Psychiatry Research 276 (2019) 167–174

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

The relationship between daily stress, social support and Facebook Addiction Disorder

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ARTICLE INFO

Keywords:
Daily stress
Offline social support
Online social support
Facebook use intensity
Facebook Addiction Disorder (FAD)

ABSTRACT

The present study investigated the links between daily stress, social support, Facebook use, and Facebook Addiction Disorder (FAD). Two varieties of social support were considered, according to the communication channel: offline and online. In a sample of 309 Facebook users (age: *M*(*SD*) = 23.76(4.06), range: 18–56), daily stress was positively related to the intensity of Facebook use and to tendencies towards Facebook addiction. The link between daily stress and intensity of Facebook use was negatively moderated by perceived offline social support, indicating that individuals who received low levels of support offline were particularly likely to increase their Facebook use at higher levels of daily stress. Perceived online social support partly mediated the positive relationship between Facebook use intensity and tendencies towards FAD. It is remarkable that Facebook use intensity is systematically related to both positive (i.e., receiving online social support) and negative (i.e., building up FAD) consequences. Thereby, individuals who receive high levels of social support online tend to be at risk for tendencies towards FAD. Thus, while offline social support might protect mental health, online support might influence it negatively. This should be considered when assessing individuals at risk for obsessive Facebook use and when planning interventions to deal with FAD.

1. Introduction

Humans are social beings (Dahrendorf, 2010). The awareness of being part of a close social network that will provide social support if necessary belongs to the most important of human needs (Wills, 1991). Social support refers to the degree to which individuals perceive that they are cared for, loved, esteemed, and valued by significant others, such as family members and friends (Taylor et al., 2004). It is an important external resource that is positively linked to subjective well-being (Burt, 2005; Reis and Gable, 2003). People who frequently experience stressful events in their daily life benefit in particular from social support, as it contributes to the individual's capability to cope with negative life experiences and to mitigate the negative impact of stress (Brailovskaia et al., 2018c; Cohen and Wills, 1985). Lack of social support can negatively impact individual mental health (Frese, 1999; Holahan and Moos, 1981). Inter alia, it contributes to the development of depression and anxiety symptoms (Fydrich et al., 2009; Seeman, 1996). To avoid loneliness and to satisfy the need for social interaction, people often actively search for a social network where they can receive social support (Baumann et al., 1987; Baumeister and Leary, 1995).

Previous studies have found that individuals who often experience daily stress tend to use online social networking sites (SNSs) excessively to modify their mood (Hou et al., 2017; Wilson et al., 2010) and to find online social support (Frison and Eggermont, 2015; Indian and Grieve, 2014). With over 2.3 billion members, Facebook is currently the most popular SNS. More than 1.5 billion people use this platform daily for social exchange (Roth, 2019), often discussing individual problems, negative experiences, and feelings with other users, who provide them with social support by suggesting solutions for their problems and by expressing appreciation and understanding (Moreno et al., 2011; Park et al., 2016; Sinclair and Grieve, 2017). This positive interaction contributes to the users' perception of connectedness to a large network, and of social support provided by this network which may – similarly to social support provided in offline interactions – contribute to, for example, the reduction of symptoms of depression (Frison and Eggermont, 2015; Manago et al., 2012; Nabi et al., 2013; Wright et al., 2013). Therefore, online social support seems to be especially advantageous as compensation for individuals who miss support offline (see Ellison et al., 2011; Indian and Grieve, 2014).

Thus, based on this theoretical and empirical background, it can be concluded that Facebook use might contribute to subjective well-being by increasing the likelihood of receiving social support. In addition, the

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https://doi.org/10.1016/j.psychres.2019.05.014
Received 11 March 2019; Received in revised form 8 May 2019; Accepted 8 May 2019
Available online 09 May 2019
0165-1781/

higher the intensity of individuals' commitment to Facebook use, the more support they might perceive themselves to receive from the online social network.

However, it is also important to consider the results of recent studies that have emphasized that intensive Facebook use may have a "dark side" (Fox and Moreland, 2015). A high level of Facebook activity that is linked to positive experiences such as mood modification has the potential to contribute to the development of an emotional bond to the social platform. This bond, however, may be linked to an obsessive need to stay permanently online, to be permanently concerned about one's use of the platform, and to experience a psychological unease when one has to leave the online world (e.g., Andreassen and Pallesen, 2014; Brailovskaia and Margraf, 2017; Koc and Gulyagci, 2013). This can lead to a further increase in the intensity of Facebook use, which may contribute to offline conflicts with regards to personal relationships, as well as education and working life (Andreassen et al., 2017; Błachnio et al., 2015; Brailovskaia et al., 2018a; Marino et al., 2018).

Similar patterns of activity have previously been identified for individuals who exhibit intensive Internet use (Kuss and Griffiths, 2015; Young and Nabuco de Abreu, 2011) or intensive playing of online games (Hull et al., 2013; Trivedi and Teichert, 2017; Wu et al., 2013). These patterns have considered in terms of components of addictive behavior (e.g., Kuss and Pontes, 2019). Griffiths (1996, 1998, 2002, 2005) defined six criteria/components that are common for different types of (behavioral) addiction (modified from Brown, 1993): (cognitive and behavioral) salience, tolerance, mood modification, withdrawal, relapse, and conflict. These criteria/components have been applied to media-related behavioral addictions, such as general Internet use (e.g., Griffiths, 2000), and computer or Internet game playing (e.g., Griffiths, 2002). However, some studies on addictive Internet/computer use and gaming have emphasized that not all criteria are equally important to assess addictive behavior. Corresponding to factor-analytic results, behavioral salience, withdrawal, relapse, and conflict, which have clear negative consequences for the individual, were considered to belong to the core criteria of addiction. In contrast, cognitive salience, tolerance, and mood modification were considered to represent peripheral criteria of addiction, which are more suitable to assess high "engagement" in the behavior of interest, rather than to provide evidence for the addiction itself (e.g., Charlton, 2002; Charlton and Danforth, 2007, 2010; Lehenbauer-Baum and Fohringer, 2015; Lehenbauer-Baum et al., 2015).

