



Shyness, self-esteem, and loneliness as causes of FA: The moderating effect of low self-control

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Abstract

This study examined the impacts of shyness, self-esteem and loneliness on Facebook addiction by considering their inter-relations. Furthermore, the moderating effect of low self-control on the relationship between Facebook addiction and individuals' performance was also examined. Data were collected via an online survey from 348 Malaysians and were analysed using the partial least squares technique. The results showed that shyness has both a direct effect and an indirect effect through loneliness on Facebook addiction. Although self-esteem has no direct effect on Facebook addiction, it has an indirect effect through loneliness. The results also confirmed that low self-control negatively moderates the relationship between Facebook addiction and individuals' performance. The findings of the study contribute to knowledge on the impacts of social and psychological problem, including shyness, self-esteem and loneliness, on Facebook addiction. In addition, this study is the first attempt to investigate the moderating effect of personal characteristics, including low self-control, on the relationship between Facebook addiction and performance. The results could benefit psychologists, managers, and school counsellors in helping to prevent Facebook addiction and control its effect on individuals' performance by developing prevention and intervention programs.

Keywords Facebook addiction · Shyness · Self-esteem · Loneliness · Low self-control

Introduction

Using social network sites (SNSs) is considered as a core component of the daily tasks for many users worldwide (Foroughi et al. 2019a). Recently, Facebook has emerged as the most popular SNS, with 2.2 billion monthly active users (Statista 2018).

Meanwhile, some studies have highlighted the negative consequence of using Facebook, especially in terms of privacy (Pempek et al. 2009; Special and Li-Barber 2012), and most recently addiction (Błachnio and Przepiorka 2018; Foroughi et al. 2019a; Masur et al. 2014). As such, Facebook addiction (FA) has received considerable attention among researchers. Previous studies have shown that FA has a harmful effect on students' and employees' performance (Moqbel and Kock 2018), subjective happiness (Satici and Uysal 2015; Uysal et al. 2013), subjective vitality (Satici and Uysal 2015), health (Moqbel and Kock 2018), and life satisfaction (Błachnio et al. 2016a; Foroughi et al. 2019a; Satici and Uysal 2015). Among these harmful outcomes, the negative effect of FA on performance has been strongly evidenced in the literature. If we accept it as a fact that FA has a negative effect on performance, the next question arises: How can we minimize the negative effect of FA on individuals' performance? According to the literature, individuals with high self-control have the ability to concentrate on their tasks and are less affected by job distractors such as Facebook (Liu et al. 2017; Eisenberg et al. 2004). Furthermore, psychological studies of performance have consistently reported a negative relationship between low self-control and performance (Feldmann et al. 1995; Tangney et al. 2018). As such, in this study, high self-control was proposed as a potential personality

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characteristic that may offset the impact of FA on individuals' performance. This study contributes to the emerging body of knowledge about outcomes of FA by testing the moderating effect of self-control and proposing it as a personality characteristic that may diminish the negative effect of FA on individuals' performance.

Identifying the drivers of FA has been one key area of investigation. The first group of studies pertains to the relationships between social and psychological needs and FA. For instance, Foroughi et al. (2019a) found that using Facebook to gratify recognition and entertainment needs will lead to FA. According to Masur et al. (2014), gaining competence (the ability to work efficiently and the desire to achieve something meaningful), satisfying the desire for autonomy (no external pressures and having volition), and satisfying the need for relatedness (feelings of closeness and being connected to others) contribute to FA. This group of researchers believe that due to Facebook's interactive dynamics and the corresponding possibilities to satisfy social and psychological needs, Facebook users might be particularly at risk of becoming addicted. The second group of studies introduces users' personality and psychological problems as drivers of FA. The 'Big Five' model consists of personality factors with a high level of predictability; however, previous studies reveal that only a very small amount of the variance in FA could be predicted through these factors (Błachnio et al. 2016a, 2017; Hong et al. 2014). This can probably be explained by the fact that the Big Five factors are too general to accurately predict a particular behaviour. Therefore, it would be better to use narrower and more precise personality traits such as shyness, self-esteem, and loneliness in order to examine FA. Much of the previous research on the importance of these personality traits has investigated their impacts without considering the inter-relations of these traits. For example, Błachnio and Przepiorka (2019) tested the direct effects of self-esteem and loneliness on FA without testing the indirect effect of self-esteem on FA through loneliness. Zhao et al. (2012) showed that these three variables are inter-related. Disregarding the inter-relation of loneliness, self-esteem, and shyness will create bias in the findings. To overcome the limitations of previous studies, the present research tests the joint impact of loneliness, self-esteem, and shyness on FA by considering their inter-relations. The findings extend the literature by illustrating a more accurate picture of their impacts on FA.

Literature Review and Conceptual Development

Facebook Addiction

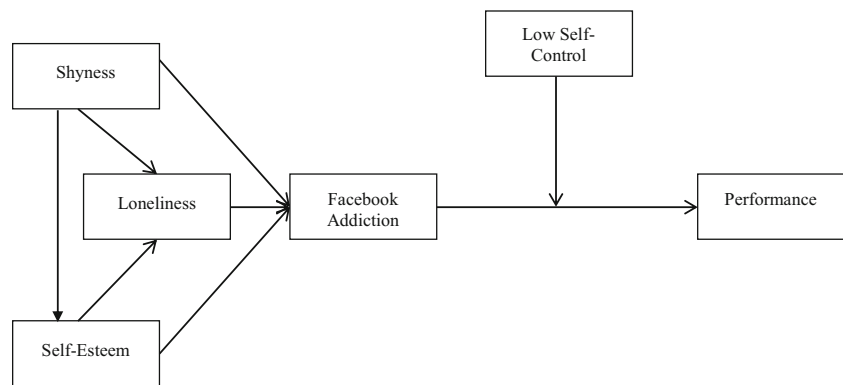
Behavioural addiction could be considered as a disorder in the form of (1) behaviour that intends to create pleasure and to alleviate stress and pain, and (2) failure to regulate behaviour

in spite of significant pernicious outcomes (Shaffer 1996). In behavioural addictions, the reward is usually the behaviour itself in gambling or using SNSs. FA is the most recent type of behavioural addiction. Its symptoms are similar to the symptoms of addiction to other types of behaviours or substances (Echeburua and de Corral 2010). To be more specific, FA symptoms include salience, modifying mood, withdrawal, tolerance, relapse, and conflicts (Griffiths 2005). Salience refers to the importance of a particular activity in one's life and the extent to which an activity dominates behaviours and thinking (e.g., paying full attention to Facebook use in daily conduct, emotion, and cognition). Mood modification is the extent to which an activity leads to a favourable change in emotional states and improves mood (e.g., using Facebook brings numerous beneficial changes in the state emotion). Tolerance and withdrawal are, respectively, the extent to which increasing amounts of an activity are required to remain satisfied (e.g., increasing Facebook usage over time) and the unpleasant feelings that occur when the activity is discontinued (e.g., showing unpleasant emotional and physical symptoms if Facebook usage is restricted or blocked). Conflict refers to the extent to which an activity causes conflict in relationships, in work/education and in other activities (e.g., using Facebook negatively affects job or family relations). Relapse is a tendency to quickly revert to earlier patterns of activity after a period of abstinence (e.g., a quick return to excessive use of Facebook after being away from it for a long time) (Andreassen et al. 2012; Griffiths et al. 2014; Douglas et al. 2008).

