



# Interpreting the impact of extraversion and neuroticism on social media addiction among university students of Pakistan: A mediated and moderated model

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## ABSTRACT

This study aims to investigate the association between two important personality traits (extraversion and neuroticism) and social media addiction (SMA) through social media usage (SMU) while considering the important moderating role of life satisfaction. We collected data from 623 university students in Pakistan through an electronic survey. SmartPLS software was utilized to perform partial least squares – structural equation modeling (PLS-SEM) analyses to verify our proposed model. The results revealed a significant direct association between extraversion and social media addiction whereas social media usage partially mediates this relationship. However, the direct relationship between neuroticism and social media addiction was not found significant but was fully mediated by social media usage. In addition, life satisfaction revealed no moderating effect on the relationship between extraversion, neuroticism, and social media addiction. Our results contribute to the prior studies that intensity of using social media for whatever purpose leads to social media addiction; life satisfaction does not play any role in social media addiction. Limitations and directions for future research are discussed.

## 1. Introduction

SMA is becoming a major problem worldwide. This can be termed as excessive use of social media (Przepiorka & Blachnio, 2016). Griffiths and Kuss (2017) define that “social media refers to the web 2.0 capabilities of producing, sharing, and collaborating on the online content (i.e. user-generated content, implying a social element)”. There are several social media sites, such as Facebook, WhatsApp, Twitter, Snapchat, Instagram, YouTube, and Google (Top, 2018), and the use of social media has become a common platform (Kuss & Griffiths, 2017; Perrin & Anderson, 2019) for communicating with friends, relieving boredom, entertainment, meeting new people, and alleviating loneliness (Desjarlais, 2019). A large number of studies have reported the primary motivations for using the social media (Facebook, Instagram, Snapchat, and YouTube), which include entertainment, self-expression, documentation, social interaction, creativity, modality agency, content creation, and viewing

(Alhabash & Ma, 2017; Griffiths & Kuss, 2017; Haridakis & Hanson, 2009; Khan, 2017; Kuss & Griffiths, 2011; Whiting & Williams, 2013).

Using social media sites is not a problem because it makes people happy (Fetah et al., 2014) and are able to deal with personal problems, depressed feelings, anxiety and stress (Andreassen et al., 2016; Koc & Gulyagci, 2013). This ultimately leads to satisfaction (Demir et al., 2015; Zhan et al., 2016) because they practice the feelings of acceptance and societal support (Scissors et al., 2016; Tang et al., 2016). People spend more time on the internet to escape disappointment and achieve psychological satisfaction but excessive use (Ryan et al., 2014) contributes to SMA.

Moreover, a huge number of studies explored that “self-disclosure” (Kuss & Griffiths, 2011), “self-presentation” (Lee et al., 2014; Monacis et al., 2021; Seidman, 2013), and “message post-sharing behaviors” on social media sites were linked with various personality traits (Chen et al., 2016; Choi et al., 2017; Hollenbaugh & Ferris, 2014). Afterwards,

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Kircaburun et al. (2020) reported that personality traits use social media according to their preference and goals leading them to problematic SMU. For example, neurotic individuals more passively engage on social media sites also spend more time on Facebook to see reactions of others on their selfies and status (Putri et al., 2016). It is also reported in the literature that to get social support (Tang et al., 2016) and experience the feelings of acceptance through using social media is the core objective of neurotics individuals to use social media. Not only neurotic individuals but also extroverts use social media more passively. Previous research stated that extroverts are more inclined to use social media for communication (Amichai-Hamburger & Vinitzky, 2010; Horzum, 2016; Kim & Chock, 2017; Misoch, 2015). Afterwards, Marengo et al. (2020) examined that both extraversion and neuroticism are predictors of SMU and SMA.

However, there have been many studies that have found an association between personality traits and SMA (Kuss, Griffiths, et al., 2013; Kuss, Van Rooij, et al., 2013; Przepiorka & Blachnio, 2016). However, the clarity regarding the relationship between extraversion and problematic SMU is not yet explained, especially through mediation and moderation mechanisms (Andreassen et al., 2013; Blackwell et al., 2017; Marino et al., 2016; Marino et al., 2018). The aim of the present study is to investigate the link amid personality traits (e.g. extraversion and neuroticism) and SMA through mediation (i.e. SMU) and moderation (i.e. life satisfaction) mechanisms. Although it was documented in many investigations that excessive use of SMU leads to SMA but to study this mediating variable (SMU) in the context of personality traits (e.g. extraversion and neuroticism) and SMA was lacking.

