



## Full length article

## Objective Facebook behaviour: Differences between problematic and non-problematic users



Claudia Marino <sup>a, b, \*</sup>, Livio Finos <sup>a</sup>, Alessio Vieno <sup>a</sup>, Michela Lenzi <sup>a</sup>,  
 Marcantonio M. Spada <sup>b</sup>

<sup>a</sup> Dipartimento di Psicologia dello Sviluppo e della Socializzazione, Università di Padova, Padova, Italy

<sup>b</sup> Division of Psychology, School of Applied Sciences, London South Bank University, London, UK

## ARTICLE INFO

## Article history:

Received 6 December 2016

Received in revised form

3 April 2017

Accepted 7 April 2017

Available online 10 April 2017

## Keywords:

Objective Facebook behaviour

Problematic Facebook use

Young adults

## ABSTRACT

The aim of the study was to test whether, and how much, specific objective Facebook behaviours are more frequent in problematic than non-problematic Facebook users. Differences between problematic and non-problematic Facebook users in objective Facebook behaviours were examined using frequentist and Bayesian *t*-tests. Participants were undergraduate students ( $n = 297$ , 80.8% female, age mean = 21.05, standard deviation = 1.88). Problematic Facebook use was assessed using fifteen items adapted from the scale developed and validated for the measurement of Generalized Problematic Internet Use. A specific R package was developed to obtain information about objective Facebook behaviours (friendship activities, events, wall activities, and text messages). *T*-tests indicated that non-problematic and problematic users significantly differ in several objective Facebook behaviours. Bayesian analyses confirmed *t*-test results and supported that Problematic users scored higher than non-problematic users in several dependent variables, such as number of friendships established, number of events attended, all wall activities (e.g. number of “like”), and private messages sent. The analysis of data about objective Facebook behaviours goes beyond the self-reported information about such activities, and helps to understand the role of its potentially addictive activities in predicting PFU.

© 2017 Elsevier Ltd. All rights reserved.

## 1. Introduction

## 1.1. Problematic Facebook use

Facebook addiction or Problematic Facebook use (PFU) have not been recognized as a legitimate disorder yet; however, there is mounting evidence to support that Facebook use can become problematic, and take the form of a behavioural addiction (Kuss & Griffiths, 2011; Ryan, Reece, Chester, & Xenos, 2016). PFU has been defined as the use of Facebook that creates problems and impairments in different domains of one's life, such as school, work, friendships and romantic relationships (Marino et al., 2016). In other words, people may be defined as “problematic Facebook users” to the extent to which Facebook use pervades their everyday life, and they suffer any distress related to their use of Facebook, including everyday cognitive failures (Xanidis & Brignell, 2016) and

lower subjective well-being (Denti et al., 2012).

Recent research has indicated that problematic Facebook users are more likely to prefer online social interactions to a face-to-face context and to use Facebook for mood regulation (e.g., Caplan, 2010; Marino et al., 2016). Moreover, it is purported that problematic Facebook users are at risk of engaging in cognitive preoccupation and compulsive use related to the use of this social networking site (thus showing deficient self-regulation) (Caplan, 2010). A large body of literature has also examined a variety of possible correlates of PFU, such as personality traits (Tang, Chen, Yang, Chung, & Lee, 2016), mood disorders (Koc & Gulyagci, 2013), motives for use and gratification obtained from Facebook use (Ryan, Chester, Reece, & Xenos, 2014). Importantly, previous studies (e.g., Hormes, Kearns, & Timko, 2014) highlighted that the frequency of use is part of the problematic aspect of this behaviour, showing that problematic Facebook users tend to spend significantly more time on Facebook compared to non-problematic users. However, the amount of time spent on the Internet per se is not necessarily considered indicative of problematic use by scholars in this field (Pontes, Kuss, & Griffiths, 2015); nonetheless, it is plausible that excessive Facebook use contributes to, or maintains,

\* Corresponding author. Dipartimento di Psicologia dello Sviluppo e della Socializzazione, Università di Padova, Padova, Italy.

E-mail address: [claudia.marino@phd.unipd.it](mailto:claudia.marino@phd.unipd.it) (C. Marino).

problematic patterns of Internet use (Kittinger, Correia, & Irons, 2012). Beyond the frequency and time spent on Facebook use in general, a recent study (Ryan et al., 2016) has suggested the need to deepen the analysis of the relation between different types of activities that users engage in (e.g., updating profiles, posting, texting, playing, etc.) and PFU, in order to be able to better define PFU and to understand the role of its potentially addictive activities in predicting PFU.