Previous studies on FA have highlighted a number of important topics such as measurement of FA (Andreassen et al. 2012), the link between Facebook use and FA (Hong et al. 2014; Serenko and Turel 2015), outcomes of FA (Satici and Uysal 2015; Błachnio et al. 2016a; Foroughi et al. 2019a), psychological reasons for negative outcomes of FA (Moqbel and Kock 2018; Satici 2019), the potential causes of FA, including social and psychological needs (Balakrishnan and Shamim 2013; Foroughi et al. 2019a; Masur et al. 2014), and personality and psychological problems (Tang et al. 2016; Błachnio et al. 2017; Błachnio and Przepiorka 2018). Although these efforts have expanded our understanding of FA from various angles, research on the interactive effect of personal characteristics and FA on individuals' performance is relatively underdeveloped. Therefore, testing the moderating effect of low self-control is an attempt to fill this gap in the literature (Fig. 1).

Previous studies on behavioural addiction considered low self-control as a mediator to explain the relationship between psychological problems (i.e., shyness, loneliness, and self-esteem) and behavioural addiction (i.e., smartphone addiction and Internet addiction). For instance, Mei et al. (2015) found that both self-esteem and well-being were associated with Internet addiction via the mediating effect of low self-control.

Fig. 1 Model with related hypotheses



In another study, Özdemir et al. (2014) showed that depression and loneliness have indirect effects on Internet addiction through low self-control. Han et al. (2017) also found that low self-control mediates the impacts of shyness and anxiety on smartphone addiction. According to these studies, low self-control is one of the causes of addictive behaviours. However, the findings of these studies demonstrate that although psychological problems have indirect effects on addictive behaviours through low-self-control, self-control is not able to fully explain these relationships. For example, according to the findings of Özdemir et al. (2014), loneliness has both a direct effect and an indirect effect through self-control on Internet addiction. Furthermore, Chan et al. (2012), drawing on Uses and Gratifications theory (U&G), proposed recognition needs, information needs, social needs, and entertainment needs as drivers of FA. As such, as psychological problems are not the only drivers of FA and low self-control cannot fully explain the impacts of psychological problems on FA, there is no guarantee that individuals with high self-control will not become addicted to Facebook. Self-control is defined as “the ability to interrupt undesired behavioural tendencies” (Tangney et al. 2004; p. 275). Individuals with high self-control have also shown better performance in comparison to those with low self-control (Shoda et al. 1990). Accordingly, this study proposed self-control as an ability that enables addicted Facebook users to interrupt their undesired tendency to check Facebook during working hours and to concentrate on their tasks, which consequently offsets the impact of FA on individuals’ performance.

Previous studies on the relationships between psychological problems and FA have found loneliness, low self-esteem, and shyness to be drivers of FA. According to studies in the field of psychology, there are inter-relationships among these three psychological problems which have been ignored in research on FA. Zhao et al. (2012) showed that both shyness and self-esteem have direct effects on loneliness, and that self-esteem mediates the impact of shyness on loneliness. Considering psychological problems as independent constructs while testing their impacts on FA may cause bias in the inference of results. For instance, one of the reasons why

shy individuals tend to use Facebook intensively is that they struggle to meet their social needs in the real world and consequently feel lonely (Ebeling-Witte et al. 2007). As such, they use Facebook as an alternative to face-to-face interaction to connect with others, which gradually leads to addiction. Testing the impacts of shyness and loneliness without considering the interrelationships between them may cause bias in estimating the importance of shyness in shaping FA. This means that the potential indirect effect of shyness on FA through loneliness will take the power of its direct effect and cause underestimation of its influence on FA. To address the potential bias in previous studies, this study is the first attempt to consider these three factors simultaneously with respect to their interrelationships (Fig. 1). In the following sub-sections, the hypotheses of the study are developed based on the literature.

Shyness, Self-Esteem, and Loneliness Effects

According to Henderson and Zimbardo (2001), shyness is referred to as a state of discomfort experienced in social situations, which is usually followed by inhibition or frustration that considerably affects an individual’s capability to achieve his or her goals or their willingness to actively take part in social events. Shyness negatively influences pleasant communication; furthermore, shy individuals probably suffer from low levels of self-esteem (Wadman et al. 2008; Zhao et al. 2012) and loneliness (Tan et al. 2016; Gökhan 2010; Zhao et al. 2013). Loneliness can be defined as a negative feeling when a person experiences an inconsistency between actual experienced interpersonal relationships and his or her desired ambitions (Jin 2013). Self-esteem is described as the personal judgment an individual makes about himself/herself. In fact, it “expresses an attitude of approval and indicates the extent to which an individual believes himself to be capable, significant, successful, and worthy” (Coopersmith 1967, pp. 4–5). Shy people are usually evasive about social interactions. They are more likely to pick up negative emotions, and tend to negatively evaluate others as well as themselves. The negative evaluation and emotions cause them to have reduced

participation in social activities, and result in a strong feeling of loneliness (Ashe and McCutcheon 2001). In addition, shy people with a negative evaluation of themselves reveal a low level of confidence in their social interactions, and the ultimate result is a low level of self-esteem (Zhao et al. 2012). Low self-esteem causes these people to blame themselves for failures in their social interactions or for reducing their social contact, which they believe ultimately leads to their loneliness (Perlman and Peplau 1981). To avoid these negative feelings, some shy individuals immerse themselves in Facebook use, which consequently leads to FA (Ryan and Xenos 2011). It means, shy and low-self esteem individuals are more likely to use Facebook to reduce their loneliness, because they tend to feel more comfortable maintaining social relationships in online settings than they do in face-to-face settings (Ebeling-Witte et al. 2007; Clayton et al. 2013).

Since shyness, low self-esteem, and sense of loneliness are the factors that prevent people from engaging in face-to-face social interactions (Nelson et al. 2008; Cheek and Melchior 1990; Segrin 1996), people with such personality traits are more likely to choose Facebook as a remedy to solve these problems and feel more connected. Drawing on Davis' (2001) cognitive-behavioural theory of problematic Internet use, we proposed that people with psychological problems would prefer online interaction through Facebook to face-to-face interaction, which will lead to FA. According to this theory, addictive behaviours are consequences, rather than causes, of psychopathology (e.g., shyness, loneliness and low self-esteem). This theory was used by Caplan (2002) and Özdemir et al. (2014) to explain the impacts of shyness, loneliness and self-esteem on problematic internet use.