Considering the high popularity of the social platform Facebook and the potential negative consequences of its intensive use (see for example Marino et al., 2018), Andreassen et al. (2012) adopted the criteria described by Griffiths (e.g., 2005) with respect to addictive Facebook use, using the term Facebook Addiction Disorder (FAD; Fenichel, 2009). Specifically, salience was defined as permanent cognitive preoccupation with Facebook (note that the focus was on cognitive salience); tolerance was described the gradual increase in amounts of Facebook use required to attain the level of previous positive effects; mood modification was defined as mood improvement achieved by Facebook use; relapse was used to refer to reverting to higher amounts of Facebook use after unsuccessful attempts to reduce this; withdrawal symptoms to refer to becoming nervous and irritable without Facebook use; and conflict was defined as the occurrence of (interpersonal) problems caused by intensive Facebook use within the offline world. Corresponding to the theoretical background that can equally be applied to the development and maintenance of different forms of media-related addiction (e.g., Internet use or gaming; Chou and Ting, 2003; Griffiths, 1998; Hull et al., 2013; Osborne et al., 2016), intensity of Facebook use was described to be both an antecedent of FAD as well as its core component (i.e., tolerance; Andreassen et al., 2012; Brailovskaia et al., 2019). However, in contrast to other forms of media-related addictive behavior (e.g., Lehenbauer-Baum et al., 2015), the factor analyses of FAD revealed a one-factor structure that included all six components as core criteria of addictive Facebook use (Andreassen et al., 2012; Pontes et al., 2016). This seems to be a specific characteristic of FAD that distinguishes it from other forms of media-related addictions.

Previous research has reported the level of FAD to be positively linked to depression and anxiety symptoms, as well as to insomnia. Its link to satisfaction with one's own general health status has been found to be negative (Atrozsko et al., 2018; Brailovskaia and Margraf, 2017; Hong et al., 2014; Koc and Gulyagci, 2013; Ryan et al., 2014). Furthermore, higher scores in the FAD survey were positively related to addictive tendencies in the use of text messages and instant messaging services, to the use of the Internet in general, to the use of mobile phones, and to compulsive buying. The link to addictive tendencies in relation to video gaming was not significant (Andreassen et al., 2013). Results of a recent longitudinal study indicated that daily stress positively predicted the level of FAD across a time span of one year (Brailovskaia et al., 2018d).

Considering the high popularity of the platform Facebook and the results concerning tendencies towards addictive Facebook use, it seems highly desirable to understand which mechanisms might underlie the negative impact of Facebook use. Therefore, based on previous results, the present study aimed to investigate the following hypothetical reasoning, which may at least partly clarify the mechanisms underlying the link between daily stress, intensity of Facebook use and FAD: People who experience a high level of daily stress can profit from social support (e.g., Baumeister and Leary, 1995). In addition, for those who do not receive the expected support offline, this deficit might motivate to an intensive use of Facebook, where there is a high probability to receive online social support (e.g., Ellison et al., 2007, 2011; Steinfield et al., 2008; Verduyn et al., 2017). The positive experience of online social support might contribute to the desire to receive more social support, which however may probably enhance the individual's vulnerability to develop tendencies towards FAD.

Based on this reasoning, we expected to find a positive association between levels of daily stress and of FAD (Hypothesis 1). Additionally, daily stress was expected to be positively related to the intensity of Facebook use (Hypothesis 2a). Given that people who receive support offline do not have the need to search for compensatory social support on Facebook, offline social support was expected to be negatively linked to perceived daily stress (Hypothesis 2b) and to Facebook use intensity (Hypothesis 2c). Moreover, we assumed offline social support to be a negative moderator of the relationship between daily stress and Facebook use intensity (Hypothesis 3). That is, the less social support an individual perceives to receive offline, the closer the link between daily stress and Facebook use intensity.

Furthermore, we hypothesized that Facebook use intensity is positively associated with online social support (Hypothesis 4a) and with level of FAD (Hypothesis 4b), and that online social support and level of FAD are positively interrelated (Hypothesis 4c). Moreover, we assumed that online social support might at least partially mediate the link between Facebook use intensity and level of FAD (Hypothesis 5). Why might such mediation occur? We assumed that Facebook use has the potential to contribute to the perception of online social support, which is experienced as rewarding by the recipient (Ellison et al., 2007, 2011). This positive experience might foster the development of an emotional bond to the social platform, which is linked to a strong need to engage permanently in further online activities and thus might enhance the individual's vulnerability for an increase in the level of FAD.

To investigate our hypotheses, it seemed reasonable to collect data in a university student sample. Students as a group experience multiple daily stressors, specifically academic stress due to a high pressure to perform (Misra and McKean, 2000; Wunsch et al., 2017), but also stress due to further challenges that occur in this stage of life, for example moving away from home, and thus from the close social network of family and friends, initiating of new (romantic) relationships, and first-time self-employed housekeeping (Arnett, 2000). To cope with daily stress, students often intensively use Facebook, where they can

temporarily escape from offline problems, and thus they belong to a high risk group for enhanced FAD level (Brailovskaia et al., 2018d). Accordingly, Brailovskaia and Margraf (2017) reported a significant increase in the number of students who reached a critical level of FAD over a one year period.

2. Materials and methods

2.1. Procedure and participants

Data from 309 Facebook users (71.5% women; age (years): *M (SD)* = 23.76(4.06), range: 18–56; all university students; marital status: 49.8% single, 47.9% with romantic partner but not married, 2.3% married), who were recruited by participation invitations displayed at public places, like bakeries, and at several universities, was collected from June to September 2018 via an online survey. The requirement for participation, which was voluntary and for which no compensation was provided, was a current Facebook membership. Implementation of the present study was approved by the responsible Ethics Committee. Participants fully informed about the study and provided informed consent to participate online.

2.2. Measures

2.2.1. Daily stress

To assess daily stressful experiences, i.e., inconveniences or difficulties in daily life (e.g., related to family, health, finances, or study), over the last 12 months, the Brief Daily Stressor Screening (BDSS; Scholten et al., 2014) was used. The BDSS consists of nine items rated on a 5-point Likert scale (0 = *not at all*, 4 = *very much*; previously reported and current scale reliability: Cronbach's α = 0.78).

2.2.2. Offline social support

Anticipated or perceived offline support received from the offline social network was measured with the short form of the Social Support Questionnaire (F-SozU K-14; Fydrich et al., 2009) which represents a one-dimensional German standard measure of social support. It includes 14 items (e.g., "I have friends and family who will always take time and listen carefully if I want to express myself") rated on a 5-point Likert scale (1 = *not true*, 5 = *true*; previously reported reliability: α = 0.94; current reliability: α = 0.95). Participants were explicitly instructed to refer to their offline social network.

2.2.3. Online social support

Anticipated or perceived online social support received from other Facebook users was assessed with seven items (see Table 1) rated on a 5-point Likert scale (1 = *disagree strongly*, 5 = *agree strongly*). The items were adapted from Kim and Lee (2011) and Liu and Yu (2013), and integrated into an Online Social Support Scale. An exploratory factor analysis (EFA) using principal component analysis (PCA; rotation method: varimax) on the seven items of the scale revealed a two-factor structure. Both factors had eigenvalues over 1 (factor 1: 3.153, factor 2: 1.899) and in combination explained a substantial portion of 72.1% of the variance (factor 1: 45%, representing items 3, 4, 5, 6, 7; factor 2: 27.1%, representing items 1, 2). While both items that belong to factor one refer to Facebook related activity of the individual, items that belong to factor two refer to perceived activity of the Facebook friends. Current reliability of the scale: α = 0.86; mean interitem correlation: r_{mi} = 0.47.