Similarly, several studies have reported a significant negative relationship between life satisfaction and SMA (Çikrikci et al., 2019; Raza et al., 2020; Sahin, 2017). Some researchers, however, found a positive link between SMA and life satisfaction (Brooks, 2015; Liu & Yu, 2013; Mohammed, 2020). Moreover, it was reported that extraversion were positive predictors of life satisfaction while neuroticism were negative predictors of life satisfaction and also has been shown positive predictors of SMA (Kai et al., 2020). This paradox, therefore, prompts authors to assess the moderate effect of life satisfaction on the relationship of personality traits (extraversion, neuroticism) and SMA. This is because according to reviewed literature a satisfied person will weaken the impact of SMA whatever personality he would have. This research contributes to the existing literature that to be satisfied or dissatisfied in life does not strengthen or weaken the link between personality traits (neuroticism, extraversion) and SMA. Instead, the intensity of social media use plays an important role in getting addicted to social media.

## 2. Literature review

### 2.1. Personality traits and social media addiction

The five-factor personality model is one of the most used models (Judge et al., 1999). The model tries to clarify the characteristics associated with personality structures. The five personality traits are openness to new experience, conscientiousness, extraversion, agreeableness, and neuroticism, (McCrae & Costa, 1987). The five-factor personality model is measured as a variable that is accustomed to describe SMA (Dalvi-Esfahani et al., 2019). SMA can be stated as the “excessive attachment to social media” (Przepiorka & Blachnio, 2016) while not noticing its adverse effects on lives (Ryan et al., 2014). Previous literature on social media evidenced that several terminologies have been used as interchangeable terms such as SMA pertaining to specific social networking sites (SNSs) e.g. Facebook, Twitter, or any SNSs (Andreassen et al., 2016; Bányai et al., 2017), social media disorder (Van den Eijnden et al., 2016), social media dependency (Lee & Choi, 2018), and problematic social media use (Montag et al., 2021; Wartberg et al., 2020). Despite having many terminologies, hereafter, we just stick to SMA.

The concerns for various personality traits and SMA are based on the previous studies. For instance, several studies explored different

personality traits and their role in getting addicted on social media sites (Blachnio et al., 2017; Kuss, Griffiths, et al., 2013; Kuss, Van Rooij, et al., 2013; Tang et al., 2016). Extensive literature has found that different personality traits agreeableness, conscientiousness, and openness to new experiences were negative predictors of SMA (Andreassen et al., 2013; Przepiorka & Blachnio, 2016; Tang et al., 2016). Furthermore, Hawi et al. (2019) found that conscientiousness, agreeableness, and openness to new experience were not only negative predictors of SMA but also negative predictors internet addiction, and this is because of the protective factor of these three personality traits (Andreassen et al., 2013). As these three personality traits were not a matter of concern for authors. The authors just studied extraversion and neuroticism as it was assumed to be positive predictors of SMA and internet addiction. In a very previous study Wang et al. (2015), these two were found to be positive predictors of SMA. In this regard, recently a study Marengo et al. (2020) was conducted it had been found that high engagement in online activities was extremely related to the danger of SMA, videogame addiction (Abbasi, Rehman, et al., 2021). Additionally, it had also been analyzed that extraversion was extremely engaged in SMU for uploading photos, receiving positive feedback and likes are the main source of addiction for extraversion (Kim & Chock, 2017). Though, the previous studies reported inconsistent results for extraversion while neuroticism has been shown direct relation with SMA (e.g. Blackwell et al., 2017; Burrow & Rainone, 2017; Marino et al., 2016). Previously, it was concluded that neurotics individuals use social media for seeking “social support” (Tang et al.) and extraversion for “positive social interactions” (Chen et al., 2016). This way of using social media leads them to SMA. Subsequently, in a study by Blackwell et al. (2017) found that “insecure attachment” between neuroticism and SMA played an important role and mediated this relationship. According to Marengo et al. (2020) neuroticism is directly related to SMA and the reason for addiction is to seeking social support.