According to Orr et al. (2009) and Sheldon (2008), Facebook usage is reported to be higher among shy people than non-shy people. Błachnio et al. (2016c) found that self-esteem has a negative effect on intensive Facebook use. Błachnio et al. (2016b) revealed that people with high levels of loneliness tend to spend significantly more time on Facebook and are more likely to become addicted to Facebook. Schwartz (2010) reported a negative relationship between the meaning ascribed to Facebook use, the frequency of Facebook use, and the level of self-esteem. These findings imply that shy people and those with low self-esteem are more willing to use Facebook, since they do not experience any face-to-face interactions online as they do in their real life interactions (Ebeling-Witte et al. 2007). Indeed, Facebook helps them to feel more secure (Stritzke et al. 2004). Shy people prefer to use social networking interactions on the Internet in order to satisfy their need for socialization without feeling the anxiety or discomfort which are usually experienced in face-to-face communications in their real life (Han et al. 2017). Beside shyness and low self-esteem, loneliness is also considered an important reason behind Internet addiction

(Özdemir et al. 2014; Błachnio et al. 2016b). As such, the following hypotheses were developed:

- H1. Shyness is negatively related to self-esteem.
- H2. Shyness is positively related to loneliness.
- H3. Self-esteem is negatively related to loneliness.
- H4. Shyness has a positive (a) direct and (b) indirect effect through loneliness on FA.
- H5. Self-esteem has a negative (a) direct and (b) indirect effect through loneliness on FA.
- H6. Loneliness is positively related to FA.

FA and Low Self-Control Interactive Effects

Over the past few years, studies have shown that employees' and students' excessive usage of Facebook have negatively affected their overall performances and productivity (Canales et al. 2009; Karpinski and Duberstein 2009). Schulten (2009) found that spending long hours on Facebook could explain the negative relationship between FA and performance. Moqbel and Kock (2018) found that greater addiction to Facebook increases work distraction and decreases positive emotions, and consequently leads to lower performance. In contrast to Karpinski and Duberstein (2009), Junco (2011), conducting a study on 5154 students in the US, reported no significant relationship between class preparation time and frequency of Facebook use. Rouis et al. (2011) believe that individuals' personalities determine the impact of students' excessive Facebook usage on their academic performance. For example, those who have high self-control may have better ability to manage their time and control their intensive use of Facebook. This means that individuals with high self-control are able to interrupt their tendency to use Facebook intensively in order to concentrate on their tasks and consequently to achieve their specific goals.

Tangney et al. (2004) define self-control as an ability to pursue a long-term goal by ignoring external temptations and resisting inner desires. Self-control is in fact the authority or power to change one's inner responses, as well as to resist unwanted behavioural tendencies and restrain oneself from acting on them (Tangney et al. 2018). According to the literature, people who reported a high level of dispositional self-control outperformed their counterparts in various aspects of their personal lives. Shoda et al. (1990) reported that children with success in postponing gratification turned into adults with higher scores, showing more efficient academic performance. The ability to intentionally control behaviour to achieve specific goals helps individuals to concentrate on their tasks (Liu et al. 2017; Chen et al. 2012; Eisenberg et al. 2004). Therefore, it could be concluded that self-control could enable Facebook addicted users to give priority to their tasks, to control their tendency to check Facebook during work or study

time and to concentrate on their tasks. Consequently, it is expected that FA has less effect on the performance of Facebook addicted users with high self-control in comparison to those with low self-control.

Social-cognitive learning theory (SCT), developed by Bandura (1989), is able to explain the moderating effect of self-control on the relationship between FA and individuals' performance. Bandura's reciprocal determinism model in SCT consists of a triad of cognitive, behavioural, and environmental factors, which interactively affect each other. According to Bandura (1991), individuals' cognitive self-control over addictive behaviour can change how using Facebook (behaviour) interferes with other tasks (environment), which in turn can affect their performance. As such, in this study, the following hypotheses were developed:

- H7. FA has a negative effect on individuals' performance.
- H8. Low self-control moderates negatively the impacts of FA on individuals' performance.

Method

Sample and Procedure

To test our proposed hypotheses, shown in Fig. 1, a questionnaire was presented via the online survey tool Google Forms, which participants accessed via a link posted on Facebook groups which have Malaysian members. A total of 362 Facebook users responded to the survey. Fourteen participants had to be excluded, either due to missing data or because the respondents were not Malaysian. The final sample contained 348 respondents aged 19–61 years ($M = 32.5$, $SD = 6.8$), of whom 42.2% were male and 57.8% were female. With regard to their educational level, 6.3% of respondents held a high school degree, 8.9% held a diploma, 56.6% held a bachelor's degree, 24.7% held a master's degree, and 3.4% held a doctoral degree. The majority of the respondents declared that they had used Facebook for more than 4 years (89.4%), followed by 2 to 4 years (8.3%), and less than 2 years (2.3%).

Measures

FA

An adapted version of the Internet Addiction Scale by Andreassen et al. (2012) was used to measure FA. The 18 items cover the six dimensions of addiction: salience (e.g., "spent a lot of time thinking about Facebook or planned use of Facebook"), tolerance (e.g., "Spent more time on Facebook than initially intended"), mood modification (e.g., "used Facebook in order to forget about personal problems"),

relapse (e.g., "tried to cut down on the use of Facebook without success"), withdrawal (e.g., "become restless or troubled if you have been prohibited from using Facebook"), and conflict (e.g., "used Facebook so much that it has had a negative impact on your job/studies"). Each dimension is measured with three items, to which participants responded on a five-point Likert scale ranging from 1 = "very rarely" to 5 = very often.

Loneliness

Most research on loneliness has been based on the UCLA loneliness scale (Russell 1996). However, due to the discriminant validity issue between this scale and self-esteem, the items used to measure loneliness in the present study were adapted from Jong-Gierveld and Kamphuis's (1985) scale, consisting of 11 items such as "I wish I had a really close friend" and "There are enough people that I feel close to" [reverse coded]. Each item is answered on a five-point scale ranging from 1 = "strongly disagree" to 5 = "strongly agree".

Shyness

Shyness was measured using a 13-item scale known as the revised Cheek and Buss Shyness Scale (Cheek 1983). Participants were provided with a five-point Likert-type scale and were asked to indicate the extent of their agreement, from 1 = "strongly disagree" to 5 = "strongly agree" for each item, such as "I feel tense when I'm with people I don't know well" and "I have no doubts about my social competence" [reverse coded].

Low Self-Esteem

Low self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES) (Rosenberg 1965). The scale consisted of 10 items, five of which were positively and five negatively worded, for assessing the global self-esteem (e.g., "I feel that I have a number of good qualities" [reverse coded] and "I wish I could have more respect for myself"). The items are rated on a five-point Likert scale from "strongly disagree" to "strongly agree".

Self-Control

The Grasmick et al. (1993) scale was used to measure self-control. It comprises a total of 24 items, including three dimensions: the impulsivity component (e.g., "I don't devote much thought and effort to preparing for the future"), the simple task component (e.g., "I frequently try to avoid things that I know will be difficult"), and the risk-seeking component (e.g., "sometimes I will take a risk just for the fun of it"). Grasmick et al. (1993) used a four-point Likert scale; however, in the present study, a five-point Likert scale was used for

each item, where 1 = “strongly disagree” and 5 = “strongly agree”. This modification serves as an attempt to increase variation.

