3
Social Media use	Facebook	143	87.2
	Twitter	41	25.0
	Instagram	146	89.0
	Snapchat	130	79.3
	WhatsApp	163	99.4
	Other	29	17.7

Measuring instruments

In order to measure the variables resulting from the research question and the corresponding hypotheses, self-constructed demographic questions, three self-constructed questions concerning the frequency of social media usage, and three different scales were used. The three different scales were the Mental Health Continuum - Short Form (MHC-SF), the Symptom CheckList - 9- k (SCL-9-K), and the Big Five Inventory - 2s (BFI-2s). The combination of the MHC-SF and the SCL-9-K intended to measure the two continuums of mental health. The BFI-2s had the purpose to test the extent of the three personality traits openness, extraversion, and neuroticism. Also, the current research was part of another research project, which is why two more questions concerning the specific Instagram usage, one question concerning the relationship status, and the Rosenberg Self-esteem scale were also part of the study. These items, however, were not relevant for examining the

hypotheses stated above. All these scales were applied in one survey constructed via the online survey tool Qualtrics.

Social Media Usage

The degree of social media usage was assessed by using three questions. The first question aimed at identifying the specific platforms that were used by the participants. The second question asked the participants for indicating a valid amount of time spent on social media platforms in general. As the exact estimation of such a value appeared difficult to guess, the question provided an instruction about how to clarify the specific usage times. More specific, some smartphones measure the exact value spent per app, such as the screen time application from iPhones. Given that the participants were not able to identify the amount of time, the third question provided established categories in which the participant could also estimate the corresponding category for their frequency of use concerning social media. One example question would be *"Please indicate how much time (in minutes) you spend on all social media sites per day. Note: Your smartphone may provide you with an average screen time application for a more accurate indication. If you do not have such a screen time application, please leave this field blank."*. The specific questions concerning the variable of social media use may be reviewed in Appendix A.

Mental Health Continuum - Short Form

The Mental Health Continuum - Short Form was compiled from the Mental Health Continuum Long Form. The short form consisted of 14 items and was derived from Keyes (2009). These 14 items intended to measure the overall well-being of the participant, but also included three subscales coherent with the three construct definitions of mental health. These three subscales were namely emotional, social and psychological well-being. The emotional well-being subscale was measured by three items, the social well-being subscale entailed five items, and the psychological well-being subscale consisted of six items. Example questions were *"During the past month, how often did you feel happy?"* from the emotional well-being subscale, *"During the past month, how often did you feel that you had something important to contribute to society?"* from the social well-being subscale, and *"During the past month, how often did you feel that you liked most parts of your personality"* from the psychological subscale. The complete scale may be reviewed in Appendix B. The items were scored from zero to five on a Likert-scale. More specific, the participants had to score from "Never" (0), "Once or Twice" (1), "About Once a Week" (2), to "2 or 3 Times a Week" (3), "Almost Every Day" (4) and every day (5). From these scores the sums were calculated, so the total scores concerning the participants

ranged from zero to 70 (Keyes, 2009). In this regard, higher sums indicate a higher level of well-being. Overall, the MHC-SF proved significant internal consistency (>.80) and discriminant validity in samples consisting of adolescents and adults from the U.S., the Netherlands, and in South Africa (Keyes 2005; Keyes, 2006; Keyes et al., 2008; Lamers et al., 2010; Westerhof, & Keyes, 2009). The test-retest reliability resulted in a mean value of .68 after three months, and a value of .65 after nine months (Lamers et al., 2010). Conducted factor analyses also emphasized the three factor model of the MHC-SF, namely the psychological, emotional and social well-being subscales, in samples of among others the Netherlands (Lamers et al., 2010). Based on these values it appeared to be a founded measurement tool for one continuum of mental health. The Cronbach's Alpha concerning the current study resulted in a sufficient value of .90.

Symptom CheckList - 9 - K

The continuum of the level of complaints concerning the psychological distress was measured with the Symptom CheckList - 9-K (SCL-9-K). The SCL-9-K is part of the SCL-90-R and compiled 9 items. In addition, the whole SCL-90-R was developed by Derogatis (1992). As there was a need for timely more efficient measurement instruments, Klaghofer and Brähler (2000) created the shorter version of the original SCL-90-R. The items correlating highest with the Global Severity Index (GSI) of the original SCL-90-R were selected for the SCL-9-k. . Furthermore, the SCL-90-R intended to measure several subdomains of psychological symptoms, such as anxiety or depression. The SCL-9-K, in contrast, only measured the global severity factor of psychological symptoms (Sereda, & Dembitskyi, 2016). Example questions of the SCL-9-k were, for instance, *"During the past week, how much were you bothered by temper outbursts that you could not control"*, *"During the past week, how much were you bothered by feeling blocked in getting things done"*, or *"During the past week, how much were you bothered by worrying too much about things"*. The complete scale may be reviewed in Appendix C. The corresponding items were scored on a Likert-scale from zero to four, namely from "Not at all" (0), "A little bit" (1), "Moderately" (2), to "Quite a bit" (3) and "Extremely" (4). From these scores the mean values were calculated, ranging from the lowest mean of 0 to the highest mean of four. A high mean, therefore, indicates a higher level of complaints, while a low mean indicates a rather lower level of complaints. Furthermore, as a tool the SCL-9-K appeared internally consistent with the newest reliability value being .89 in an Ukrainian sample with a mean age of 45 (Sereda, & Dembitskyi, 2016). As a short version, the SCL-9-K proved to be a valid substitute for the SCL-90-R (Dembitskyi, 2016). Based on the framework, the promising reliability and validity estimates of the study from Sereda and Dembitskyi (2016), the SCL-9-K seemed like an appropriate

tool for measuring the other continuum of mental health. The current study revealed a significant Cronbach's Alpha of .84 concerning the SCL-9-k.