Table 1
Online Social Support Scale.

Items
1. When I feel lonely, I always find someone to talk to on Facebook
2. When I feel lonely or unrelated to others, I typically log in to Facebook
3. My Facebook friends are interested in my life and my activities
4. My Facebook friends congratulate me on my achievements
5. My Facebook friends listen to my problems
6. My Facebook friends provide help with solving my problems
7. My Facebook friends give positive feedback on the content I've posted (status, pictures)

2.2.4. Facebook use intensity

Three indicators were included to assess intensity of Facebook use: frequency of daily Facebook use; duration of daily Facebook use (in minutes); integration of Facebook use into the daily life as assessed with the six items of the Facebook Intensity Scale (FIS; Ellison et al., 2007) rated on a 5-point Likert scale (1 = *disagree strongly*, 5 = *agree strongly*; e.g., "Facebook is part of my everyday activity"; reliability reported earlier: α = 0.85, current reliability: α = 0.83). To attain a composite index, the mean of the three z-transformed indicators was calculated (current reliability: α = 0.83).

2.2.5. Facebook Addiction Disorder (FAD)

The level of FAD over the time frame of the past year was assessed with the brief version of the Bergen Facebook Addiction Scale (BFAS; Andreassen et al., 2012). This instrument consists of six items (e.g., "Felt an urge to use Facebook more and more?") according to the six core addiction features (i.e., salience, tolerance, mood modification, relapse, withdrawal, conflict) that are rated on a 5-point Likert scale (1 = *very rarely*, 5 = *very often*; previous reliability: α = 0.83–0.86; current reliability: α = 0.92). For further differentiation of FAD (i.e., a problematic vs. a non-problematic level), Andreassen et al. (2012) suggested two critical cutoffs: (1) a polythetic scoring scheme (cutoff score: ≥3 on at least four of the six items); (2) a monothetic score scheme (cutoff score: ≥3 on all six items).

2.3. Statistical analyses

Statistical analyses were conducted with the Statistical Package for the Social Sciences (SPSS 24) and the macro Process version 2.16.1 (www.processmacro.org/index.html). In the first step, descriptive statistics of the investigated variables and zero-order bivariate correlations were computed. Additionally, partial correlations controlling for age and gender for the relationships between the investigated variables (i.e., daily stress, offline social support, Facebook use intensity, online social support, level of FAD) were calculated.

In the second step, a moderation analysis (model 1) was run to investigate the relationship between daily stress (predictor), offline social support (moderator) and Facebook use intensity (outcome). In this analysis, age and gender were controlled for as covariates. The moderation effect was assessed by the bootstrapping procedure (10.000 samples) that provides accelerated confidence intervals (*CI* 95%).

In the third step, a mediation analysis (model 4) assessed the association between Facebook use intensity (predictor), online social support (mediator), and level of FAD (outcome), controlling for the covariates age and gender. The basic relationship between Facebook use intensity and level of FAD was denoted by path *c* (the total effect). Path *a* denoted the association between Facebook use intensity and online social support, and path *b* denoted the link between online social support and level of FAD. The combined effect of path *a* and path *b* represented the indirect effect. The link between Facebook use intensity and level of FAD after the inclusion of online social support in the model was denoted by path *c'* (the direct effect). The bootstrapping procedure (10.000 samples) providing accelerated confidence intervals (*CI* 95%) assessed the magnitude of the mediation effect. P_M (the ratio of indirect effect to total effect), which has been previously shown to overcome the shortcomings of the commonly used effect size kappa-squared (κ^2; Wen and Fan, 2015), was included as the mediation effect measure.

Table 2
Descriptive statistics of daily stress, offline and online social support, Facebook use variables and FAD.

	M (SD)	Min-Max
BDSS	11.86 (6.41)	0–35
F-SozU K-14	61.80 (10.64)	17–70
Facebook visits daily (times)	6.00 (8.73)	0–60
Facebook use daily duration (minutes)	53.41 (62.12)	0–360
FIS	13.28 (5.51)	6–30
Online Social Support Scale	15.95 (5.65)	6–34
BFAS	8.57 (4.46)	6–29

Notes. $N = 309$; *M* = Mean; *SD* = Standard deviation; *Min* = Minimum; *Max* = Maximum; BDSS = brief daily stressor screening; F-SozU K-14 = social support questionnaire; FIS = Facebook Intensity Scale; BFAS = Bergen Facebook Addiction Scale.

3. Results

3.1. Descriptive statistics and correlation analyses

Table 2 summarizes the descriptive statistics of the investigated variables. According to the polythetic scoring, 19 (6.1%) participants reached the critical cutoff; using the monothetic scoring, the critical cutoff was reached by 16 (5.2%) participants.

As presented in Table 3, the variable age was significantly positively correlated with daily stress, Facebook use intensity, and online social support. Gender was significantly negatively correlated with offline social support, whereas its correlation with Facebook use intensity and with level of FAD was significantly positive. In correspondence with Hypothesis 1, a significant positive correlation was registered between daily stress and level of FAD, indicating that higher stress was associated with higher tendencies towards Facebook addiction. In accordance, with Hypothesis 2a–2c, daily stress was significantly positively correlated with the composite index representing Facebook use intensity, whereas offline social support significantly negatively correlated with daily stress and Facebook use intensity. Furthermore, corresponding with Hypothesis 4a–4c, Facebook use intensity was significantly positively linked to online social support and level of FAD, and online social support and level of FAD were significantly positively interrelated. Note that the pattern of results in Table 3 does not change if non-parametric rank-order correlations instead of parametric product-moment correlations are employed.

3.2. Daily stress, offline social support, and Facebook use intensity (moderation model)

The moderation model outlined in Hypothesis 3 builds on the confirmation of Hypothesis 2, which refers to the relationship between daily stress, offline social support and Facebook use intensity. The moderation model turned out to be statistically significant, $R^2 = 0.358$, $F(5,303) = 19.416$, $p < .001$. Consistent with Hypothesis 3, the significant interaction between daily stress and offline social support, $b = -0.256$, SE = 0.035, 95% *CI* [−0.325;−0.186], $t = -7.275$, $p < .001$, and the simple slope tests (see below) indicated that the positive relationship between daily stress and Facebook use intensity was negatively moderated by offline social support.

Simple slope tests revealed that the positive link between daily stress and Facebook use intensity emerged equally in people with low and medium levels of offline social support, but not in people with high levels of offline social support. As shown in Fig. 1, the link between daily stress and Facebook use intensity was fairly strong for participants who expressed a low level of offline social support (one *SD* below mean = −1.001), $b = 0.447$, SE = 0.058, 95% *CI*[.332;.561], $t = 7.674$, $p < .001$, but was weaker for participants who expressed a medium level of offline social support (mean = 0), $b = 0.191$, SE = 0.049, 95% *CI*[.094;.288], $t = 3.866$, $p = .001$, and did not become significant for participants who expressed a high level of offline social support (one *SD* above mean = 0.772), $b = -0.007$, SE = 0.058, 95% *CI*[−0.121;.108], $t = -0.112$, $p = .911$. Note that the described moderation effect of offline social support on the relationship between daily stress and Facebook use intensity remained stable even after the exclusion of outliers.