Performance

The items measuring performance were adapted from Walker (2013). The scale consisted of four items (e.g., “I fulfil all responsibilities required by my work tasks”). The items are rated on a five-point Likert scale from “strongly disagree” to “strongly agree”.

Data Analysis

In this study, SmartPLS 3.2 (Ringle et al. 2015) was employed to assess the conceptual model. PLS was chosen due to the prediction-oriented character of the current research, which aims to evaluate how well the exogenous constructs can predict the endogenous variables. Moreover, estimation of complex models is often impossible with CB-SEM (Hair et al. 2017). The model in the current research consists of a higher-order construct (FA), a moderator (self-control), and two mediators (self-esteem and loneliness). A complex model is characterized by having more than seven variables (Hair et al. 2014). With 12 variables, PLS-SEM is considered more appropriate to analyse the research model for this study. There is a two-step approach for this data analysis, namely, first analyse to the model for measurement, and next to evaluate the relationships among the structures of the underlying constructs. The reliability and validity of the measures were determined using this method before identifying the relationships within the model.

Results

Measurement Model

To assess the convergent validity, factor loading, average variance extracted (AVE) and composite reliability (CR) were evaluated (Hair et al. 2017). FA and low self-control are second-order constructs. To create these constructs, we used a two-stage approach (see Foroughi et al. 2019b). As Table 1 displays, the CRs of all first-order and second-order variables indicated scores higher than 0.7 with factor loadings above 0.4. The AVE values were found to be more than 0.5. These results demonstrated satisfactory convergent validity (Hair et al. 2017).

As Henseler et al. (2015) suggested, discriminant validity was examined through the heterotrait-monotrait ratio of correlations (HTMT). The HTMT values were revealed to be less than 0.85 (Table 2), thus confirming the discriminant validity of all given variables (Kline 2016).

Structural Model

The proportion of variance explained was used to determine the accuracy of the model’s predictions. In the present study, the R^2 values of self-esteem, loneliness, FA, and performance were 0.259, 0.541, 0.208, and 0.105, respectively. Further, predictive relevance was measured by calculating the Stone-Geisser Q^2 (cross-validated redundancy) value based on a blindfolding process used in PLS. Chin (2010) states that a model shows an acceptable predictive relevance if the Q^2 value is greater than zero. The results show that the Q^2 values for self-esteem (0.160), loneliness (0.372), FA (0.107), and performance (0.068) are all greater than zero, thus confirming the predictive relevance of the endogenous variables in this study (Ali et al. 2019; Foroughi et al. 2019c).

In order to test the structural model, non-parametric bootstrapping was applied (Wetzels et al. 2009; Zailani et al. 2019) with 2000 replications (Table 3). Based on the results, shyness had a negative effect on self-esteem ($\beta = -0.509$; $p < 0.001$), and a positive direct effect on loneliness ($\beta = 0.544$; $p < 0.001$) and FA ($\beta = 0.221$; $p < 0.01$). Self-esteem had a negative effect on loneliness ($\beta = -0.291$; $p < 0.001$). However, self-esteem had no direct effect on FA ($\beta = 0.009$; $p > 0.05$). The positive effect of loneliness on FA was also supported ($\beta = 0.280$; $p < 0.01$). FA also had a negative effect on performance ($\beta = -0.324$; $p < 0.001$).

To test the mediation effect of shyness and self-esteem on FA through loneliness, the method of bootstrapping the indirect effect was utilized (Preacher and Hayes 2004, 2008). The bootstrapping analysis demonstrated that shyness had a positive indirect effect ($\beta = 0.152$; $p < 0.01$) on FA through loneliness with a t-value of 2.874. Furthermore, as highlighted by Preacher and Hayes (2008), the indirect effect 0.152, 95% Boot CI: [LL = 0.048, UL = 0.256] did not straddle a 0 in between, specifying there is a mediation. Moreover, The indirect influence of self-esteem on FA via loneliness where $\beta = -0.081$ is meaningful with its t-value equal to 2.089. With -0.81 , 95% Boot CI: [LL = -0.158 , UL = -0.005], the trend does not overlap zero between the values, which shows a mediating effect. As such, all the hypotheses from H1 to H7 were supported except for H5a.

The product indicator approach was employed to create the interaction of low self-control and FA (Hair et al. 2017; Kim et al. 2019). The results indicate that low self-control negatively moderates the relationships between FA and individual’s performance ($\beta = -0.121$; $p < 0.05$). As such, H8 was supported.

Figure 2 illustrates that the negative impact of FA on performance is weaker among individuals with high self-control in comparison to those with low self-control.

Table 1 Measurement model evaluation

First-order constructs	Second-order constructs	Number of items	Factor loadings	CR	AVE
Shyness		13	0.747–0.840	0.937	0.624
Self-esteem		10	0.695–0.887	0.912	0.676
Loneliness		11	0.789–0.875	0.945	0.740
Salience		3	0.872–0.905	0.919	0.791
Tolerance		3	0.758–0.942	0.908	0.769
Mood modification		3	0.930–0.953	0.961	0.892
Relapse		3	0.892–0.903	0.924	0.802
Withdrawal		3	0.924–0.955	0.969	0.887
Conflict		3	0.903–0.931	0.941	0.842
	Facebook Addiction	6	0.719–0.861	0.915	0.642
Impulsivity components		4	0.874–0.05	0.939	0.793
Simple task component		4	0.933–0.946	0.956	0.880
Risk-seeking component		4	0.616–0.858	0.841	0.573
	Low-Self Control	3	0.645–0.940	0.870	0.696
Performance		4	0.831–0.904	0.908	0.767

AVE Average Variance Extracted, CR Composite Reliability

Discussion

The present study builds on our understanding of the role of shyness, self-esteem, and loneliness in FA. Furthermore, the role of low self-control on worsening the negative impact of FA on individuals' performance was investigated. The results showed that shyness has both a direct and an indirect effect on FA through loneliness. Although self-esteem has no direct effect on FA, it has an indirect effect through loneliness. The direct effect of loneliness was also confirmed. Furthermore, the effect of FA on individuals' performance was moderated negatively by low self-control, with this negative effect being weaker for individuals with high self-control.

The first three hypotheses examined the inter-relations of shyness, self-esteem, and loneliness. As expected, the results showed that shyness has a positive effect on loneliness and a negative effect on self-esteem. The negative relationship between self-esteem and loneliness is also confirmed. These results are consistent with the earlier psychological studies suggesting a relationship between shyness and self-esteem

(Wadman et al. 2008; Zhao et al. 2012), shyness and loneliness (Cheek and Busch 1981; Zhao et al. 2012), and self-esteem and loneliness (Mahon et al. 2006; Zhao et al. 2012). As the present findings show, shy people generally evaluate themselves negatively and have a very low level of confidence in their personal activities as well as their social communications. They usually avoid social interactions in order to alleviate their stress and pain as well as to prevent negative consequences, which are often reflected in their loneliness. Furthermore, the direct effect of shyness on loneliness reveals that self-esteem cannot completely explain the relationships between shyness and loneliness and some other intermediate factors may lead shy individuals to suffer from loneliness.