Big Five Inventory - 2s

The subdomains of personality were assessed using the research fitting Big Five Inventory - 2s (BFI-2s). The BFI-2s is based on the original BFI and BFI-2 which was developed by a panel of experts by reviewing 300 items from the Adjective Check List (ACL; Gough & Heilbrun, 1983; Soto, & John, 2017). The BFI-2s consists of 30 items measuring the five traits of personality, namely openness, conscientiousness, extraversion, agreeableness, and neuroticism. More specific, every trait was measured by six items, respectively. Example questions were *"I am someone who tends to be quiet"* from the "Extraversion" subscale, *"I am someone who worries a lot"* from the "Neuroticism" subscale, and *"I am someone who is fascinated by art, music, or literature"* from the "Openness" subscale. A full overview of the BFI-2s may be reviewed in Appendix D. These 30 items were scored by the participants on a Likert-scale from one to five, ranging from "Strongly Disagree" to "Strongly Agree". From these indications a mean score should be calculated for the five subscales. Therefore, a participant shows low levels of the specific trait if the mean was close to one, and high levels of the specific trait if the mean was close to five. In comparison to the BFI-2, the BFI-2s shows lower reliability values for the subdomains of openness (.42 to .64), extraversion (.60 to .72), and neuroticism (.65 to .75) in a sample of more than 2000 American students from college or university (Soto, & John, 2017). Still, the three-factor structure was maintained by this tool. However, due to time saving reasons concerning the duration of the survey, the BFI-2s was selected as the three-factor structure seemed sufficient for measuring the three personality traits. Concerning the current study, sufficient Cronbach's Alpha was found for the subscales of "Extraversion" with .74, and "Neuroticism" with .88. In contrast, insufficient Cronbach's Alpha value was revealed for the scale of "Openness" with .66. Still, all of these reliability values were higher than the one´s Soto and John (2017) found.

Procedure

Before beginning with the data collection, ethical approval was requested from the Ethical Committee of the University of Twente. After the approval by the Ethical Committee, data was gathered starting at the 25th of March 2018 until the 3rd of May. In order to access the study an anonymous distribution link was posted with an additional recruitment text. By clicking on the link, by smartphone or by a PC, one was shown the informed consent of the current study. This informed consent included information about the goal of the study, estimated duration of filling out the survey

(approximately 10 to 30 minutes), anonymity and confidentiality, withdrawal at any given time without having to mention a reason, and, in case of any questions, remarks or interest the contact details of the researcher. Given that the participant agreed to the conditions by clicking on yes, she or he continued with filling out the survey. Otherwise, if the participant clicked on no, he or she was sent to the end of the survey. Afterwards, participants taking part via Sona could indicate their Sona ID, so that their participation can be confirmed, and credits can be transferred.

At the end of the official study part, participants should also indicate their level of motivation for the current study on a scale from one to five. Finally, the participant may also sign up for receiving the study results via email, if wished for. At the end, a customized end of survey message was displayed, in which the participant was thanked for participation and contact details of the researchers were provided again in case of any questions or comments from the participants.

Data analysis

The data gathered was analysed using the software SPSS (version 24.0.0). At first, the data was cleaned. The cleaning process involved filtering of the cases who did or did not fulfil the inclusion criteria described above. Additionally, the data was screened and filtered for contradicting data, such as outliers, in order to establish a more valid data set.

Descriptive statistics

Subsequent to the cleaning process, descriptive statistics aiming to provide an overview of the data gathered were computed. For these descriptive statistics, the mean values, standard deviation, skewness and kurtosis values were calculated concerning the variables of social media use, mental well-being, psychological complaints, and the personality traits of openness, extraversion, and neuroticism.

The means, standard deviations, skewness and kurtosis values provided insight about whether the data was skewed or kurtic. These values, however, aimed to provide an overview of the distribution of the data. So due to the large sample, a normal distribution was assumed in the current study (Field, 2013).

Reliability

Every scale with its subdomains (MHC-SF, SCL-9-K, BFI-2s) was analysed for internal consistency by calculating Cronbach's Alpha. Scales were approved as sufficiently reliable if the result displayed at least a value of .70 (George & Mallary, 2003).

Correlational and Moderation analyses

In order to evaluate the first hypothesis H_1 "Social media use is positively correlated with mental well-being" and second hypothesis H_2 "Social media use is negatively correlated with psychological distress." bivariate correlational analyses were performed concerning the total score of the MHC-SF, the total score of the SCL-9-k and the indication of the frequency of social media use. As the data was approximately normally distributed indicated by the sample size, the skewness and kurtosis values, a "Pearson´s r" correlation analysis was performed as it provided a fitting estimate of the correlation when the parametric distribution was present (Field, 2013). Correlations were approved as significant given that the p-value is smaller than .05 (Goodman, 1999). As the p-value fallacy states that the p-value solely does not give a satisfactory indication of the relationship between two variables, the effect size "r" and corresponding confidence intervals concerning the true value of "r" were also calculated (Goodman, 1999). In this regard, effect sizes from .1 to .29 represent a small effect, from .3 to .49 represents a medium effect, and from .5 to 1 a large effect (Field, 2013).