Based on the above literature, it is hypothesized that:

**H1a.** Individuals with extraversion trait positively explain SMA.

**H1b.** Individuals with neuroticism trait positively explain SMA.

### 2.2. Personality traits, SMU, and SMA

SMU plays an essential role in an individual's life. It is documented in the literature that when a person uses social media properly or within limit it brings many benefits such as people may get access to useful information, develop psychological wellbeing, interpersonal relationships, managerial skills, and personal competencies (Bonds-Raacke & Raacke, 2010; Cheon et al., 2015; Gan & Wang, 2015; Hu et al., 2017; Hu et al., 2018; Wankel, 2016). Moreover, using social media helps people to deal with private problems, depressing feelings, nervousness and worry. Ultimately people enjoy feeling of acceptance and social support. Although there are many benefits to using social media, when a person constantly uses and enjoys social media, it becomes a habit and at the same time it leads to behavioral addiction (Chung et al., 2019; Fox & Moreland, 2015; Marino et al., 2018; Paek et al., 2013) and the people display high dependence on social media sites and gradually get addicted to social media (Yang et al., 2016). Furthermore, it has been evidenced that social media use found to have a positive association with SMA (Hamutoglu et al., 2020).

Scholars reported that personality traits were assumed to be important in accepting technologies and for using social media (Blackwell et al., 2017). Every individual uses social media for different purposes for example Horzum (2016) reported seven different motives for using social media but “establishing and maintaining online and offline” relationship is the primary motive of using social media. Kircaburun et al. (2020) also pointed out that personality indicates different motives and preferences of using social media and these lead to problematic SMU.

For example, Horzum (2016) in their study mentioned that to fulfill three motives extroverts use social media like (1) gratifications of

connecting with new people. (2) Informational and educational objectives (3) and for a “task management tool”. Kim and Chock (2017) stated that extroverts not only post photos and selfies but the number of online friends is also high and also create content. Similarly, neuroticism is considered an important predictor to the use of social media (Blackwell et al., 2017) post words and continuously check feedback/responses to their selfies and use social media more passively than extroverts. Self-disclosure was the main objective for both extroverts and neurotics individuals (Kuss & Griffiths, 2011; Misoch, 2015). For example, Blackwell et al. (2017) examined the link of two personality traits (extraversion and Neuroticism) concerning SMA and it was reported that both personality traits are positive predictors of SMU and as well for SMA. For extraversion to SMA “status updates and received likes” mediated the relationship between extraversion and SMA.

Previous research by Marengo et al. (2020) has shown that Online activity plays an important role in describing the individual differences in the use of social media and the relationship between extraversion, neuroticism, and SMA when compared to extroverts with introverts it has been shown extroverts individual use social media more intensively than introverts for online activities, online networking, and enhance likes on your posts (Burrow & Rainone, 2017; Shen et al., 2015). Similarly, when compared neurotics persons with the emotionally stable person it was seen that they post status and do comments but receive fewer likes (Amichai-Hamburger & Vinitzky, 2010; Burrow & Rainone, 2017; Shen et al., 2015) they use the medium social media to talk with others as they avoid face to face interactions due to communication disturbance (Kandell, 1998). Moreover, neurotic individuals use social media for self-expression and for seeking supports (Tang et al., 2016) while “extroverts” use social media to increase “positive social connections” (Kuss & Griffiths, 2011). Previously it was found that neuroticism people use social media and go to addiction while extraversion findings were mixed (Andreassen et al., 2013; Blackwell et al., 2017; Marino et al., 2016; Marino et al., 2018). Moreover, recently based on online activities, a study by Blackwell et al. (2017) was directed to check the link between Neuroticism and extraversion and SMA in the presence of “positive social feedback” and “received online” likes and it was found that neuroticism is directly linked with SMA while extraversion is indirectly related to SMA via positive likes and feedback. Extraversion user continuously check social media sites to get positive feedback (Marengo et al., 2020).

Based on the above-discussed literature, it is proposed that.

- H2a.** Extraversion is positively associated with SMU.
- H2b.** Neuroticism is positively associated with SMU.
- H3.** SMU positively associated with SMA.
- H4a.** SMU mediates the association between extraversion and SMA.
- H4b.** SMU mediates the association between neuroticism and SMA.