3.3. Facebook use intensity, online social support, and FAD (mediation model)

The mediation model outlined in Hypothesis 5 builds on the confirmation of Hypothesis 4, which refers to the link between Facebook use intensity, online social support, and level of FAD. Supporting Hypothesis 5, Fig. 2 presents the results of the bootstrapped mediation analysis. The results indicate that online social support partly mediated the link between Facebook use intensity and level of FAD (total effect, *c:* $p < .001$; direct effect, *c':* $p < .001$). The indirect effect (*ab*) was also significant, $b = 0.536$, SE = 0.178, 95% *CI*[.231;.930]; P_M: $b = 0.159$, SE = 0.055, 95% *CI*[.066;.281].

4. Discussion

Many people, especially students, experience daily stress – that is, environmental demands of work, study and home that cause psychological strain (Almeida, 2005). Perceived social support from the social network increases the individual's capability to cope with daily stress. Today, a large part of social interaction takes place online and social support also is increasingly provided by positive online comments and

Table 3
Correlations between the investigated variables.

	(2)	(3)	(4)	(5)	(6)	(7)
(1) Age	0.130*	0.115*	−0.064	0.244**	0.198**	0.089
(2) Gender		0.099	−0.209**	0.195**	0.108	0.225**
(3) BDSS			−0.605**	0.378**	0.256**	0.571**
			(−0.600**)	(0.355**)	(0.234**)	(0.563**)
(4) F-SozU K-14				−0.320**	−0.169**	−0.616**
				(−0.291**)	(−0.147*)	(−0.596**)
(5) Facebook use intensity					0.499**	0.652**
					(0.468**)	(0.640**)
(6) Online social support scale						0.481**
						(0.469**)
(7) BFAS						

Notes. $N = 309$; BDSS = brief daily stressor screening; F-SozU K-14 = social support questionnaire; BFAS = Bergen Facebook Addiction Scale. Partial correlations in parentheses control for age and gender.

* $p < .05$.

** $p < .01$.

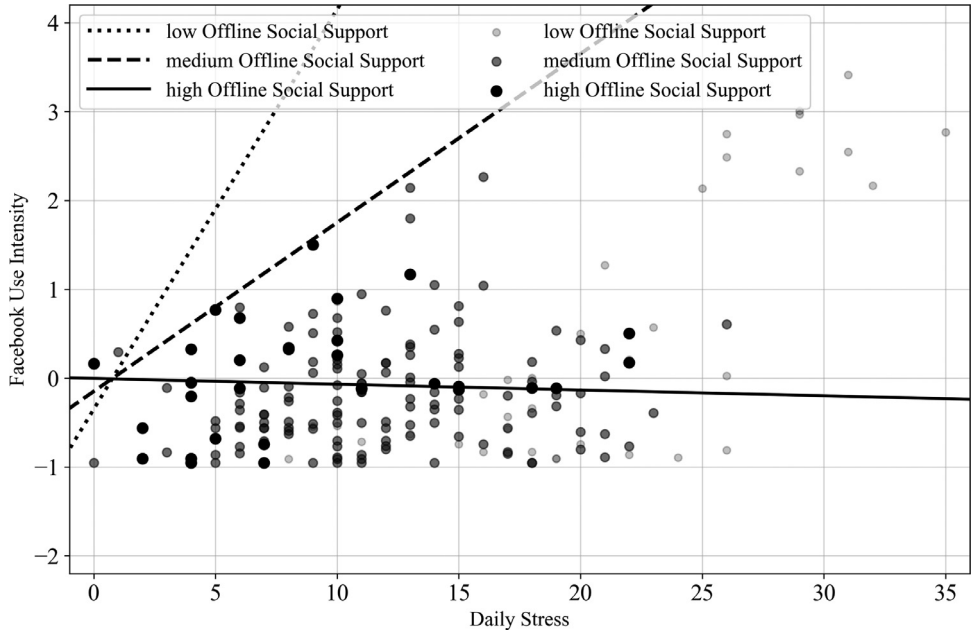

Fig. 1. Moderating effect of offline social support on the connection between daily stress and Facebook use intensity.

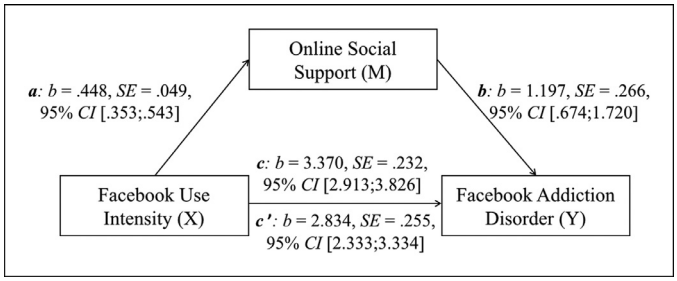

Fig. 2. Mediation model including Facebook use intensity (X), online social support (M), and Facebook Addiction Disorder (Y).

the setting of "Likes".

The current study investigated the link between daily stress, Facebook use intensity, and FAD. As the assessed mean level of FAD in our sample was relatively low (M = 8.57, SD = 4.46, range: 6–29) and the critical cutoff scores suggested by Andreassen et al. (2012) were reached by a relatively low percentage of the present sample (polythetic scoring: 6.1%; monothetic scoring: 5.2%), current findings allow only statements about tendencies towards FAD.

The significant results confirm our hypotheses and contribute to a better understanding of how offline and online perceived social support might contribute to the relationship between daily stress, Facebook use intensity, and tendencies towards FAD. Our findings indicate that the two forms of social support should not be equated with each other, because they demonstrate different patterns of results. Specifically, whereas offline social support was negatively associated with daily stress, Facebook use intensity and tendencies towards FAD, online social support was positively linked to all three variables.

The level of daily stress was positively related with higher scores in the FAD survey: Higher stress indicated higher tendencies towards Facebook addiction (confirmation of Hypothesis 1). The further results provide first evidence on the mechanisms that may contribute to the explanation of this positive link between daily stress and tendencies to FAD.

In accordance with earlier findings, daily stress was positively related to Facebook use intensity (confirmation of Hypothesis 2a). Thus, corresponding to previous research it may be assumed that to cope with daily stress, people tend to escape into the online world, presumably hoping to find relief (Ryan et al., 2014) and to receive social support (Frison and Eggermont, 2015). Considering earlier findings (Indian and Grieve, 2014) and the current result that offline social support was significantly negatively linked to both variables – daily stress and Facebook use intensity (confirmation of Hypothesis 2b and 2c) – and moreover negatively moderated the positive relationship between these variables (confirmation of Hypothesis 3), it may be concluded that Facebook use seems to be of relevance to individuals who do not receive sufficient social support in the offline world. This might apply to many students who often move away from their familiar environment, in particular when they enter the university.