Subsequently, the moderation analyses were performed by applying hierarchical multiple regression analyses in order to test the hypotheses H_{3A} to H_{3E} and H_{4A} to H_{4E}. In order to refrain from potentially large multicollinearity with the interaction between the variables concerning social media use and the personality traits, the means of these two variables were centred and an interaction variable was calculated (Aiken & West, 1991). Normally, these hierarchical multiple regression analyses would be performed by employing a first model in which two independent variables are analysed in relation to the dependent variable. Subsequently, an interaction term embodying the multiplication of the two independent variables is calculated and tested in a second model in relation to the dependent variable. Given that the change in the explained variance R^2 is significant, a present moderation is possible. However, these hierarchical multiple regression analyses were performed by using the Add-On tool "PROCESS" developed by Hayes (2017). This tool is able to conduct a hierarchical multiple regression analysis in one step. The "PROCESS" tool was applied in order to receive an overview of a possible interaction effect by centering the independent variables and computing an additional interaction term. Also, a code with the aim to visualize possible interaction effects was generated with the "PROCESS" tool (Hayes, 2017). A significant *b* coefficient and a corresponding confidence interval, which does not include 0, of the interaction terms were considered as a present moderation effect. The confidence interval refers to the *b* coefficient. As soon as this confidence interval contains a 0, the *b* coefficient could also take the value 0 indicating that there is probably also no relation. In this regard,

R-squared provides an indication about the variance explained by the specific statistical model.

Results

Data cleaning

After the data was cleaned for outliers and according to whether participants met all the inclusion criteria, a dataset with 164 participants was left. In this regard, everyone was regarded as an outlier if an average time of more than 16 hours per day spent on social media was indicated, as these indications appeared to deviate too far from the rest of the distribution

Descriptive Statistics

The calculated descriptive values concerning the mental well-being, psychological distress, social media use, and the three personality traits may be reviewed in Table 2. This table reveals that the current sample showed rather high mental well-being as the mean was close to the maximum value of 70 with a standard deviation of 11.52. Also, the current sample showed rather low levels of complaints as the mean of psychological distress is closer to zero than to the maximum value of four. Social media use was rather low across this sample as there were not many participants using social media frequently. With regards to the personality traits, the current sample was highest in openness, in comparison to the other personality traits. Still, this sample exhibited stable means around the median three concerning the trait extraversion. A bit below the median of three, however, was the trait of neuroticism, showing that the current sample was a bit less emotionally labile in comparison to the other personality traits.

Table 2
Means, standard deviations, skewness and kurtosis values of mental well-being, psychological distress, social media use, and the five personality traits, namely Openness, Extraversion, and Neuroticism (N=164).

N= 164	Mean	Standard Deviation	Skewness	Kurtosis
Mental Well-being	58.33	11.52	-0.23	-0.44
Psychological Distress	1.34	0.74	0.56	-0.46
Social Media Use	125.01	96.78	1.81	4.95
Openness	3.89	0.62	0.09	-0.54
Extraversion	3.40	0.74	-0.37	-0.32
Neuroticism	2.90	0.97	0.001	-0.89

Correlation and Moderation Analyses

Examining the first hypothesis H_1 "Social media use is positively correlated with mental well-being" resulted in a non-significant and small negative correlation between social media use and mental well-being. Investigating the second hypothesis H_2 "Social media use is negatively correlated with psychological distress" revealed a significant and small positive correlation between social media use and psychological distress. Mental well-being and psychological distress had a significant strong negative correlation. The level of Extraversion showed a significant and medium positive correlation with mental well-being. The level of Neuroticism resulted in a significant and strong negative correlation with mental well-being. The level of Extraversion, furthermore, displayed a significant and medium positive correlation with psychological distress. The level of Neuroticism revealed a significant and strong positive correlation with psychological distress. In contrast, the level of neuroticism was significant, but positive weakly correlated with social media use. Moreover, the level of the personality traits of openness, and extraversion were non-significant and only resulted in small correlations with social media use. Furthermore, the level of openness showed a non-significant and a small correlation with mental well-being and psychological distress. A full overview of all correlation coefficients, p-values and confidence intervals may be reviewed in Table 3.

Table 3
Pearson Correlation and P-values Concerning the Mental Well-being, Psychological Distress, Social Media Use also with regard to the Three Personality Traits Openness, Extraversion, and Neuroticism.

	1	**2**	**3**
1. Mental Well-being	-		
2. Psychological Distress	**-.56**	-	
p-value	**.001****	-	
3. Social Media Use	-.12	**.20**	-
p-value	.14	**.01****	-
4. Openness	.11	-.02	-.05
p-value	.18	.84	.52
6. Extraversion	**.41**	**.37**	.09
p-value	**.00****	**.00****	.24
8. Neuroticism	**-.61**	**.74**	**.22**
p-value	**.00****	**.00****	**.01****

N.B.: * p-value significant at .05 margin, ** p-value significant at .01 margin

The hypothesis H_{3A} to H_{3C} were examined by applying hierarchical multiple regression model with mental well-being as the dependent variable and social media use, accompanying personality traits and the interaction of these two predictors as independent variables in this model. The corresponding Beta-values, Standard errors, t-values, p-values, and confidence intervals may be reviewed in Table 4 concerning openness, Table 5 concerning extraversion, and Table 6 concerning neuroticism.

In Table 4, it becomes apparent that social media use was a significant predictor of mental well-being, while openness was not. However, taking the interaction between openness and social media use into account, a moderation effect was found. The interaction plot is visualized in figure 2. Against the expectation, it seemed that all participants who used social media frequently had relatively low levels of mental well-being regardless of their level of openness. However, when social media use was low, people high in openness seem to have higher mental well-being than people low in openness. So even though there is a significant moderation, the direction is different than expected. As a consequence of this finding, the hypothesis H_{3A} "*Social media use is positively correlated with mental well-being and this relationship is moderated by the personality trait openness in a way that people with high openness experience more well-being than people with low levels of openness when using social media.*" was rejected.