### 2.3. Moderating role of life satisfaction

Diener et al. (1985) define the notion as “life satisfaction is a part of subjective well-being and forms the cognitive aspect of happiness”. According to Deniz et al. (2010) to meet the needs and wants is called satisfaction. Generally, it is assumed that a dissatisfied person or individual will use social media to get satisfaction (Abbasi, Shamim, et al., 2021; Zhan et al., 2016) because what people want they easily get on social media sites. It was also reported by Gaia et al. (2021) that usage of social media is a way for enhancing life satisfaction. Previously there was a positive association between life satisfaction and SMA (Mohammed, 2020; Muhammad, 2018) but recently, studies were conducted and it was stated that there is a negative correlation between life satisfaction and SMA (Akin & Akin, 2015; Hawi & Samaha, 2017; Przepiorka & Blachnio, 2016; Raza et al., 2020; Sahin, 2017). Similarly, the associations amid personality and life satisfaction has gained substantial attention and

Studies were conducted on the relationship between life satisfaction and personality traits and in studies, it was reported that except neuroticism, all other personality traits (extraversion, Agreeableness, Openness to new experience and consciousness) were positive predictors of life satisfaction (Hounkpatin et al., 2018; Kai et al., 2020). This study assumed only two personality traits i.e., extraversion (positive predictors of life satisfaction) and neuroticism (negative predictors of life satisfaction). The statement was in line with the research of Kai et al. (2020) whose reported that extraversion is positive and neuroticism is a negative predictor of life satisfaction. Although, the results of other studies described the reasons (Kim et al., 2018) extraversion has positive emotions in life and their social skills will contribute to their life satisfaction. Similarly, the finding of previous research Argyle and Lu (1990) suggested a positive impact of social activities on extrovert's overall happiness, and interdependent happiness leads extroverts to life satisfaction (Lun & Yeung, 2019). While depressive states lead neuroticism to lower life satisfaction further (Dryman et al., 2016; Lun & Yeung, 2019) confirmed these relationships by describing that negative emotions (anxiety and depression) of neuroticism will contribute to poor life quality and well-being.

As indicated that life satisfaction and SMA were negatively correlated with each other and at the same point extroverts and neurotics are positive predictors of SMA. Despite that extroverted individuals are positive predictors of life satisfaction (See, Fig. 1). These implicit and conflicting results regarding the association between SMA lead authors to hypothesized and check whether a satisfied person will strengthen or weaken the relationship between extraversion, neuroticism, and SMA. Hence based on the above-discussed literature it is hypothesized that:

**H5a.** Life satisfaction moderates the relationship between extraversion and SMA such that a positive relationship will be weak under the condition of high life satisfaction.

**H5b.** Life satisfaction moderates the relationship between neuroticism and SMA such that a positive relationship will be weak under the condition of high life satisfaction.

## 3. Method

### 3.1. Participants

The participants were 623 university students of Pakistan comprising 48.3 % of male and 51.7 % of female. The mostly participants' age were ranged in between “20–30 years (i.e. 89.9%)”, which is followed by 8 % (i.e. 31–40 years) and 2.1 % (above 40 years) respectively.

### 3.2. Procedures

An online questionnaire was distributed in different universities of Pakistan. The time slot of data collection for this study was December 2020–February 2021 and the respondents were asked to fill-in the questionnaire on the 5-point Likert scale ranging from “1 = strongly disagree” to “5 = strongly agree”. 654 questionnaires were received, 31 questionnaires were removed due to missing values. The remainder 623 questionnaires were retained for statistical data analyses. For the model assessment, we utilized the Smart PLS 3.2.7 software (Ringle et al., 2005) to perform PLS-SEM analysis as it is considered to be most viable approach for studying a model that is exploratory and explanatory in nature (Hair et al., 2019).

### 3.3. Instruments

We adopted a four-items scale from Gosling et al. (2003) to evaluate the two personality traits comprising neuroticism and extraversion. In particular, we used two-items (e.g. PT1 and PT6) to assess extraversion trait. The sample item of the extraversion includes as “I see myself as extraverted, enthusiastic”. In the case of neuroticism personality trait,