As indicated by the occurrence of a positive association between Facebook use intensity and online social support (confirmation of Hypothesis 4a), individuals who have many online contacts and invest a lot of time in intensive Facebook interactions are likely to have a high probability to receiving a high amount of support from their online friends (cf., Nabi et al., 2013). The more online friends a user has, the higher the probability is that someone will write a positive and supportive comment on a status update, place a "Like" on your uploaded photos, and will congratulate you on individual achievements (Ellison et al., 2011). This positive experience of the intensive Facebook use, often missed offline, may increase the awareness of belonging to a social network, being esteemed, valued, and respected, which may trigger a positive emotional state and thus may positively contribute to an individual's subjective happiness level (Indian and Grieve, 2014).

However, current results also indicate that Facebook use intensity as well as online social support are positively linked to tendencies towards FAD (confirmation of Hypothesis 4b and 4c). Moreover, online social support turned out to be a significant mediator of the association between Facebook use intensity and tendencies towards FAD (confirmation of Hypothesis 5). Thus, social support provided by online friends and the resulting positive emotional state might also enhance the risk of developing a psychological dependence on the online platform, as individuals search for more and more online support, and fear receiving less of it when temporarily leaving the Facebook world. This conclusion is supported by Brailovskaia et al. (2018b) who reported that subjective happiness experienced during intensive Facebook use seems to be a positive predictor of the level of FAD. However, the fact that in the current study we only found a partial mediation effect of online social support on the relationship between Facebook use intensity and

tendencies towards FAD indicates that further variables (e.g., admiration, self-presentation, personality traits) might be involved in the explanation of this association. The identification of such variables is an important aim for future investigations.

Thus, it can be concluded that Facebook is often used as a source of social support, particularly amongst students who receive low levels of social support offline. The success of this coping strategy might contribute to the development of tendencies towards an addictive need to stay permanently in the Facebook world, which however might have a negative impact on the individuals' offline life. Students are frequently under time pressure due to pressure to perform and additional pressure that results from carrying out the tasks of daily life, such as self-employed housekeeping (Andrews and Wilding, 2004). Those who exhibit increased tendencies to FAD, spend a large amount of time on Facebook, think permanently about the ongoing events on the social platform, and experience psychological unease during their non-usage time (Andreassen et al., 2012), are presumably not able to complete their offline duties adequately. This however might enhance their experience of daily stress and in turn contribute to further escape into the online world, which in extreme cases might be the only place where positive experiences can be achieved. Of course, this vicious cycle could easily contribute to the enhancement of already present tendencies towards FAD.

4.1. Limitations and further research

The present investigation enables a deeper understanding of the processes involved in the relationship between daily stress, Facebook use, tendencies towards FAD, and (offline and online) social support. However, some limitations should be considered when interpreting the current findings.

In the present study, the concept of addictive Facebook use described by Andreassen et al. (2012) was adopted. Even though the authors applied the six criteria that had previously been used to describe different forms of (behavioral) addiction to define FAD (see Brown 1993; Griffiths, 2005), it should be noted that FAD does not fall under formal psychiatric disorders recognized in the Diagnostic and Statistical Manual of Mental Disorders (5th ed., DSM-5; American Psychiatric Association, 2013). Moreover, the mean FAD level assessed in the current sample was relatively low. Therefore, the term "Facebook addiction" and present findings should be treated with caution when drawing conclusions about the mental health state of the investigated population. Additionally, it seems reasonable for future research to investigate the similarities and differences between FAD and established forms of addiction – substance and non-substance related. For example, possible reasons for the different factor structure of FAD (Andreassen et al., 2012; Pontes et al., 2016) and Internet Gaming Disorder (Lehenbauer-Baum and Fohringer, 2015; Lehenbauer-Baum et al., 2015) – currently the only media-related disorder that was included in the DSM-5 ("Emerging Measures and Models" section; American Psychiatry Association, 2013) – should be investigated. Note that in the present study, the one-factor structure of FAD was emphatically replicated: The factor had an eigenvalue of 4.381 and explained 73% of the variance (standardized item loadings: Item 1: 0.769, Item 2: 0.878, Item 3: 0.856, Item 4: 0.860, Item 5: 0.899, Item 6: 0.860).

Given the cross-sectional nature of the present data, as well as of the data of most previous research on addictive Facebook use, it is important to emphasize that only hypothetical conclusions about the causality of the demonstrated associations may be drawn. Future longitudinal studies are necessary to draw truly causal conclusions about the network of variables employed here, particularly to establish online social support unequivocally as a causal predictor of tendencies to FAD (cf., Kraemer et al., 1997). Additionally, in the current study only one potential combination of the included variables was investigated with a cross-sectional design, which revealed offline social support to function as a moderator of the link between daily stress and Facebook use intensity, and online social support to function as a mediator between Facebook use intensity and tendencies to FAD. However, considering the potential diversity of the consequences of Facebook use (e.g., Marino et al., 2018; Ryan et al., 2014), further dependencies among the investigated variables should be examined in future longitudinal studies. For example, a high intensity of Facebook use might contribute to fewer offline social interactions and therefore restrict the individual offline social network, which – as a consequence – might reduce the probability of receiving offline social support. Furthermore, online social support might positively moderate the association between daily stress and the intensity of Facebook use.

Some earlier studies found that active (i.e., writing of status updates, uploading of photos) and passive (i.e., reading the updates of other users) Facebook use may have different impact on members' well-being. Specifically, active Facebook use was found to be positively linked to the perception of social support by online friends (e.g., Indian and Grieve, 2014; Kim and Lee, 2011), whereas passive use rather contributed to feelings of envy and dissatisfaction with one's own life (e.g., Chou and Edge, 2012). Therefore, we recommend to expand on our approach by the differentiation of the quality of Facebook use to gain deeper insights into the link between Facebook use and tendencies towards FAD. Additionally, due to the partial mediation effect of online social support, it seems reasonable to investigate additional variables, such as personality traits, to understand the mechanisms that mediate Facebook use intensity and the occurrence of tendencies towards FAD more fully. Considering earlier findings, the personality trait narcissism, for example, may turn out to be a significant predictor of tendencies to FAD (Brailovskaia and Margraf, 2017). Narcissistic individuals search for attention and admiration and therefore engage in intensive Facebook use (Brailovskaia and Bierhoff, 2016; Buffardi and Campbell, 2008). This may increase their likelihood to develop tendencies towards FAD.