According to the results, loneliness has a significant effect on the extent of FA. This result is consistent with the findings of Guo et al. (2018) and Yao and Zhong (2014) in the context of Internet addiction. Actually, lonely individuals, who have poor social skills and struggle with face-to-face communication, use Facebook intensively to escape from loneliness and increase their sense of belonging. Lonely individuals tend to spend more time on Facebook in an attempt to find companionship and emotional support (Ehrenberg et al. 2008). Caplan (2007) stated that lonely users can express themselves better through a virtual environment in comparison to face-to-face interaction. As such, they use Facebook intensively as an alternative to face-to-face interaction to meet their social needs.

The results also showed that shyness has both direct and indirect effects through loneliness on FA. The direct impact of shyness is consistent with the results of previous studies on mobile phone addiction (Bian and Leung 2015; Han et al. 2017) and Internet addiction (Ayas 2012; Eldeleklioglu and Vural-Batik 2013). This consistency confirms that FA is

Table 2 Heterotrait-Monotrait (HTMT)

	SH	SE	LO	FA	LS	PE
SH						
SE	0.554					
LO	0.740	0.613				
FA	0.410	0.261	0.438			
LS	0.196	0.311	0.234	0.185		
PE	0.651	0.638	0.606	0.327	0.299	

SH Shyness, SE Self-Esteem, LO Loneliness, FA Facebook Addiction, LS Low Self-Control, PE Performance

Table 3 Path coefficients and hypotheses testing

Hypotheses	Relationships	Path coefficients	95% confidence interval	Decisions
Direct and indirect effects				
H1	SH → SE	−0.509***	[−0.657, −0.327]	Supported
H2	SH → LO	0.544***	[0.342, 0.667]	Supported
H3	SE → LO	−0.291***	[−0.435, −0.173]	Supported
H4a	SH → FA	0.221**	[0.142, 0.431]	Supported
H4b	SH → LO → FA	0.152**	[0.048, 0.256]	Supported
H5a	SE → FA	0.009	[−0.184, 0.249]	Not Supported
H5b	SE → LO → FA	−0.081*	[−0.158, −0.005]	Supported
H6	LO → FA	0.280**	[0.062, 0.497]	Supported
H7	FA → PE	−0.324***	[−0.450, −0.194]	Supported
Moderating effect of low self-control				
-	LS → PE	−0.253**	[−0.374, −0.074]	–
H8	FA*LS → PE	−0.121*	[−0.262, −0.067]	Supported

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

essentially similar to other behavioural addictions such as mobile phone addiction and Internet addiction. The current study also found that self-esteem has no direct effect on FA and that its effect is mediated by loneliness. The indirect effect of shyness and self-esteem through loneliness highlights that studies which included these variables together but did not consider their inter-relations are likely to have underestimated the power of shyness and self-esteem in explaining behavioural addictions (e.g., Błachnio and Przepiorka 2019; Hong et al. 2014). The indirect effect indicates that shy individuals and those who have low self-esteem may find it difficult to fulfil their social needs in a real-world context and consequently have a sense of loneliness and turn to Facebook, as they are more comfortable interacting online rather than face-to-face. This suggests that shy people and those with low self-esteem are likely to use Facebook to reduce their sense of loneliness by connecting with others online rather than attempting to connect with the same individuals in face-to-face settings. Song et al. (2014) suggested that for shy people and for those with low social support, Facebook can be a place of compensation for their social problems. In this condition, it is probable that employing self-esteem improvement and shyness-therapy programs can reduce the sense of loneliness and consequently lead to lower addiction to Facebook.

In this study, the impacts of FA on individuals' performance and the moderating effect of low self-control were also investigated. Consistent with the findings of Moqbel and Kock (2018), the result indicated that FA has a negative effect on individuals' performance. They found a negative effect of FA on individuals' positive emotions and a positive effect on task distraction as a potential explanation for the negative impact of FA on performance. Regardless of the reason for this relationship, this study found that low self-control

negatively moderates the relationship between FA and performance. This means that FA in individuals with higher self-control is less likely to lead to lower performance. Immediate gratification is an important characteristic of individuals with low self-control (Gottfredson and Hirschi 1990); these individuals are more likely to do whatever brings them pleasure in the short term, even at the cost of some distant goal, and consequently FA has a more harmful effect on their performance in comparison to individuals with high self-control. As such, by accepting FA as a fact, to help Facebook addicted individuals to overcome the negative impact of FA on their performance, their self-control should be strengthened. Self-control training can improve self-awareness and self-monitoring (Alberts et al. 2011; Wan and Sternthal 2008) and effectively strengthen self-control. Illustrating the moderating effect of self-control extends the literature on the dark sides of FA by suggesting the role of personal characteristics in offsetting the negative consequences of FA. Future studies can test the moderating effect of other personal characteristics, including achievement goal orientation, psychological well-being and optimism, on the impacts of FA and its negative consequences, including low life satisfaction, academic performance and health.

The present study provides both theoretical and practical contributions. In terms of theoretical contributions, this study is one of the first to investigate the interactive effect of low self-control and FA on individuals' performance. The results confirm that individuals' self-control can reduce the detrimental effect of FA on their performance. Furthermore, this study extends the literature on the impacts of personality and psychological problems, including shyness, low self-esteem, and loneliness, on FA by considering the inter-relations of these factors. The findings show that loneliness mediates the impacts of both shyness and self-esteem on FA. Furthermore,

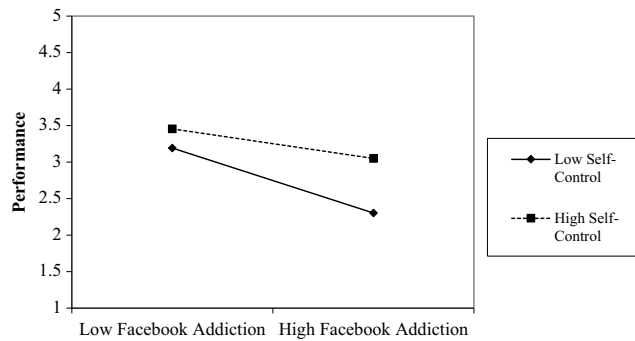


Fig. 2 Interaction effect of low self-control and Facebook addiction on performance

previous studies employed the SCT to explore the impacts of various factors on individuals' performance (e.g., Lent et al. 2016; Wang et al. 2016), and the current study confirms the explanatory power of the SCT in explaining the moderating effect of self-control on the relationship between FA and individuals' performance. In terms of practical contributions, these findings can benefit psychologists, managers, and school counsellors in the development of prevention and intervention programs. The results highlight the importance of helping individuals to overcome feelings of loneliness by addressing their low self-esteem and shyness disorders. Furthermore, as previous studies have indicated that it is possible to improve self-control (Muraven et al. 1999; Oaten and Cheng 2006), individuals who are addicted to Facebook can be helped to minimize its negative effect on their performance by applying programs in schools to prevent low self-control.