Table 4
Hierarchical Multiple Regression on Mental Well-being with Social media, Openness and the Interaction Between these Two Predictors.

	b	SE (b)	*t*	*p*	95% Confide Interval
(Constant)	58.24	0.89	65.57	.00**	56.48/59.99
Social Media Use	-0.02	0.01	-2.17	.03*	-0.03/-0.002
Openness	1.20	1.57	1.27	.21	-1.11/5.10
Interaction	-0.03	0.01	-3.33	.00**	-0.05/-0.01

Note. R^2 = .06; df = 3, 160; * p-value significant at .05 margin; ** p-value significant at .01 margin; b= unstandardized slope coefficient; S.E.= Standard Error of b

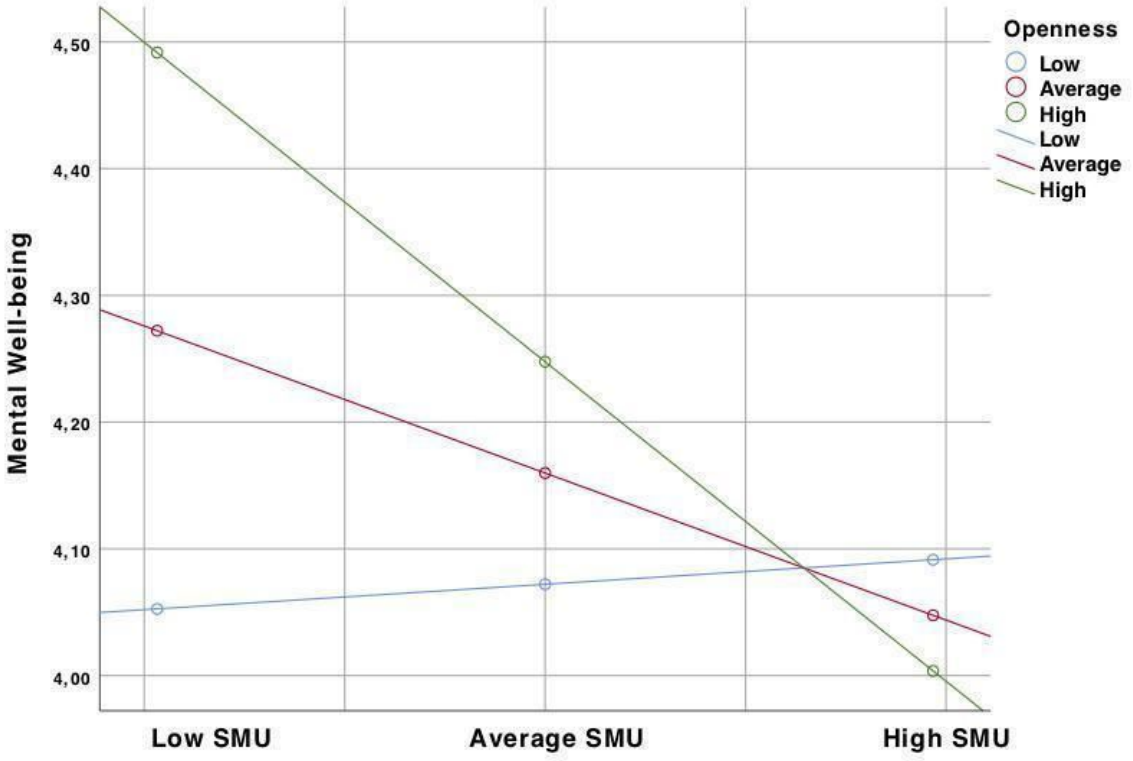

Figure 2. Plot Between Mental Well-being as Dependent Variable, Social Media Use (SMU) as Independent Variable, and Openness as Moderator.

In Table 5, there were significant relationships of social media use and extraversion with mental well-being. Nonetheless, no interaction effect was found to be significant. Therefore, no moderation effect occurred between social media use, mental well-being and openness. As a consequence, the hypothesis H_{3B} "*Social media use is positively correlated with mental well-being and this relationship is moderated by the personality trait extraversion in a way that people with high extraversion experience more well-being than people with low levels of extraversion when using social media.*" was rejected.

Table 5
Hierarchical Multiple Regression on Mental Well-being with Social media, Extraversion and the Interaction Between these Two Predictors.

	b	**SE (*b*)**	***t***	***p***	**95% Confidence Interval**
(Constant)	58.37	0.83	72.45	.00**	56.76/59.98
Social Media Use	-0.02	0.01	-2.32	.02*	-0.03/-0.003
Extraversion	6.65	1.24	5.35	.00**	4.20/9.11
Interaction	-0.01	0.01	-0.42	.67	-0.04/0.02

N.B.: R^2= .19; df = 3, 160; * p-value significant at .05 margin; ** p-value significant at .01 margin; b= unstandardized slope coefficient; S.E.= Standard Error of b

Table 6 showed a significant relationship of neuroticism with mental well-being, while social media use was not a significant predictor in this model. In addition, no interaction effect was found between neuroticism and social media use on mental well-being. Thus, there was no moderation effect of neuroticism on the relationship between social media and mental well-being. Concluding, hypothesis H_{3C} "*Social media use is positively correlated with mental well-being and this relationship is moderated by the personality trait neuroticism in a way that people with high neuroticism experience more well-being than people with low levels of neuroticism when using social media.*" was rejected.

Table 6
Hierarchical Multiple Regression on Mental Well-being with Social media, Neuroticism and the Interaction Between these Two Predictors.

	b	**SE (b)**	**t**	**p**	**95% Confidence Interval**
(Constant)	58.40	0.71	81.72	.00**	56.99/59.81
Social Media Use	0.001	0.01	0.40	.69	-0.01/0.02
Neuroticism	-7.32	0.77	-9.54	.00**	-8.84/-5.81
Interaction	-0.003	0.01	-0.34	.74	-0.02/0.02

N.B.: R^2 = .38; df = 3, 160; * p-value significant at .05 margin; ** p-value significant at .01 margin; b= unstandardized slope coefficient; S.E.= Standard Error of b

In order to test the hypotheses H_{4A} to H_{4E}, hierarchical multiple regression models were administered. These models entailed the social media use, the personality traits and the interaction of these two predictors as independent variables on the dependent variable psychological distress. The associated Beta-values, Standard Errors, t-values, p-values and confidence intervals may be inspected in Table 7 concerning openness, Table 8 concerning extraversion, and Table 9 concerning neuroticism.