Previous studies have demonstrated that university students, on the one hand, are at risk of experiencing daily stress, and, on the other hand, often intensively use Facebook and are also highly vulnerable to tendencies towards FAD (Andreassen et al., 2013; Brailovskaia and Margraf, 2017; Ryan et al., 2014). This was the reason why the current study intentionally investigated a sample of university students. Our sample is comparably young and includes more female than male participants. Therefore, we advise future researches to replicate our results on basis of a more balanced age and gender composition, and to focus on Facebook users other than university students.

Furthermore, in the current study, two different measures were employed to assess online and offline social support. While offline social support was measured with the F-SozU K-14 (Fydrich et al., 2009) which is well-established in Germany, online social support was assessed with a scale that was constructed via the adaptation of existing instruments used by Kim and Lee (2011) and Liu and Yu (2013). To achieve a higher comparability of the measurement of both forms of social support, future studies are advised to use the offline social support scale as starting point and to slightly modify its wording to derive the online social support scale (e.g., "Offline, I have friends and family who will always take time and listen carefully if I want to express myself" vs. "On Facebook, I have friends and family who will always take time and listen carefully if I want to express myself").

To summarize, current results indicate that the channel – offline or online – by which social support is provided might have an impact on the link between daily stress, Facebook use and tendencies towards FAD. Offline social support, which has been proven to be an important protective factor of mental health (Cohen, 2004; Cohen and Wills, 1985), seems to have the potential to buffer the negative impact of daily stress. In contrast, online social support might enhance the development of tendencies towards a psychological dependence on Facebook use. Thus, it does not only matter whether social support is provided, it also matters, through which communication channel the support is provided, i.e., face-to-face or mediated by the online world.

Longitudinal studies are necessary to investigate this hypothetical conclusion and to elucidate whether and how online social support might contribute to the development of tendencies towards FAD.

Declarations of interest

None.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.05.014.

References

Almeida, D.M., 2005. Resilience and vulnerability to daily stressors assessed via diary methods. Curr. Dir. Psychol. Sci. 14 (2), 64–68. https://doi.org/10.1111/j.0963-7214.2005.00336.x.

American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental Disorders. Author, Washington, DC.

Andreassen, C.S., Griffiths, M.D., Gjertsen, S.R., Krossbakken, E., Kvam, S., Pallesen, S., 2013. The relationships between behavioral addictions and the five-factor model of personality. J. Behav. Addic. 2 (2), 90–99. https://doi.org/10.1556/JBA.2.2013.003.

Andreassen, C.S., Pallesen, S., 2014. Social network site addiction – an overview. Curr. Pharm. Des. 20 (25), 4053–4061.

Andreassen, C.S., Pallesen, S., Griffiths, M.D., 2017. The relationship between addictive use of social media, narcissism, and self-esteem: findings from a large national survey. Addict. Behav. 64, 287–293. https://doi.org/10.1016/j.addbeh.2016.03.006.

Andreassen, C.S., Torsheim, T., Brunborg, G.S., Pallesen, S., 2012. Development of a Facebook addiction scale. Psychol. Rep. 110 (2), 501–517. https://doi.org/10.2466/02.09.18.PR0.110.2.501-517.

Andrews, B., Wilding, J.M., 2004. The relation of depression and anxiety to life-stress and achievement in students. Br. J. Psychol. 95 (4), 509–521. http://dx.doi.org/10.1348/0007126042369802.

Arnett, J.J., 2000. Emerging adulthood: a theory of development from the late teens through the twenties. Am. Psychol. 55 (5), 469–480.

Atroszko, P.A., Balcerowska, J.M., Bereznowski, P., Biernatowska, A., Pallesen, S., Andreassen, C.S., 2018. Facebook addiction among Polish undergraduate students: validity of measurement and relationship with personality and well-being. Comput. Hum. Behav. 85, 329–338. https://doi.org/10.1016/j.chb.2018.04.001.

Baumann, U., Laireiter, A., Pfingstmann, G., Pointner, P., 1987. Soziales Netzwerk und Soziale Unterstützung mit besonderer Berücksichtigung von Partnerschaft/Ehe und Familie. Dialog. Information Ehe Familie 3, 4–9.

Baumeister, R.F., Leary, M.R., 1995. The need to belong: desire for interpersonal attachments as a fundamental human motivation. Psychol. Bull. 117 (3), 497–529.

Błachnio, A., Przepiórka, A., Pantic, I., 2015. Internet use, Facebook intrusion, and depression: results of a cross-sectional study. Eur. Psychiatry 30 (6), 681–684. https://doi.org/10.1016/j.eurpsy.2015.04.002.

Brailovskaia, J., Bierhoff, H.-W., 2016. Cross-cultural narcissism on Facebook: relationship between self-presentation, social interaction and the open and covert narcissism on a social networking site in Germany and Russia. Comput. Hum. Behav. 55, 251–257. https://doi.org/10.1016/j.chb.2015.09.018.

Brailovskaia, J., Margraf, J., 2017. Facebook Addiction Disorder (FAD) among German students – a longitudinal approach. PLoS One 12 (12), e0189719. https://doi.org/10.1371/journal.pone.0189719.

Brailovskaia, J., Margraf, J., Köllner, V., 2019. Addicted to Facebook? Relationship between Facebook Addiction Disorder, duration of Facebook use and narcissism in an inpatient sample. Psychiatry Res. 273, 52–57. http://doi.org/10.1016/j.psychres.2019.01.016.

Brailovskaia, J., Rohmann, E., Bierhoff, H.-W., Margraf, J., 2018a. The brave blue world: Facebook Flow and Facebook Addiction Disorder (FAD). PLoS One 13 (7), e0201484. https://doi.org/10.1371/journal.pone.0201484.

Brailovskaia, J., Schillack, H., Margraf, J., 2018b. Facebook Addiction Disorder (FAD) in Germany. Cyberpsychol. Behav. Soc. Netw. 21 (7), 450–456. https://doi.org/10.1089/cyber.2018.0140.

Brailovskaia, J., Schönfeld, P., Zhang, X.C., Bieda, A., Kochetkov, Y., Margraf, J., 2018c. A cross-cultural study in germany, russia, and china: are resilient and social supported students protected against depression, anxiety, and stress? Psychol. Rep. 121 (2), 265–281. https://doi.org/10.1177/0033294117727745.

Brailovskaia, J., Teismann, T., Margraf, J., 2018d. Physical activity mediates the association between daily stress and Facebook Addiction Disorder (FAD) – a longitudinal approach among German students. Comput. Hum. Behav. 86, 199–204. https://doi.org/10.1016/j.chb.2018.04.045.

Brown, R.I.F., 1993. Some contributions of the study of gambling to the study of other addictions. In: Eadington, W.R., Cornelius, J.A. (Eds.), Gambling Behavior and Problem Gambling. University of Nevada, Reno, NV, pp. 241–272.

Buffardi, L.E., Campbell, W.K., 2008. Narcissism and social networking Web sites. Pers. Soc. Psychol. Bull. 34 (10), 1303–1314. https://doi.org/10.1177/0146167208320061.