In line with the generalized problematic Internet use model (Caplan, 2010), it is possible that the frequent use of specific online applications for mood regulation is associated with cognitive pre-occupation, compulsive use, and negative consequences. However, at this stage of research, there is still a lack of knowledge about the most frequent activities problematic Facebook users engage in when on Facebook. As outlined below, this is in part due to the methods commonly used to measure engagement in Facebook activities (i.e., self-report scales). In this study, we test whether specific objective Facebook activity (friendship activities, events, wall activities, and text messages) are more frequent in problematic than non-problematic Facebook users. Engagement in these activities was not assessed via self-reports, but through the analysis of real data from Facebook users' accounts.

## 1.2. Frequency of specific activities and PFU

Previous studies have examined the associations between the frequency of specific activities people engage in on Facebook and/or the amount of time spent on Facebook and several individual characteristics and personal outcomes. For example, the number of friends has been previously considered one of the social capital indicators (Ellison, Steinfield, & Lampe, 2007; Valenzuela, Park, & Kee, 2009), whereas Facebook informational use (i.e., reading the news posted by one's friends) has been associated to adolescents' civic engagement (Lenzi et al., 2015). Other studies have described different patterns of Facebook use for different personality traits showing that, for example, individuals who score high on neuroticism prefer wall activities (Ross et al., 2009), those high in narcissism are more likely to frequently update their status and to value their profile picture, whereas extroverts have a large number of friends and photos posted (Ong et al., 2011). However, an important limitation of this line of research is that the majority of these studies assessed the frequency of use of different applications and the quantity of specific Facebook features engaged with exclusively through self-report measures (e.g. Oberst, Renau, Chamorro, & Carbonell, 2016; Rosen, Whaling, Rab, Carrier, & Cheever, 2013).

Indeed, in such studies, participants were usually asked to rate the frequency of their own engagement in different sets of Facebook activities, such as chatting, reading news feeds, posting status update (Dantlgraber, Wetzel, Schützenberger, Stieger, & Reips, 2016), posting photos, posting comments on others' Facebook profiles (Vogel, Rose, Roberts, & Eckles, 2014), clicking "like", adding or requesting to add new friends, joining or creating events, playing games, and joining or creating groups (Rosen et al., 2013). Researchers often selected a set of Facebook applications and used different rating scales to assess the frequency of use. For example, in a recent study (Vogel, Rose, Okdie, Eckles, & Franz, 2015) participants were asked to rate the frequency of Facebook status updates and comments on others' Facebook profiles over a long period of time (one year or more) on a 6-point Likert-type scale (1 = never or almost never, 2 = once a year, 3 = once a month, 4 = once a week, 5 = once a day, 6 = multiple times a day), whereas in a study by Rosen et al. (2013) 15 different Facebook activities were included and rated on a 7-point scale referred to a shorter time span (1 = never, 2 = once a month, 3 = several times a month, 4 = once a

week, 5 = several times a week, 6 = daily, 7 = 0 several times a day).

Such variety in activities measured and rating scales employed hampers the comparisons between results of different studies. Most importantly, self-reported use of Facebook tends to suffer from essential limitations, such as limited response accuracy due to memory failure and potentially distorted self-perception of Facebook use; the latter being particularly relevant for problematic Facebook users. In support of this view, Fenichel (2009) argued that users often do not realize (or fail to report correctly) their behaviours or amount of time spent on social networking sites because they can remain "in their minds" also when offline. The other side of the coin is that users (especially those most "problematic") may underestimate the number of actions they do on a daily basis when on Facebook. For example, a study by Junco (2012) showed that there was a significant discrepancy between self-reported and actual time spent on Facebook, confirming the need to adopt alternative methods to gain data about actual behaviours in Facebook studies.

To our knowledge, no attempt has been made to assess the frequency or amount of "objective" Facebook behaviour and to link this to PFU. Therefore, the aim of this study was to test whether, and how much, specific objective Facebook behaviour is more frequent in problematic than non-problematic Facebook users. In other words, do problematic Facebook users differ from non-problematic users in terms of frequency of objective Facebook behaviour?

## 2. Method

### 2.1. Participants and procedure

The study included 297 Italian students of the University of Padova (Italy), aged between 19 and 35 years ( $M = 21.05$ ;  $SD = 1.88$ ) who had a Facebook account. Among them, 80.8% ( $n = 240$ ) were women and 19.2% were men ( $n = 57$ ). Participants were first asked to answer an online questionnaire by logging in an institutional website using an anonymous personal code. They were then asked to provide a copy of their Facebook data (see Table 1), downloading a zip folder from their Facebook profile which contains several html pages. Participants were instructed to use the function "download a copy of your Facebook data" in the settings section of their Facebook profile and to name their folder with the same personal anonymous code used to complete the questionnaire (full instructions for downloading data from Facebook accounts are presented in the following official Facebook link: <https://www.facebook.com/help/131112897028467/>). All participants were assured of the confidentiality of both their responses to the questionnaire and "objective data" provided. They all agreed to give their written informed consent. The Ethics Committee of Psychological Research at the University of xxxxx, Italy, gave formal approval for this research.