In the model displayed in Table 7, there was a significant main effect of social media use on psychological distress. Openness, in contrast, seemed to have no significant main effect on psychological distress. Also, the interaction between social media use and openness revealed no significant moderation effect with the dependent variable psychological distress. This finding indicated that there was no apparent moderation effect. Thus, the hypothesis H_{4A} "*Social media use is negatively correlated with psychological distress and this relationship is moderated by the personality trait openness in a way that people with high openness experience less psychological distress than people with low openness when using social media.*" was rejected.

Table 7
Hierarchical Multiple Regression on Psychological Distress with Social Media, Openness and the Interaction Between these Two Predictors.

	b	SE (b)	t	p	95% Confidence Interval
(Constant)	1.35	0.06	23.14	.00**	1.23/1.46
Social Media Use	0.002	0.001	2.37	.02*	0.0003/0.003
Openness	-0.01	0.10	-0.11	.92	-0.21/0.18
Interaction	0.001	0.001	1.01	.32	-0.001/0.003

N.B.: R^2 = .05; df = 3, 160; * p-value significant at .05 margin; ** p-value significant at .01 margin; b= unstandardized slope coefficient; S.E.= Standard Error of b

The model in Table 8 revealed that social media use and extraversion were both significant predictors of psychological distress. There was, in contrast, no significant interaction effect between social media use and extraversion on psychological distress. Therefore, no moderation effect transpired. As a consequence, the hypothesis H_{4B} "*Social media use is negatively correlated with psychological distress and this relationship is moderated by the personality trait extraversion in a way that people with high extraversion experience less psychological distress than people with low extraversion when using social media.*" was rejected.

Table 8
Hierarchical Multiple Regression on Psychological Distress with Social Media, Extraversion and the Interaction Between these Two Predictors.

	b	SE (b)	t	p	95% Confidence Interval
(Constant)	1.35	0.05	25.62	.00**	1.25/1.46
Social Media Use	0.002	0.001	3.02	.00**	0.001/0.003
Extraversion	-0.39	0.07	-5.87	.00**	-0.52/-0.26
Interaction	-0.001	-0.001	-1.85	.07	-0.003/0.0001

N.B.: R^2 = .21; df = 3, 160; * p-value significant at .05 margin; ** p-value significant at .01 margin; b= unstandardized slope coefficient; S.E.= Standard Error of b

As reported in Table 9, there was a significant main effect of neuroticism, while there was no significant relationship of social media use with psychological distress. Additionally, the interaction between social media use and neuroticism on psychological distress was also not significant. In other words, no moderation effect occurred. Therefore, the hypothesis H_{4C} "*Social media use is negatively correlated with psychological distress and this relationship is moderated by the personality trait neuroticism in a way that people with high neuroticism experience less psychological distress than people with low neuroticism when using social media.*" was rejected.

Table 9
Hierarchical Multiple Regression on Psychological Distress with Social Media, Neuroticism and the Interaction Between these Two Predictors.

	b	SE (b)	t	p	95% Confidence Interval
(Constant)	1.34	0.04	32.68	.00**	1.26/1.42
Social Media Use	0.0003	0.001	0.46	.65	-0.001/0.001
Neuroticism	0.56	0.04	14.43	.00**	0.48/0.64
Interaction	0.0001	0.001	0.25	.80	-0.001/0.001

N.B.: R^2 = .55; df = 3, 160; * p-value significant at .05 margin; ** p-value significant at .01 margin; b= unstandardized slope coefficient; S.E.= Standard Error of b

In conclusion, the first hypothesis H_1 "Social media use is positively correlated with mental well-being" was rejected. The second hypothesis H_2 "Social media use is negatively correlated with psychological distress". was also rejected. The same accounted also for the hypotheses H_{3A} to H_{3C} and H_{4A} to H_{4C}, which were also rejected by the current findings.

Discussion

Conclusion

The aim of the current study was to examine whether there is a relationship between the daily social media use of adults aged 18 to 35 and their levels of mental well-being and psychological distress, and whether this relationship is moderated by their personality traits openness, extraversion, and neuroticism.

Social Media Use, Mental Health, and Personality Traits. The current study found no significant relationship between social media use and mental well-being. In contrast, the findings revealed a significant positive, but weak, relationship between social media use and psychological distress. In other words, the more people tend to use social media, the higher their psychological distress. As this relationship was

revealed by a correlation analysis, this could also be bidirectional. So, the higher the psychological distress of people, the more they tend to use social media. In addition, the two continuums of mental health investigated in the current study, namely mental well-being and psychological distress, were also negative, but significantly intermediate related.

Moreover, the three personality traits openness, extraversion, and neuroticism were additionally correlated to the two continuums of mental health and social media use. Here, it became apparent that openness is not related to neither the two continuums of mental health nor to social media use. In contrast, extraversion was intermediately related with the two continuums, but not with social media use. Further, neuroticism was strongly related to the two continuums of mental health, and also weakly related to social media use.

Moderation effect of Openness, Extraversion, and Neuroticism on relationship between Social Media Use and Mental Well-being. The findings of the current study revealed that the frequency of social media use seems to be a more important predictor of mental well-being than the level of openness. The interaction of social media use and openness, however, showed a significant moderation effect. More specific, it becomes apparent that whenever people use social media, their well-being tends to be lower regardless of their level of openness. Only when the frequency of social media use is low, there are differences in mental well-being concerning the levels of openness.