Burt, R.S., 2005. Brokerage and closure: An introduction to Social Capital. Oxford University Press, New York.

Charlton, J.P., 2002. A factor-analytic investigation of computer 'addiction'and engagement. Br. J. Psychol. 93 (3), 329–344. https://doi.org/10.1348/000712602760146242.

Charlton, J.P., Danforth, I.D.W., 2007. Distinguishing addiction and high engagement in the context of online game playing. Comput. Hum. Behav. 23 (3), 1531–1548. https://doi.org/10.1016/j.chb.2005.07.002.

Charlton, J.P., Danforth, I.D.W., 2010. Validating the distinction between computer addiction and engagement: online game playing and personality. Behav. Inf. Technol. 29 (6), 601–613. https://doi.org/10.1080/01449290903401978.

Chou, H.-T.G., Edge, N., 2012. "They are happier and having better lives than I am": the impact of using Facebook on perceptions of others' lives. Cyberpsychol. Behav. Soc. Netw. 15 (2), 117–121. https://doi.org/10.1089/cyber.2011.0324.

Chou, T.-J., Ting, C.-C., 2003. The role of flow experience in cyber-game addiction. CyberPsychol, Behav. 6 (6), 663–675. https://doi.org/10.1089/109493103322725469.

Cohen, S., 2004. Social relationships and health. Am. Psychol. 59 (8), 677–684.

Cohen, S., Wills, T.A., 1985. Stress, social support, and the buffering hypothesis. Psychol. Bull. 98, 310–357. https://doi.org/10.1037/0003-066X.59.8.676.

Dahrendorf, R., 2010. Homo Sociologicus. Ein Versuch Zur Geschichte, Bedeutung und Kritik der Sozialen Rolle. Verlag für Sozialwissenschaften, Wiesbaden.

Ellison, N.B., Steinfield, C., Lampe, C., 2007. The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. J. Comput. Mediat. Commun. 12 (4), 1143–1168. https://doi.org/10.1111/j.1083-6101.2007.00367.x.

Ellison, N.B., Steinfield, C., Lampe, C., 2011. Connection strategies: social capital implications of Facebook-enabled communication practices. New Media Soc. 13 (6), 873–892. https://doi.org/10.1177/1461444810385389.

Fenichel, M., 2009. Facebook Addiction Disorder (FAD). http://www.fenichel.com/facebook/accessed 03 May 2019.

Fox, J., Moreland, J.J., 2015. The dark side of social networking sites: an exploration of the relational and psychological stressors associated with Facebook use and affordances. Comput. Hum. Behav. 45, 168–176. https://doi.org/10.1016/j.chb.2014.11.083.

Frese, M., 1999. Social support as a moderator of the relationship between work stressors and psychological dysfunctioning: a longitudinal study with objective measures. J. Occupat. Health Psychol. 4 (3), 179–192.

Frison, E., Eggermont, S., 2015. The impact of daily stress on adolescents' depressed mood: the role of social support seeking through Facebook. Comput. Hum. Behav. 44, 315–325. https://doi.org/10.1016/j.chb.2014.11.070.

Fydrich, T., Sommer, G., Tydecks, S., Brähler, E., 2009. Fragebogen zur sozialen Unterstützung (F-SozU): normierung der Kurzform (K-14). Z. Med. Psychol. 18 (1), 43–48.

Griffiths, M.D., 1996. Nicotine, tobacco and addiction. Nature 384, 18. https://doi.org/10.1038/384018a0.

Griffiths, M., D., 1998. Internet addiction: Does It Really exist? In: Gackenbach, J. (Ed.), Psychology and the Internet Academic Press, San Diego, CA, pp. 61–75.

Griffiths, M.D., 2000. Internet addiction - time to be taken seriously? Addict. Res. 8, 413–418. https://doi.org/10.3109/16066350009005587.

Griffiths, M.D., 2002. Gambling and Gaming Addictions in Adolescence. British Psychological Society/Blackwell, Leicester.

Griffiths, M.D., 2005. A 'components' model of addiction within a biopsychosocial framework. J. Subst. Use 10 (4), 191–197. https://doi.org/10.1080/14659890500114359.

Holahan, C.J., Moos, R.H., 1981. Social support and psychological distress: a longitudinal analysis. J. Abnorm. Psychol. 90 (4), 365–370.

Hong, F.-Y., Huang, D.-H., Lin, H.-Y., Chiu, S.-L., 2014. Analysis of the psychological traits, Facebook usage, and Facebook addiction model of Taiwanese university students. Telemat. Inform. 31 (4), 597–606. https://doi.org/10.1016/j.tele.2014.01.001.

Hou, X.-L., Wang, H.-Z., Guo, C., Gaskin, J., Rost, D.H., Wang, J.-L., 2017. Psychological resilience can help combat the effect of stress on problematic social networking site usage. Pers. Individ. Differ. 109, 61–66. https://doi.org/10.3389/fpsyt.2018.00686.

Hull, D.C., Williams, G.A., Griffiths, M.D., 2013. Video game characteristics, happiness and flow as predictors of addiction among video game players: a pilot study. J. Behav. Addict. 2 (3), 145–152. https://doi.org/10.1556/JBA.2.2013.005.

Indian, M., Grieve, R., 2014. When Facebook is easier than face-to-face: social support derived from Facebook in socially anxious individuals. Pers. Individ. Differ. 59, 102–106. https://doi.org/10.1016/j.paid.2013.11.016.

Kim, J., Lee, J.E., 2011. The Facebook paths to happiness: effects of the number of Facebook friends and self-presentation on subjective well-being. Cyberpsychol. Behav. Soc. Netw. 14 (6), 359–364. https://doi.org/10.1089/cyber.2010.0374.

Koc, M., Gulyagci, S., 2013. Facebook addiction among Turkish college students: the role of psychological health, demographic, and usage characteristics. Cyberpsychol. Behav. Soc. Netw. 16 (4), 279–284. https://doi.org/10.1089/cyber.2012.0249.

Kraemer, H.C., Kazdin, A.E., Offord, D.R., Kessler, R.C., Jensen, P.S., Kupfer, D.J., 1997. Coming to terms with the terms of risk. Arch. Gen. Psychiatry 54 (4), 337–343. https://doi.org/10.1001/archpsyc.1997.01830160065009.

Kuss, D.J., Griffiths, M.D., 2015. Internet Addiction in Psychotherapy. Palgrave Pivot, Basingstoke, UK.

Kuss, D.J., Pontes, H.M., 2019. Internet Addiction. Advances in Psychotherapy – Evidence-Based Practice 41. pp. 1–79.

Lehenbauer-Baum, M., Fohringer, M., 2015. Towards classification criteria for internet gaming disorder: debunking differences between addiction and high engagement in a German sample of World of Warcraft players. Comput. Hum. Behav 45, 345–351. https://doi.org/10.1016/j.chb.2014.11.098.