Conclusion

FA has become a reality; with the increasing number of Facebook users and with the extended amount of usage time, this negative phenomenon may spread even more rapidly. With the aim of preventing this phenomenon and mitigating its negative effect on individuals' performance, this study investigated the impacts of psychological problems on FA and the role of self-control in offsetting the impacts of FA on individuals' performance. Our findings highlighted that shyness had both a direct effect and an indirect effect through loneliness on FA. Although self-esteem had no direct effect on FA, it had an indirect effect through loneliness. The results also confirmed that low self-control negatively moderates the relationship between FA and individuals' performance. The findings of the study contribute to knowledge on the impacts of psychological problems, including shyness, low self-esteem and loneliness, on FA by considering the interrelationship between these factors. Furthermore, this study extends the literature by illustrating the role of self-esteem as a

personal characteristic, which can be nurtured, in reducing the impact of FA on individuals' performance.

The present study accomplished the predetermined goals; however, there are some limitations that should be considered prior to its generalization to other contexts. The first limitation is concerned with self-reported data, which can be affected by social desirability effects (Fischer and Fick 1993). Therefore, it is feasible that participants may not have answered the items completely honestly. It is strongly recommended that future studies that collect data through other types of respondents (e.g., friends, parents) should draw on more objective measuring scales. The second limitation of the present study is concerned with its design. The study used a cross-sectional research design which has some problems due to confounded variables: such a design cannot provide a pure representation of the temporal structure of the causal variables under investigation. Therefore, longitudinal designs are recommended for future studies to examine the direction of observed effects and causal assumptions.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

- Alberts, H. J. E. M., Martijn, C., & Vries, N. K. D. (2011). Fighting self-control failure: Overcoming ego depletion by increasing self-awareness. *Journal of Experimental Social Psychology, 47*(1), 58–62.
- Ali, H., Zailani, S., Iranmanesh, M., & Foroughi, B. (2019). Impacts of environmental factors on waste, energy and resource management and sustainable performance. *Sustainability, 11*(8), 2443.
- Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a FA scale. *Psychological Reports, 110*(2), 501–517.
- Ashe, D. D., & McCutcheon, L. E. (2001). Shyness, loneliness, and attitude toward celebrities. *Current Research in Social Psychology, 6*, 124–133.
- Ayas, T. (2012). The relationship between internet and computer game addiction level and shyness among high school students. *Educational Sciences Theory & Practice, 12*(2), 632–636.
- Balakrishnan, V., & Shamim, A. (2013). Malaysian Facebookers: Motives and addictive behaviours unraveled. *Computers in Human Behavior, 29*(4), 1342–1349.
- Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.), *Annals of child development, Six theories of child development* (Vol. 6, pp. 1–60). Greenwich, CT: JAI Press.
- Bandura, A. (1991). Self-efficacy mechanism in physiological activation and health promoting behavior. In J. Madden IV (Ed.), *Neurobiology of learning, emotion, and affect* (pp. 229–270). New York, NY: Raven.