Moderation effect of Openness, Extraversion, and Neuroticism on relationship between Social Media Use and Psychological Distress. The current study resulted in one significant moderation effect, while the other moderation effects remained non-significant. When comparing social media to the level of openness, it seems as if social media use is stronger related to mental well-being. Furthermore, no significant moderation effect of extraversion on the relationship between social media use and psychological distress was found. However, social media use and extraversion appear both to be important in relation to psychological distress. Finally, no significant moderation effect of neuroticism on the relationship between social media use and psychological distress was found. In comparison to the social media use, however, neuroticism seems to be have a more important relation to psychological distress. So hypotheses H_{3A} to H_{3C} , and H_{4A} to H_{4C} were rejected as the found relationship were not expected according to the hypothesis (H_{3A}) or there was no moderation effect at all.

Theoretical Reflection

In the light of the current findings there is some contribution to the recent research framework. As there was no other study found dealing with the moderation of the three personality traits openness, extraversion, and neuroticism on the relationship between social media use and mental well-being, the reflection focuses on the relationships between social media use and the personality traits and social media use and mental health, respectively. This reflection, therefore, aims to find possible explanations why certain moderation effects were found while others were not found.

Social Media Use and Mental Well-being. First of all, previous research indicated contradictions whether mental well-being social media use is negatively or positively associated with social media use (Reinecke & Trepte, 2014; Oberst et al., 2016). In comparison, the current study did not find such a relationship. One explanation for this divergence may be that Oberst et al. (2016) focused on the social media platform Facebook. However, the current study dealt with all kinds of social media platforms, such as Instagram or Snapchat. So, it might be that the negative relationship between Facebook and mental well-being only accounts for Facebook, but not for other social media platforms. In comparison to other platforms, Facebook seems to be a platform that integrates many features into its domain, but does not really specify on one. For instance, Instagram is a social media platform focusing on the interaction of images, by posting and viewing, between users, while Facebook additionally also allows users to post text messages entirely.

In contrast to Oberst et al. (2016), Reinecke and Trepte (2014) found a positive relationship with social media use. Reinecke and Trepte (2014) examined the degree of authenticity one exhibits on social media platforms. In a longitudinal study they found that the higher the degree of authenticity on social media platforms, the higher also their well-being (Reinecke & Trepte, 2014). A possible explanation could be that the current sample did not use social media as much as the study of Reinecke and Trepte (2014) as they reported an unequally distributed sample using social media networks. Literature reports that if there are a lot of frequent social media users representative in the sample, drawing inferences may lead to systematic errors (Parks, 2011). So, this difference in social media usage between the samples might explain the reason for not being able to have the same results as Reinecke and Trepte (2014).

Social Media Use and Psychological Distress. The findings of the current study also diverge with the findings from the findings of Grieve and Watkinson (2016) and Reinecke and Trepte (2014). In comparison to the current study, where psychological distress is positively related with social media use, past research indicated that social media use is negatively related to psychological distress. One explanation for this divergence might be that the current study applied a screen time application, while the other studies did not. So, the current study had more accurate social media usage

data in correspondence with the self-reported psychological distress values. As there may be strong deviations in estimating the social media usage time, the data gathered by other studies may lead to draw biased results (Goldstone, Lhamon, & Boardman, 1957).

Moderation effect of Openness on Social Media Use and Mental Health. The findings of the current study concerning the moderation effect of openness on social media use and mental health was not expected. As open people seem to be more socializing with other people (Lee et al., 2014), it was expected that the results would also indicate a positive relation to mental well-being. This, however, is not the case, as people high in openness seem to have higher mental well-being than people low in openness. When social media use is frequent, however, there are no significant differences in mental well-being for all levels of openness. One possible explanation of this divergence would be that people high in openness may not feel as if they experience new situations on social media platforms. However, as social media was initiated a decade ago and people seem to use it almost daily, there might not be as much new experiences made on social media (Ross et al., 2009; Wang, Jackson, Zhang, & Su, 2012). And as the level of openness is also related to mental well-being, and mental health in general (Strickhouser et al., 2017), the level of mental well-being might be higher when people high in openness do not use social media often. Another possible explanation could be that the current sample consisted of mainly students, while other studies focused on adults or social media users as such (Bodroza & Jovanovic, 2016; Lee et al. 2014). This overrepresentation may have led to different findings than those previous studies as students may behave differently online, such as interacting more with friends and family online than people who are employed, but in the same age (Subrahmanyam, Reich, Waechter, & Espinoza, 2008).

However, the level of openness seems only to be involved in the relationship between social media use and mental well-being as it does not seem to moderate the relationship between social media use and psychological distress. This divergence with the findings might be explained by the authenticity behaviours exhibited on social media platforms. Longitudinal studies found that the more authentic a person behaves on social media, the lower their level of stress (Grieve & Watkinson, 2016; Reinecke & Trepte, 2016). So, it might be that as the current study only examined the general social media time, that deviations concerning their level of authenticity for different people high in openness are present. It might be that the current sample does not seem to show high levels of authenticity online, but also not low enough to be significantly related to the level of stress. Therefore, the degree of authenticity exhibited offline and online might be an aspect deviating the findings between the

two continuums as there was a significant moderation effect found for the mental well-being continuum.

Another possible explanation, therefore, could also be the contradicting findings concerning past research. While Reinecke and Trepte (2014) found a positive relationship between social media use and mental well-being, Oberst et al. (2016) found a negative relationship between social media use and mental well-being. This contradicting findings could explain why there was a significant moderation found for openness on the relationship between social media use and mental well-being and not for psychological distress. So, while people who are highly open to new experiences do experience some differences in their mental well-being in relation to social media use, differences for psychological distress seem not to be apparent. Therefore, even though people high in openness seem to deteriorate their mental well-being when social media is used, it does at the same moment not to be related to their psychological distess. In other words, while people high in openness do not gain new experiences on social media platforms, it seems as if this does not to be related to their level of psychological distress as these people may have alternatives to gather new experiences.