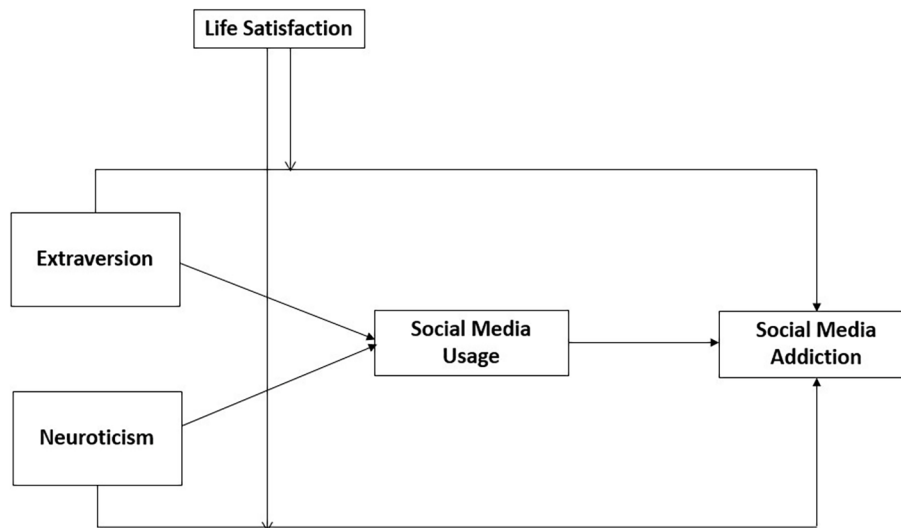


Fig. 1. Conceptual model.

we also utilized the two-items (PT4 and PT9) from the personality scale to calculate the scores on neuroticism trait. The sample item for neuroticism trait is stated as “I see myself as anxious, easily upset”.

Life satisfaction was measured by satisfaction with life scale (SWLS) by Diener et al. (1985) which was utilized to estimate the score on social media users' satisfaction with life. Social media use integration scale was established by Jenkins-Guarnieri et al. (2013) and adapted accordingly in this study by replacing Facebook with social media. SMA scale was adopted by Liu and Ma (2018) comprising 28-items to gauge addiction of social media users. All scales were administered in the English version. We have also included the survey in the Appendix A.

3.4. Descriptive statistics of constructs

We performed the descriptive statistics comprising maximum-value and minimum value of the response, mean, and standard deviation (SD), skewness and kurtosis on our study's constructs as tabulated in Table 1. We also examined the normality (though not required for PLS-SEM; Hair et al., 2019) using the skewness and kurtosis and found that the study's construct have acceptable values (i.e. +1 and -1) as shown in the Table 1, hence indicating that the data has no normality issues.

4. Data analyses and results

4.1. Measurement model assessment

While using the PLS-SEM approach for analyses, we first evaluated the measurement model for reliability and validity through item loading, internal consistency, convergent and discriminant validity. Table 2 reported that all outer loadings except (PT6, PT9) were within the acceptable values (ranging from 0.40 to 0.70; Abbasi et al., 2019; Hair et al., 2016). We did not delete those items as the main constructs met the reliability (i.e. >0.70) and validity criteria (especially, the

convergent validity using average variance extracted (AVE), which should exceed the value of 0.50; Hair et al., 2019). We deleted 7-items of SMA (SMA-2, SMA-7, SMA-9, SMA-15, SMA-16, SMA-26, SMA-8) due to lower loading (i.e. <0.70) to increase the AVE, which was initially below the threshold value. After deleting those items, we achieved the AVE value (i.e. 0.50; Hair et al., 2019) for SMA and SMU. SMU, SMA, and life satisfaction scale met the composite reliability at 0.70 as suggested by Hair et al. (2019), whereas personality traits (extraversion and neuroticism) achieved the composite reliability at 0.60 (Abbasi et al., 2020; Pedersen et al., 2018).

We also assessed the study's constructs for discriminant validity. The heterotrait-monotrait (HTMT) ratio of correlations is more conservative approach for evaluating the discriminant validity among the constructs given by Henseler et al. (2015), who recommended that the HTMT ratios should be below 0.85 to consider best or at least below 0.90 to reflect good acceptability of HTMT ratios. The study findings witnessed that constructs have achieved the discriminant validity as all HTMT ratios are below 0.85, see Table 3.

4.2. Structural model assessment

Once we achieved the satisfactory results of the measurement model, we proceeded to examine the study hypotheses as proposed in the structural model. For hypotheses testing, we estimated the path-coefficients, R<sup>2</sup> (coefficient of determination), effect size (f<sup>2</sup>), and Q<sup>2</sup> for predictive relevance (Hair et al., 2019).

4.2.1. Assessment of path coefficients

We performed the bootstrapping with 5000 samples using 623 valid cases in SmartPLS application, we found that extraversion positively influence SMA with t-value = 3.929 > 1.96 and p-value (0 < 0.05), hence H1a was supported. H1b was rejected due to having low significance value (i.e. p-value = 0.186, t-value = 1.322). Personality traits

Table 1 Descriptive statistics.