- Bian, M., & Leung, L. (2015). Linking loneliness, shyness, smartphone addiction symptoms, and patterns of smartphone use to social capital. *Social Science Computer Review*, 33(1), 61–79.
- Błachnio, A., & Przepiorka, A. (2018). Facebook intrusion, fear of missing out, narcissism, and life satisfaction: A cross-sectional study. *Psychiatry Research*, 259, 514–519.
- Błachnio, A., Przepiorka, A., & Rudnicka, P. (2016a). Narcissism and self-esteem as predictors of dimensions of Facebook use. *Personality and Individual Differences*, 90, 296–301.
- Błachnio, A., Przepiorka, A., Boruch, W., & Bałakier, E. (2016b). Self-presentation styles, privacy, and loneliness as predictors of Facebook use in young people. *Personality and Individual Differences*, 94, 26–31.
- Błachnio, A., Przepiorka, A., & Pantic, I. (2016c). Association between Facebook addiction, self-esteem and life satisfaction: A cross-sectional study. *Computers in Human Behavior*, 55, 701–705.
- Błachnio, A., Przepiorka, A., Senol-Durak, E., Durak, M., & Sherstyuk, L. (2017). The role of personality traits in Facebook and internet addictions: A study on Polish, Turkish, and Ukrainian samples. *Computers in Human Behavior*, 68, 269–275.
- Błachnio, A., & Przepiorka, A. (2019). Be aware! If you start using Facebook problematically you will feel lonely: Phubbing, loneliness, self-esteem, and Facebook intrusion. A cross-sectional study. *Social Science Computer Review*, 37(2), 270–278.
- Canales, C., Wilbanks, B., & Yeoman, A. (2009). Facebook usage in relation to personality and academic performance. http://www.media.timesfreepress.com/docs/2009/10/Facebook_usage_study_1008.pdf. Accessed 9.09.18.
- Caplan, S. E. (2002). Problematic internet use and psychosocial well-being: Development of a theory-based cognitive behavioral measurement instrument. *Computers in Human Behavior*, 18(5), 553–575.
- Caplan, S. E. (2007). Relations among loneliness, social anxiety, and problematic Internet use. *Cyberpsychology & Behavior*, 10, 234–242.
- Chan, M., Wu, X., Hao, Y., Xi, R., & Jin, T. (2012). Microblogging, online expression, and political efficacy among young Chinese citizens: The moderating role of information and entertainment needs in the use of Weibo. *Cyberpsychology, Behavior, and Social Networking*, 15(7), 345–349.
- Cheek, J. M. (1983). The revised cheek and buss shyness scale. Unpublished manuscript, Wellesley College, Wellesley, MA, 2181.
- Cheek, J. M., & Busch, C. M. (1981). The influence of shyness on loneliness in a new situation. *Personality and Social Psychology Bulletin*, 7(4), 572–577.
- Cheek, J. M., & Melchior, L. A. (1990). Shyness and anxious self-preoccupation during a social interaction. *Journal of Social Behaviour and Personality*, 5, 117–130.
- Chen, X. Y., Huang, X. R., Wang, L., & Chang, L. (2012). Aggression, peer relationships, and depression in Chinese children: A multiwave longitudinal study. *Journal of Child Psychology and Psychiatry*, 53, 1233–1241.
- Chin, W. W. (2010). How to write up and report PLS analyses. In V. E. Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of partial least squares: Concepts, methods and applications in marketing and related fields* (pp. 655–690). Berlin: Springer.
- Clayton, R. B., Osborne, R. E., Miller, B. K., & Oberle, C. D. (2013). Loneliness, anxiousness, and substance use as predictors of Facebook use. *Computers in Human Behavior*, 29(3), 687–693.
- Coopersmith, S. (1967). *The antecedents of self-esteem*. San Francisco: Freeman.
- Ebeling-Witte, S., Frank, M. L., & Lester, D. (2007). Shyness, internet use, and personality. *CyberPsychology and Behavior*, 10(5), 713–716.
- Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior*, 17(2), 187–195.
- Douglas, A. C., Mills, J. E., Niang, M., Stepchenkova, S., Byun, S., Ruffini, C., et al. (2008). Internet addiction: Meta-synthesis of qualitative research for the decade 1996–2006. *Computers in Human Behavior*, 24(6), 3027–3044.
- Echeburua, E., & de Corral, P. (2010). Addiction to new technologies and to online social networking in young people: A new challenge. *Adicciones*, 22, 91–95.
- Ehrenberg, A., Juckes, S., White, K. M., & Walsh, S. P. (2008). Personality and self-esteem as predictors of young people's technology use. *CyberPsychology and Behavior*, 11(6), 739–741.
- Eisenberg, N., Spinrad, T. L., Fabes, R. A., Reiser, M., Cumberland, A., Shepard, S. A., et al. (2004). The relations of effortful control and impulsivity to children's resiliency and adjustment. *Child Development*, 75, 25–46.
- Eldeleklioglu, J., & Vural-Batik, M. (2013). Predict we effects of academic achievement, internet use duration, loneliness and shyness on internet addiction. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi [Hacettepe University Journal of Education]*, 28(1), 141–152.
- Feldmann, S. C., Martinez-Pons, M., & Shaham, D. (1995). The relationship of self-efficacy, self-regulation, and collaborative verbal behavior with grades: Preliminary findings. *Psychological Reports*, 77(3), 971–978.
- Fischer, D. G., & Fick, C. (1993). Measuring social desirability: Short forms of the Marlowe-Crowne social desirability scale. *Educational and Psychological Measurement*, 53(2), 417–424.
- Foroughi, B., Iranmanesh, M., Nikbin, D., & Hyun, S. S. (2019a). Are depression and social anxiety the missing link between Facebook addiction and life satisfaction? The interactive effect of needs and self-regulation. *Telematics and Informatics*, 43, 101247.
- Foroughi, B., Shah, K. A. M., Ramayah, T., & Iranmanesh, M. (2019b). The effect of peripheral service quality on spectators' emotions and behavioural intention. *International Journal of Sports Marketing and Sponsorship*, 20(3), 495–515.
- Foroughi, B., Iranmanesh, M., Gholipour, H. F., & Hyun, S. S. (2019c). Examining relationships among process quality, outcome quality, delight, satisfaction and behavioural intentions in fitness centres in Malaysia. *International Journal of Sports Marketing and Sponsorship*, 20(3), 374–389.
- Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime*. Palo Alto, CA: Stanford University Press.
- Gökhan, B. (2010). An investigation of the relationship between shyness and loneliness levels of elementary students in a Turkish sample. *International Online Journal of Educational Sciences*, 2, 419–440.
- Grasmick, H. G., Tittle, C. R., Bursik Jr., R. J., & Arneklev, B. J. (1993). Testing the core empirical implications of Gottfredson and Hirschi's general theory of crime. *Journal of Research in Crime and Delinquency*, 30(1), 5–29.
- Griffiths, M. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use*, 10, 191–197.
- Griffiths, M. D., Kuss, D. J., & Demetrovics, Z. (2014). Social networking addiction: An overview of preliminary findings. In *Behavioral addictions* (pp. 119–141). Academic Press.
- Guo, Y., You, X., Gu, Y., Wu, G., & Xu, C. (2018). A moderated mediation model of the relationship between quality of social relationships and internet addiction: Mediation by loneliness and moderation by dispositional optimism. *Current Psychology*, 1–11.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling* (2nd ed.). Thousand Oaks: Sage.
- Hair Jr., J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2014). *A Primer On Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks: Sage Publication, Incorporated.
- Han, L., Geng, J., Jou, M., Gao, F., & Yang, H. (2017). Relationship between shyness and mobile phone addiction in Chinese young