Moderation effect of Extraversion on Social Media Use and Mental Health. The current study did not reveal any significant moderation effects of extraversion on the relationship between social media use and the two continuums of mental health. This divergence might be explained by the behaviour patterns exhibited by extraverts on social media platforms. As Strickhouser et al. (2017) did find a positive relation between extraversion and mental well-being, it seems as if extraverts need to make social contact. So, it might be that people high in extraversion in the current sample may not interact with other people to a great extent on social media platforms. The studies of Ryan and Xenos (2011) and Lee et al. (2014) proposed that extraverts use social media a lot by means of posting behaviours, such as uploading photos or written text messages. That is why it might be that the extraverts of the current sample may rather engage in physical interactions with friends and family than on interacting on social media. This argument can be backed up as there was no apparent relation between the use of social media and extraversion revealed by the current study. This might be a reason why the current study could not meet the expectation that extraversion moderates the relationship between social media use and the two continuums of mental health.

Moderation effect of Neuroticism on Social Media Use and Mental Health. The current study did not reveal any significant moderation effects of neuroticism on the relationship between social media use and the two continuums of mental health. Previous studies indicated that there is a positive relation of neuroticism to social media use, as neurotic people have more control over the information (Butt &

Phillips, 2008) and the posts they are viewing (Lee et al., 2014) in comparison to an offline context. However, past research focused on Facebook as the social network domain (Bodroza & Jovanovic, 2016; Lee et al., 2014). This divergence with the expectations of the current study might be explained by the possibility that neurotic people have the feeling to lose their control over the information on other social networking platforms. Taking, for instance, Snapchat as an example where one receives a picture for a predefined time frame. Neurotics might feel insecure about the approaching picture, its content and its duration (Ross et al., 2009). Still, this insecurity might not be sufficient enough in order to be related to the psychological distress continuum while using social media.

Strengths, Limitations & Future Research

The current study has some strong points, but also some limitations, with regards to the generalizability of the findings.

First, this study displayed quite remarkable reliability values for the MHC-SF and the SCL-9-k. Due to the elaborated theoretical and psychometric framework behind these two tools, the MHC-SF and the SCL-9-k appeared to measure the variable of mental health sufficiently.

Second, estimating the time spent on social media is difficult. Deviations of several valuable hours may occur (Goldstone, Lhamon, & Boardman, 1957). New established screen time applications measuring the time spent on certain applications in the background, therefore, solve this problem. By measuring the time of the owner accurately, the time spent on social media can be exactly indicated with minute precision. Also, when the user was not on social media directly, the screen time application recognizes when no action was taken on a platform and stops timing. The current study applied this measurement tool, so that the variable of social media use had the possibility to integrate highly valid data concerning the social media frequency given that the participant indicated the right amount of time.

Third, some data might be not as reliably given as it may appear. Due to a too low motivation, participants may not read items sufficiently, skimmed through instructions, or answered not properly. Therefore, participants had the possibility to indicate their level of motivation for the current study. By omitting participants with a rather low motivation (indicated scores lower than three on a scale from one to five) concerning filling out the survey from the dataset, the validity of the findings was improved.

Fourth, this study was amongst the first to investigate the moderation of the personality traits openness, extraversion, and neuroticism on the relationship between social media use and the two continuums of mental health. That is a strong point as it

contributes unique findings to the established theoretical framework on which future studies could rely on.

The first limitation concerns the dataset. The sample is constrained to mostly students with up to 90% of the sample size. The findings, therefore, may not be applicable for people exceeding the age of 30 or people who are not studying. Future studies could, therefore, focus on people who are not studying and/or exceed the age of 30 in order to improve the representativeness of the sample.

The second limitation is about the screen time application. Even though, it is mentioned as a strong point of the current study, there might be some contradiction to it. Screen time applications tend to measure the usage time averaged over the week. The current study, however, asked for the daily social media time. Some participants may have taken biased inferences about the time and so the indicated average might have been higher than it actually is. So, while the screen time application could be used in order to have a highly valid measurement tool of the frequency of use concerning specific applications, data collection should be conducted carefully. Future research may involve the data originally provided by this screen time application directly by asking for the time spent on specific applications.

The third limitation is the measurement tool BFI-2s. The reliability of some of the scales appeared rather poor. Also, the theoretical and psychometric framework underlying the BFI-2s did not result in stable reliability and validity coefficients. The use of this measurement tool should therefore only be used if the BFI-2 is too long for a survey to integrate (Soto & John, 2017). Also, it could help focusing only on specific personality traits for future research, so that the corresponding subscales of the BFI-2 could be applied themselves (Soto & John, 2017).

A fourth limitation regards the cross-sectional research design of the current study. Cross-sectional online survey enable researchers to gather a lot of data in a short amount of time without spending too much money on the data collection. Still, with a survey design no causal inferences can be drawn (Levin, 2006). In order to enlarge the research framework concerning the relation of mental health, social media use, and personality traits, different research designs may contribute new insights into this field. One such research design could be a longitudinal study design. The advantage of a longitudinal research design is that there are multiple measurement points in time with which causation inferences could be drawn. Consequently, the influence of social media on the two continuums of mental health can be investigated and researched in more detail.

A fifth limitation concerns the validity of the social media use variables. The current study only investigated the mere exposure to social media usage time. The usage behaviour of social media network users, however, probably deviates from user to user. So, some participants might have reported a higher level of complaints due to

different behaviour patterns on social media. So, for future research not only the raw exposure time on social media should be taken into account, but also the type of behaviours, such as posting or interacting with others on social media, and their influence on mental well-being and psychological distress could be examined as described in the studies of Correa et al. (2010), Lee et al. (2014), Oberst et al. (2016), and Reinecke and Trepte (2014).