Particulars	N	Minimum	Maximum	Mean	Std. deviation	Skewness	Kurtosis
Age	623	1	3	1.122	0.386		
Extraversion	623	1	5	3.190	0.929	0.012	-0.012
Neuroticism	623	2	4	2.984	0.271	-0.031	-0.392
Social media addiction	623	1.32	5	3.499	0.905	0.094	-0.629
Social media usage	623	1.1	5	3.504	0.812	-0.436	-0.333
Satisfaction with life scale	623	1	5	3.552	0.925	-0.548	0.142

Note: Age is coded as 1 = 20–30 years, 2 = 31–40 years, 3 = above 40 years.

**Table 2**  
Measurement model assessment.

Constructs	Indicators	Item's loadings	CR	AVE
Extraversion	PT-1	0.975	0.675	0.552
	PT-6	0.391		
Neuroticism	PT-4	0.981	0.614	0.515
	PT-9	0.261		
Social media addiction	SMA-1	0.681	0.959	0.514
	SMA-10	0.642		
	SMA-11	0.67		
	SMA-12	0.654		
	SMA-13	0.696		
	SMA-14	0.691		
	SMA-17	0.752		
	SMA-18	0.787		
	SMA-19	0.799		
	SMA-20	0.757		
	SMA-21	0.799		
	SMA-22	0.811		
	SMA-23	0.752		
	SMA-24	0.751		
	SMA-25	0.738		
	SMA-27	0.728		
	SMA-28	0.733		
	SMA-3	0.654		
	SMA-4	0.666		
	SMA-5	0.655		
SMA-6	0.65			
SMA-8	0.657			
Social media usage	SMU-1	0.674	0.911	0.533
	SMU-10	0.71		
	SMU-2	0.753		
	SMU-3	0.787		
	SMU-4	0.781		
	SMU-5	0.717		
	SMU-6	0.715		
	SMU-7	0.741		
	SMU-9	0.683		
Life satisfaction	SWLS-1	0.757	0.835	0.508
	SWLS-2	0.657		
	SWLS-3	0.534		
	SWLS-4	0.748		
	SWLS-5	0.831		

**Table 3**  
Discriminant validity (HTMT criterion).

Construct	SMA	Extraversion	Life satisfaction	Neuroticism	Social media usage
SMA					
Extraversion	0.484				
Life satisfaction	0.205	0.468			
Neuroticism	0.463	0.564	0.314		
Social media usage	0.83	0.439	0.22	0.475	

**Table 4**  
Assessment of path coefficient.

Hypothesis	Relationships	Std. beta	Std. error	T-value	P-value	Remarks
H1a	Ext. → SMA	0.115	0.029	3.929	0.000	Supported
H1b	Neu. → SMA	0.04	0.03	1.322	0.186	Not supported
H2a	Ext. → SMU	0.246	0.039	6.345	0.000	Supported
H2b	Neu. → SMU	0.174	0.039	4.429	0.000	Supported
H3	SMU → SMA	0.712	0.023	31.046	0.000	Supported
H4a	Ext. → SMU → SMA	0.175	0.028	6.288	0.000	Supported
H4b	Neu. → SMU → SMA	0.124	0.028	4.380	0.000	Supported
H5a	Ext * LS → SMA	-0.038	0.037	1.030	0.303	Not supported
H5b	Neu * LS → SMA	-0.002	0.031	0.076	0.939	Not supported

Note: Ext: extraversion, Neu: neuroticism, SMU: social media usage, SMA: social media addiction, LS: life satisfaction.

(extraversion and neuroticism) also found to have a positive association with SMU with  $t = 6.345, p = 0.000$  and  $t = 4.429, p = 0$ . Hence, we accepted H2a and H2b. Our results also reported that SMU had a positive impact on SMA with  $t = 31.046, p = 0.000$ . We tested the mediating role of SMU between personality traits and SMA and resulted that SMU significantly mediated the relationship between personality traits and SMA, hence accepted H4a and H4b. It is worthy to note that SMU is successful in explaining the relationship between neuroticism and SMA, which was previously insignificant. We also tested the moderating effect of life satisfaction using the product-indicator approach (Henseler & Fassott, 2010) and evidence that H5a and H5b both were rejected at the path-coefficient of  $-0.038$   $p$ -value = 0.303, path-coefficient of  $-0.002$   $p = 0.939$  respectively, see Table 4.