- adults: Mediating roles of self-control and attachment anxiety. *Computers in Human Behavior*, 76, 363–371.
- Henderson, L., & Zimbardo, P. G. (2001). Shyness as a clinical condition: The Stanford model. In W. R. Crozier & L. E. Alden (Eds.), *International handbook of social anxiety: Concepts, research and interventions relating to the self and shyness* (pp. 431–447). New York: John Wiley & Sons Ltd..
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135.
- Hong, F. Y., Huang, D. H., Lin, H. Y., & Chiu, S. L. (2014). Analysis of the psychological traits, Facebook usage, and FA model of Taiwanese university students. *Telematics and Informatics*, 31(4), 597–606.
- Jin, B. (2013). How lonely people use and perceive Facebook. *Computers in Human Behavior*, 29, 2463–2470.
- Jong-Gierveld, J. D., & Kamphuis, F. (1985). The development of a Rasch-type loneliness scale. *Applied Psychological Measurement*, 9(3), 289–299.
- Junco, R. (2011). The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Computers & Education*, 58, 162–171.
- Karpinski, A. C., & Duberstein, A. (2009). A description of Facebook use and academic performance among undergraduate and graduate students. American Educational Research Association (AERA) conference, San Diego, 13–17 April.
- Kim, N. K., Rahim, N. F. A., Iranmanesh, M., & Foroughi, B. (2019). The role of the safety climate in the successful implementation of safety management systems. *Safety Science*, 118, 48–56.
- Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York: Guilford Press.
- Lent, R. W., Miller, M. J., Smith, P. E., Watford, B. A., Lim, R. H., & Hui, K. (2016). Social cognitive predictors of academic persistence and performance in engineering: Applicability across gender and race/ethnicity. *Journal of Vocational Behavior*, 94, 79–88.
- Liu, J., Xiao, B., Hipson, W. E., Coplan, R. J., Li, D., & Chen, X. (2017). Self-control, peer preference, and loneliness in Chinese children: A three-year longitudinal study. *Social Development*, 26(4), 876–890.
- Mahon, N. E., Yarcheski, A., Yarcheski, T. J., Cannella, B. L., & Hanks, M. M. (2006). A meta-analytic study of predictors for loneliness during adolescence. *Nursing Research*, 55, 308–315.
- Masur, P. K., Reinecke, L., Ziegele, M., & Quiring, O. (2014). The interplay of intrinsic need satisfaction and Facebook specific motives in explaining addictive behavior on Facebook. *Computers in Human Behavior*, 39, 376–386.
- Mei, S., Chai, J., & Guo, J. (2015). Subjective well-being and internet addiction of adolescents: Mediating roles of self-esteem and self-control. *Psychological Development and Education*, 31(5), 603–609.
- Moqbel, M., & Kock, N. (2018). Unveiling the dark side of social networking sites: Personal and work-related consequences of social networking site addiction. *Information & Management*, 55(1), 109–119.
- Muraven, M., Baumeister, R. F., & Tice, D. M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *Journal of Social Psychology*, 139, 446–457.
- Nelson, L. J., Padilla-Walker, L. M., Badger, S., Barry, C. M., Carroll, J. S., & Madsen, S. D. (2008). Associations between shyness and internalizing behaviors, externalizing behaviors, and relationships during emerging adulthood. *Journal of Youth and Adolescence*, 37(5), 605–615.
- Oaten, M., & Cheng, K. (2006). Improved self-control: The benefits of a regular program of academic study. *Basic and Applied Social Psychology*, 28, 1–16.
- Orr, E. S., Sisic, M., Ross, C., Simmering, M. G., Arseneault, J. M., & Orr, R. R. (2009). The influence of shyness on the use of Facebook in an undergraduate sample. *CyberPsychology and Behavior*, 12, 337–340.
- Özdemir, Y., Kuzucu, Y., & Ak, Ş. (2014). Depression, loneliness and internet addiction: How important is low self-control? *Computers in Human Behavior*, 34, 284–290.
- Pempek, T. A., Yermolayeva, Y. A., & Calvert, S. (2009). College students' social networking experiences on Facebook. *Journal of Applied Developmental Psychology*, 30(3), 227–238.
- Perlman, D., & Peplau, L. A. (1981). Toward a social psychology of loneliness. In K. Duck & R. Gilmour (Eds.), *Personal relationships in disorder* (pp. 31–56). London: Academic Press.
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36(4), 717–731.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891.
- Ringle, C. M., Wende, S., & Becker, J.-M. (2015). *SmartPLS 3.2*. Bönningstedt: SmartPLS.
- Rosenberg, M. (1965). *Rosenberg self-esteem scale*. Princeton: Princeton University Press.
- Rouis, S., Limayem, M., & Salehi-Sangari, E. (2011). Impact of Facebook usage on students' academic achievement: Role of self-regulation and trust. *Electronic Journal of Research in Educational Psychology*, 9(3), 961–994.
- Russell, D. W. (1996). UCLA loneliness scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20–40.
- Ryan, T., & Xenos, S. (2011). Who uses Facebook? An investigation into the relationship between the big five, shyness, narcissism, loneliness, and Facebook usage. *Computers in Human Behavior*, 27(5), 1658–1664.
- Satici, S. A. (2019). Facebook addiction and subjective well-being: A study of the mediating role of shyness and loneliness. *International Journal of Mental Health and Addiction*, 17(1), 41–55.
- Satici, S. A., & Uysal, R. (2015). Well-being and problematic Facebook use. *Computers in Human Behavior*, 49, 185–190.
- Schulten, K. (2009). The learning network blog. <http://learning.blogs.nytimes.com/2009/12/21/do-you-spend-too-much-time-on-facebook/>. Accessed 12.09.18.
- Schwartz, M. (2010). The usage of Facebook as it relates to narcissism, self-esteem and loneliness. Unpublished doctoral dissertation. New York, NY: Pace University. <http://www.proquest.com/enUS/products/dissertations/>. Accessed 21 Nov 2018.
- Segrin, C. (1996). Interpersonal communication problems associated with depression and loneliness. In *Handbook of communication and emotion* (pp. 215–242). Academic Press.
- Serenko, A., & Turel, O. (2015). Integrating technology addiction and use: An empirical investigation of Facebook users. *AIS Transactions on Replication Research*, 1(2), 1–18.
- Shaffer, H. J. (1996). Understanding the means and objects of addiction: Technology, the internet, and gambling. *Journal of Gambling Studies*, 12(4), 461e469.
- Sheldon, P. (2008). The relationship between unwillingness-to-communicate and students' Facebook use. *Journal of Media Psychology*, 20, 67–75.
- Shoda, Y., Mischel, W., & Peake, P. K. (1990). Predicting adolescent cognitive and self regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions. *Developmental Psychology*, 26, 978–986.

- Song, H., Zmyslinski-Seelig, A., Kim, J., Drent, A., Victor, A., Omori, K., & Allen, M. (2014). Does Facebook make you lonely?: A meta analysis. *Computers in Human Behavior*, *36*, 446–452.
- Special, W. P., & Li-Barber, K. T. (2012). Self-disclosure and student satisfaction with Facebook. *Computers in Human Behaviour*, *28*, 624–630.
- Statista (2018). Most famous social network sites worldwide as of July 2018, ranked by number of active users (in millions). Retrieved from <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/>. Accessed 03 Apr 2019
- Stritzke, W. G. K., Nguyen, A., & Durkin, K. (2004). Shyness and computer-mediated communication: A self-presentational theory perspective. *Media Psychology*, *6*, 1–22.
- Tan, J., Ai, Y., Wen, X., Wu, Y., & Wang, W. (2016). Relationship between shyness and loneliness among Chinese adolescents: Social support as mediator. *Social Behavior and Personality: An International Journal*, *44*(2), 201–208.
- Tang, J. H., Chen, M. C., Yang, C. Y., Chung, T. Y., & Lee, Y. A. (2016). Personality traits, interpersonal relationships, online social support, and FA. *Telematics and Informatics*, *33*(1), 102–108.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, *72*, 271–324.
- Tangney, J. P., Boone, A. L., & Baumeister, R. F. (2018). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. In *Self-regulation and self-control* (pp. 181–220). Routledge.
- Uysal, R., Satici, S. A., & Akin, A. (2013). Mediating effect of Facebook® addiction on the relationship between subjective vitality and subjective happiness. *Psychological Reports*, *113*(3), 948–953.
- Wadman, R., Durkin, K., & Ramsden, G. C. (2008). Self-esteem, shyness, and sociability in adolescents with specific language impairment (SLI). *Journal of Speech, Language, and Hearing Research*, *51*, 938–952.
- Walker, A. G. (2013). The relationship between the integration of faith and work with life and job outcomes. *Journal of business ethics*, *112*(3), 453–461.
- Wan, E. W., & Sternthal, B. (2008). Regulating the effects of depletion through monitoring. *Personality and Social Psychology Bulletin*, *34*(1), 32–46.
- Wang, P., Chaudhry, S., Li, L., Cao, X., Guo, X., Vogel, D., & Zhang, X. (2016). Exploring the influence of social media on employee work performance. *Internet Research*, *26*(2), 529–545.
- Wetzels, M., Odekerken-Schroder, G., & van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly*, *33*(1), 177–195.
- Yao, M. Z., & Zhong, Z. J. (2014). Loneliness, social contacts and internet addiction: a cross-lagged panel study. *Computers in Human Behavior*, *30*, 164–170.
- Zailani, S., Iranmanesh, M., Foroughi, B., Kim, K., & Hyun, S. S. (2019). Effects of supply chain practices, integration and closed-loop supply chain activities on cost-containment of biodiesel. *Review of Managerial Science*, 1–21.
- Zhao, J., Kong, F., & Wang, Y. (2012). Self-esteem and humor style as mediators of the effects of shyness on loneliness among Chinese college students. *Personality and Individual Differences*, *52*(6), 686–690.
- Zhao, J., Kong, F., & Wang, Y. (2013). The role of social support and self-esteem in the relationship between shyness and loneliness. *Personality and Individual Differences*, *54*(5), 577–581.

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