A sixth limitation could be the use of the two continuum model of mental health. Even though it is an up to date framework, it deteriorates the conciseness and structure of the conducted research, which makes it hard to follow. Although, it provides a direct comparison between the two continuums of positive and negative symptoms of mental health, future studies may choose to only examine one continuum at the same time in order to improve conciseness and structure of the conducted study.

Take-Home Message

Coming back to the research question "Is there a relationship between the daily social media use of adults aged 18 to 35 and their mental health and is this relationship moderated by the personality traits openness, extraversion and neuroticism?", some inferences can be drawn. All in all, it seems as if the relationship between social media use and psychological distress is present, but not actually moderated by most of the personality traits. The one exception embodies the personality trait openness. The people using social media seemed to have lower mental well-being regardless of their level of openness. When people do use social media not frequently it seems, however, as if mental well-being is higher for people high in openness than for people low in openness. So, it seems that social media use could be the moderator in this case, which could be interesting for future studies to investigate in order to improve interventions concerning mental well-being. In other words, when people high in openness have low mental well-being and they are using social media frequently, it may be an effective approach to refrain from social media use in order to improve mental well-being for future interventions. However, in order to confirm this relation, future studies could focus on conducting longitudinal studies investigating the causation of social media use on mental well-being for people high in openness.

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Appendix A

Please indicate on which social networking sites you have a user account.
(Multiple answers are possible!)

- [ ] Facebook
- [ ] Twitter
- [ ] Instagram
- [ ] Snapchat
- [ ] WhatsApp
- [ ] Other, namely
- [ ] None

Please indicate how much time (in minutes) you spend on all social media sites per day.

Note: Your smartphone may provide you with an average screen time application for a more accurate indication. If you do not have such a screen time application, please leave this field blank.

Please estimate how much time you spend on all social media sites per day.

- ○ Less than 30 minutes per day
- ○ Between 30 minutes and 1 hours per day
- ○ Between 1 and 2 hours per day
- ○ Between 2 and 3 hours per day
- ○ Between 3 and 4 hours per day
- ○ Between 4 and 5 hours per day
- ○ Between 5 and 7 hours per day
- ○ Between 7 and 10 hours per day
- ○ More than 10 hours per day

Appendix B

Please indicate below which of the following choices best represents your experiences and feelings during the past month.

During the **past month**, how often did you feel...

	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
happy	○	○	○	○	○	○
interested in life	○	○	○	○	○	○
satisfied with life	○	○	○	○	○	○
that you had something important to contribute to society.	○	○	○	○	○	○
that you belonged to a community (like a social group, school, neighborhood, etc.)	○	○	○	○	○	○
that our society is a good place, or is becoming a better place, for all people	○	○	○	○	○	○
that people are basically good	○	○	○	○	○	○
that the way our society works made sense to you	○	○	○	○	○	○
that you liked most parts of your personality	○	○	○	○	○	○
good at managing the responsibilities of your daily life	○	○	○	○	○	○
that you had warm and trusting relationships with others	○	○	○	○	○	○
that you had experiences that challenged you to grow and become a better person	○	○	○	○	○	○
confident to think or express your own ideas and opinions	○	○	○	○	○	○
that your life has a sense of direction or meaning to it	○	○	○	○	○	○

Appendix C

During the **past week**, how much were you bothered by...

	Not At All	A Little Bit	Moderately	Quite A Bit	Extremely
Temper outbursts that you could not control	○	○	○	○	○
Feeling blocked in getting things done	○	○	○	○	○
Worrying too much about things	○	○	○	○	○
Your feelings being easily hurt	○	○	○	○	○
Feeling that you are watched or talked about by others	○	○	○	○	○
Feeling tense or keyed up	○	○	○	○	○
Heavy feelings in your arms or legs	○	○	○	○	○
Feeling nervous when you are left alone	○	○	○	○	○
Feeling lonely when you are with people	○	○	○	○	○

Appendix D

Below is a list of statements that may or may not apply to you. Please indicate the extent to which you agree or disagree with each statement.

I am someone who...

	Disagree strongly	Disagree a little	Neutral; no opinion	Agree a little	Agree strongly
Tends to be quiet.	○	○	○	○	○
Is compassionate, has a soft heart.	○	○	○	○	○
Tends to be disorganized.	○	○	○	○	○
Worries a lot.	○	○	○	○	○
Is fascinated by art, music, or literature.	○	○	○	○	○
Is dominant, acts as a leader.	○	○	○	○	○
Is sometimes rude to others.	○	○	○	○	○
Has difficulty getting started on tasks.	○	○	○	○	○
Tends to feel depressed, blue.	○	○	○	○	○
Has little interest in abstract ideas.	○	○	○	○	○
Is full of energy.	○	○	○	○	○
Assumes the best about people.	○	○	○	○	○
Is reliable, can always be counted on.	○	○	○	○	○
Is emotionally stable, not easily upset.	○	○	○	○	○
Is original, comes up with new ideas.	○	○	○	○	○
Is outgoing, sociable.	○	○	○	○	○
Can be cold and uncaring.	○	○	○	○	○
Keeps things neat and tidy.	○	○	○	○	○
Is relaxed, handles stress well.	○	○	○	○	○
Has few artistic interests.	○	○	○	○	○
Prefers to have others take charges.	○	○	○	○	○
Is respectful, treats others with respect.	○	○	○	○	○
Is persistent, works until the task is finished.	○	○	○	○	○
Feels secure, comfortable with self.	○	○	○	○	○
Is complex, a deep thinker.	○	○	○	○	○
Is less active than other people.	○	○	○	○	○
Tends to find fault with others.	○	○	○	○	○
Can be somewhat careless.	○	○	○	○	○
Is temperamental, gets emotional easy.	○	○	○	○	○
Has little creativity.	○	○	○	○	○