4.2.2. Assessment of coefficient of determination ( $R^2$ )

In the second step, we estimated the  $R^2$  (Hair et al., 2011; Henseler et al., 2009). Hair et al. (2006) stated that the variance in an endogenous variable is caused by an exogenous variable is measured by  $R^2$ . The higher value of  $R^2$  indicates the sample's higher predictive power, and it ranges from 0 to 1. As a recommendation,  $R^2$  is categorized into three values, 0.25 (weak), 0.50 (moderate), and 0.75 (substantial) (Hair et al., 2011). The coefficient of determination of the whole model is given in Table 5 below.

4.2.3. Assessment of effect size ( $f^2$ )

Effect size ( $f^2$ ) assesses the explicit change in the “coefficient of determination- $R^2$ ” in endogenous latent variables caused by exogenous construct (Hair et al., 2011). Cohen (1988) provided the range of effect size as 0.02 small, 0.15 medium, and 0.35 strong.

The above Table 6 indicated weak effect size of both extraversion and neuroticism on SMA respectively. The effect size of interaction terms with SMA was also weak. While the effect size of SMU on SMA was strong.

4.2.4. Assessment of  $Q^2$

Lastly, we assessed the model's predictive relevance using the value of  $Q^2$  (Geisser, 1974; Stone, 1974). We performed the blindfolding test to get the value of  $Q^2$  value. For interpretation, the value of  $Q^2$  is categorized as small (above 0), medium (>0.25), and large (>0.5) (Chin, 1998). The results of  $Q^2$  are stated in the Table 7. As stated in Table 7, SMA had a greater prediction relevance than SMU.

5. Discussion

The present study examined the impact of personality traits

**Table 5**  
Assessment of  $R^2$ .

Endogenous constructs	$R^2$	Results
Social media usage	0.098	Weak
Social media addiction	0.621	Moderate

**Table 6**  
Assessment of  $f^2$ .

Hypotheses	$f^2$	Results
Extraversion → social media addiction	0.031	Weak
Neuroticism → social media addiction	0.004	Weak
Extraversion → social media usage	0.067	Weak
Neuroticism → social media usage	0.033	Weak
Social media usage → social media addiction	1.064	strong
Extraversion * life satisfaction → social media addiction	0.004	Weak
Neuroticism * life satisfaction → social media addiction	0.000	Weak

**Table 7**  
Assessment of  $Q^2$ .

Endogenous constructs	SSO	SSE	$Q^2 (=1-SSE/SSO)$	Results
Social media usage	5616	5328.09	0.051	Small
Social media addiction	13,728	9498.337	0.308	Medium

(neuroticism and extraversion) on SMA with the mediating effect of SMU and also checked the moderating effect of life satisfaction on the linkage between Personality traits (Neuroticism and extraversion) and SMA. Contrary to the previous findings, neuroticism showed an indirect relationship with SMA while extraversion showed a direct relationship with SMA (e.g. Blackwell et al., 2017; Burrow & Rainone, 2017; Marengo et al., 2020; Marino et al., 2016). We also found that both extraversion and neuroticism were highly (greatly) associated with SMU for different purposes and the usage intensity of social media sites, in turn, mediated the link between extraversion, neuroticism, and SMA. This direct and mediated effect of SMU could be interpreted in the light of covid-19 rage as the time slot of data collection was (December 2020 to February 2021). It was documented in the literature that people who were neurotics in nature were used social media most probably for moral support and to overcome anxiety (Tang et al., 2016) but nowadays social media platforms are overloaded with information, and people avoiding this information (Soroya et al., 2021) because overloading of anxious information related to covid-19 makes people more anxious and stressed and people of personality trait neuroticism avoiding to use of social media because using social media makes them more anxious. So either the positive or negative correlation between neuroticism and SMA dependent on the less or extreme usage of social media platforms.

Keeping in view the period of covid-19 and benefits of using social media the direct and mediated effect concerning extraversion could be interpreted in the light of (Horzum, 2016; Kim & Chock, 2017) studies whose reported that extraversion used social media as a task management tool and for educational purposes and as well for posting new updates and photos to social media (Horzum, 2016; Kim & Chock, 2017). This study has demonstrated that life satisfaction will not moderate the relationship on the linkage between neuroticism, extraversion, and SMA. Moreover, contrary to many other studies (Akin & Akin, 2015; Blachnio et al., 2017; Hawi & Samaha, 2017; Raza et al., 2020; Sahin,

**Appendix A. A detailed study's survey**

Personality traits (Ten-Item Personality Inventory-(TIPI))
1. I see myself as extraverted, enthusiastic.
2. I see myself as critical, quarrelsome.
3. I see myself as dependable, self-disciplined.
4. I see myself as anxious, easily upset.
5. I see myself as open to new experiences, complex.
6. I see myself as reserved, quiet.
7. I see myself as sympathetic, warm.
8. I see myself as disorganized, careless.
9. I see myself as calm, emotionally stable.
10. I see myself as conventional, uncreative.