Lehenbauer-Baum, M., Klaps, A., Kovacovsky, Z., Witzmann, K., Zahlbruckner, R., Stetina, B.U., 2015. Addiction and engagement: an explorative study toward classification criteria for internet gaming disorder. Cyberpsychol. Behav. Soc. Netw. 18 (6), 343–349. https://doi.org/10.1089/cyber.2015.0063.

Liu, C.-Y., Yu, C.-P., 2013. Can Facebook use induce well-being? Cyberpsychol. Behav. Soc. Netw. 16 (9), 674–678. https://doi.org/10.1089/cyber.2012.0301.

Manago, A.M., Taylor, T., Greenfield, P.M., 2012. Me and my 400 friends: the anatomy of college students' Facebook networks, their communication patterns, and well-being. Dev. Psychol. 48 (2), 369–380. https://doi.org/10.1037/a0026338.

Marino, C., Gini, G., Vieno, A., Spada, M.M., 2018. A comprehensive meta-analysis on problematic Facebook use. Comput. Hum. Behav. 83, 262–277. https://doi.org/10.1016/j.chb.2018.02.009.

Misra, R., McKean, M., 2000. College students' academic stress and its relation to their anxiety, time management, and leisure satisfaction. Am. J. Health Stud. 16 (1), 41–51.

Moreno, M.A., Jelenchick, L.A., Egan, K.G., Cox, E., Young, H., Gannon, K.E., Becker, T., 2011. Feeling bad on Facebook: depression disclosures by college students on a social networking site. Depress. Anxiety 28 (6), 447–455. https://doi.org/10.1002/da.20805.

Nabi, R.L., Prestin, A., So, J., 2013. Facebook friends with (health) benefits? Exploring social network site use and perceptions of social support, stress, and well-being. Cyberpsychol. Behav. Soc. Netw. 16 (10), 721–727. https://doi.org/10.1089/cyber.2012.0521.

Osborne, L.A., Romano, M., Re, F., Roaro, A., Truzoli, R., Reed, P., 2016. Evidence for an internet addiction disorder: internet exposure reinforces color preference in withdrawn problem users. J. Clin. Psychiatry 77 (2), 269–274. http://doi.org/10.4088/JCP.15m10073.

Park, J., Lee, D.S., Shablack, H., Verduyn, P., Deldin, P., Ybarra, O., Jonides, J., Kross, E., 2016. When perceptions defy reality: the relationships between depression and actual and perceived Facebook social support. J. Affect. Disord. 200, 37–44. https://doi.org/10.1016/j.jad.2016.01.048.

Pontes, H.M., Andreassen, C.S., Griffiths, M.D., 2016. Portuguese validation of the Bergen Facebook Addiction Scale: an empirical study. Int. J. Ment. Health Addict. 14 (6), 1062–1073. http://doi.org/10.1007/s11469-016-9694-y.

Reis, H.T., Gable, S.L., 2003. Toward a Positive Psychology of Relationships. In: Keyes, C.L.M., Haidt, J. (Eds.), Flourishing: Positive psychology and the life well-lived. American Psychological Association, Washington, DC, pp. 129–159.

Roth, P., 2019. Nutzerzahlen: Facebook, Instagram, Messenger und WhatsApp, Highlights, Umsätze, uvm. (Stand Januar 2019), allfacebook.de. https://allfacebook.de/toll/state-of-facebookaccessed 03 May 2019.

Ryan, T., Chester, A., Reece, J., Xenos, S., 2014. The uses and abuses of Facebook: a review of Facebook addiction. J. Behav. Addict. 3 (3), 133–148. https://doi.org/10.1556/JBA.3.2014.016.

Scholten, S., Lavallee, K., Velten, J., Zhang, X.C., Margraf, J., 2014. The Brief Daily Stressor Screening: an Introduction and Evaluation. Unpublished manuscript.

Seeman, T.E., 1996. Social ties and health: the benefits of social integration. Ann. Epidemiol. 6 (5), 442–451. https://doi.org/10.1016/S1047-2797(96)00095-6.

Sinclair, T.J., Grieve, R., 2017. Facebook as a source of social connectedness in older adults. Comput. Hum. Behav. 66, 363–369. https://doi.org/10.1016/j.chb.2016.10.003.

Steinfield, C., Ellison, N.B., Lampe, C., 2008. Social capital, self-esteem, and use of online social network sites: a longitudinal analysis. J. Appl. Dev. Psychol. 29 (6), 434–445. https://doi.org/10.1016/j.appdev.2008.07.002.

Taylor, S.E., Sherman, D.K., Kim, H.S., Jarcho, J., Takagi, K., Dunagan, M.S., 2004. Culture and social support: who seeks it and why? J. Pers. Soc. Psychol. 87 (3), 354–362. http://dx.doi.org/10.1037/0022-3514.87.3.354.

Trivedi, R.H., Teichert, T., 2017. The Janus-faced role of gambling flow in addiction issues. Cyberpsychol. Behav. Soc. Netw. 20 (3), 180–186. https://doi.org/10.1089/cyber.2016.0453.

Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., Kross, E., 2017. Do social network sites enhance or undermine subjective well-being? A critical review. Soc. Issues Policy Rev. 11 (1), 274–302. http://doi.org/10.1111/sipr.12033.

Wen, Z., Fan, X., 2015. Monotonicity of effect sizes: questioning kappa-squared as mediation effect size measure. Psychol. Methods 20 (2), 193–203. http://dx.doi.org/10.1037/met0000029.

Wills, T.A., 1991. Social Support and Interpersonal Relationships. In: Clark, M.S. (Ed.), Prosocial Behavior. Sage, Newbury Park, CA, pp. 265–289.

Wilson, K., Fornasier, S., White, K.M., 2010. Psychological predictors of young adults' use of social networking sites. Cyberpsychol. Behav. Soc. Netw. 13 (2), 173–177. https://doi.org/10.1089/cyber.2009.0094.

Wright, K.B., Rosenberg, J., Egbert, N., Ploeger, N.A., Bernard, D.R., King, S., 2013. Communication competence, social support, and depression among college students: a model of facebook and face-to-face support network influence. J. Health Commun. 18 (1), 41–57. https://doi.org/10.1080/10810730.2012.688250.

Wu, T.-C., Scott, D., Yang, C.-C., 2013. Advanced or addicted? Exploring the relationship of recreation specialization to flow experiences and online game addiction. Leis. Sci. 35 (3), 203–217. https://doi.org/10.1080/01490400.2013.780497.

Wunsch, K., Kasten, N., Fuchs, R., 2017. The effect of physical activity on sleep quality, well-being, and affect in academic stress periods. Nat. Sci. Sleep 9, 117–126. https://doi.org/10.2147/NSS.S132078.

Young, K.S., Nabuco de Abreu, C., 2011. Internet Addiction: A handbook and Guide to Evaluation and Treatment. John Wiley & Sons, Hoboken, NJ.