(continued on next page)

2017). The study revealed that life satisfaction and SMA are positively correlated with each other. The positive relation was in line with previous studies whose found a positive association between SMA and life satisfaction (Mohammed, 2020; Yesilyurt & Solpuk Turhan, 2020). The authors stated the reason in the light of covid-19 and social distance in which the only source of communication, entertainment, and information is social media, and by using social media people get life satisfaction (Zhan et al., 2016) and this leads them to a positive association (relationship amid) between life satisfaction and SMA.

**6. Limitations**

There are some limitations to this research that need to be acknowledged. First, data has been collected from students of different universities in Pakistan, so the generalizability of this study in any other context is limited. Although this model should be tested in other countries. Second, in the present study, only two personality traits (extroversion, neuroticism) have been tested, in future studies, one should be tested other personality traits such as agreeableness, openness to new experience, or Consciousness with life satisfaction and SMA. Finally, in future, the effect of Fear of Covid-19 should be tested as a mediator and moderator amid different personality traits and SMA.

**7. Conclusion**

To conclude, this study enriches the literature concerning personality traits and SMA by exploring the impact of personality traits on SMA and further ascertained the mediating role of SMU. The study found that extreme usage of social media is a factor that leads people to SMA. Further, the moderating role of life satisfaction concludes that to be satisfied and dissatisfied in life does not bring any changes on the linkage amid personality traits and SMA because life satisfaction neither strengthens nor weakens the association between personality traits and SMA.

**Conflict of interest**

The authors confirm that there is no conflict of interest related to this study.

**Data availability**

Data will be made available on request.

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(continued)

## Personality traits (Ten-Item Personality Inventory-(TIPI))

## Social media usage (Facebook integrated scale) replace with social media usage (SMU)

1. I feel disconnected from friends when I have not logged into social media
2. I would like it if everyone used social media to communicate
3. I would be disappointed if I could not use social media at all
4. I get upset when I can't log on to social media
5. I prefer to communicate with others mainly through social media
6. Social media plays an important role in my social relationships
7. I enjoy checking my social media account
8. I don't like to use social media® reverse coded.
9. Using social media is part of my everyday routine
10. I respond to content that others share using social media

## Satisfaction with life scale

1. In most ways my life is close to my ideal.
2. The conditions of my life are excellent.
3. I am satisfied with my life.
4. So far I have gotten the important things I want in life.
5. If I could live my life over, I would change almost nothing.

## Social media addiction

1. I get more respect through social media.
2. Friends on social media sites are friendlier to me.
3. I feel more confident through social media communication.
4. I feel more comfortable through social media communication.
5. I feel safer through social media communication.
6. Friends on social media sites give me more support.
7. When I am not happy, the use of social media can make me happy.
8. When I am in a bad mood, using social media can make me feel better.
9. When I get bored, using social media can make me feel better.
10. Social media can keep me from unpleasant emotions.
11. When I feel lonely, using social media can ease my sense of loneliness.
12. Although social media has had some negative impact on me, I will continue to use it.
13. Although social media has a negative impact on me, I still check/send posts, reply to others, etc.
14. Although social media has a negative impact on me, I continue browsing, commenting, etc.
15. I have been distracted due to the use of social media.
16. I have reduced sleep time more than once due to the use of social media.
17. If there is no time to use social media, I feel like I missed something.
18. If I cannot use social media, I feel anxious.
19. If I cannot use social media, I will feel lost.
20. If there is a period I am without social media, I want to know what is happening on it.
21. If I cannot use social media, I would miss it.
22. When I am not allowed to use social media, I feel a little irritable.
23. I almost forget all the other things when using social media.
24. I will not think about anything else when using social media.
25. When using social media, I am almost entirely devoted to it.
26. I have tried to reduce the use of social media, but not successfully.
27. I endeavored to control the time I use social media; however, I failed.
28. I attempted to reduce the times I logged on to social media; however, I failed.

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