### 2.2. Measurement of key variables

**Problematic Facebook Use.** PFU was measured with fifteen items adapted from the scale developed and validated by Caplan (2010) for the measurement of Generalized Problematic Internet Use (Marino et al., 2016). Participants were asked to rate their agreement with each item (e.g., "I prefer online social interaction over face-to-face communication"; "I have used Facebook to make myself feel better when I was down"; "I have difficulty controlling the amount of time I spend on Facebook"; "I would feel lost if I was unable to access Facebook"; "My Facebook use has created problems for me in my life"). Answers were provided on a 8-point scale (from (1) "definitely disagree" to (8) "definitely agree") and they were averaged to form a PFU score. Higher scores indicate higher

**Table 1**  
Description of the objective Facebook behaviour variables.

Variable names	Description
<i>Friendship</i>	
Friends	Number of new friendships established
Received requests	Number of friendship requests received
Unfriend	Number of friends removed from the friends list
Sent requests	Number of friendship requests sent
<i>Events</i>	
Going	Number of attended events
Interested	Number of events participant is interested
Rejected	Number of times participant rejected an event invitation
Not answered	Number of time participant did not respond to an event invitation
<i>Wall activities</i>	
Status updated	Number of times participant updated his/her status on the wall
Likes	Number of other users' posts participant liked
Share	Number of shared posts on the wall
Photos	Number of new photos uploaded
Messages	Number of private messages sent

Note: All variables refer to the 18-month interval before data collection.

levels of PFU. The Cronbach's alpha was 0.88 (95% CI 0.85–0.92).

**“Objective Facebook behaviour”.** This consisted of 13 variables describing “actual” users' engagement in Facebook actions and behaviours. They included friendship activities, events, wall activities, and text messages. A full description of the variables is provided in Table 1. A specific R package (library MyFbr available at <https://github.com/livioivil/myFbr>) was developed to extract information from the html pages downloaded by each participant. This package contains codes able to read information from the html pages, to transform such information into quantitative data, and to save data in a dataset. A specific time interval (18 months) was selected in order to create a dataset comprising data extracted from the same period of time for all participants' profiles. Specifically, we considered 18 months of Facebook behaviour, from the date of the beginning of the research to the day the “youngest” account was created in our sample. Objective Facebook behaviour was matched with the questionnaire answers to create a single dataset.

### 2.3. Data analyses

First, due to lack of golden cut-off to assess PFU levels, following other recent studies (e.g., Ryan et al., 2016) we used cluster analysis (K-means clustering) to identify homogenous groups of Facebook users based on scores (converted to z-scores) of the PFU scale. A first cluster solution identified three groups of Facebook users: the first and larger group showed the lowest z-scores of PFU ( $N = 187$ ,  $M = -0.59$ ) and was thus named “non-problematic users”; a second group showed moderate z-scores of PFU ( $N = 87$ ,  $M = 0.59$ ) and was named “problematic users”; and a third, small group with the highest z-scores of PFU ( $N = 23$ ,  $M = 2.56$ ) was named “highly problematic users”. Given the overall small sample size, and in particular that of the third group, “problematic” and “highly problematic” users were merged into a single group of “problematic users” ( $N = 110$ ). Women and men were equally distributed in the two groups ( $X_{(1)} = 0.12$ ,  $p = 0.74$ ). Moreover, the two groups did not differ in participants' age ( $t_{(295)} = -1.63$ ,  $p = 0.10$ ).

Second, main analyses of group differences in objective Facebook behaviour were conducted through a series of *t*-tests for independent samples. Effect size was computed as Cohen's *d*. Additionally, to further aid the interpretation of the group comparison, Bayesian *t*-tests (Wagenmakers, Wetzels, Borsboom, & van der Maas, 2011) were also performed. Briefly, Bayesian analyses allow to evaluate the relative strength of evidence for two hypotheses or, stated otherwise, it reveals how strongly data support  $H_1$  over  $H_0$  (e.g., Goodman, 1999; Rouder, Speckman, Sun,

Morey, & Iverson, 2009).

In this analysis we compared the following two hypotheses:

**H0.** *Non-problematic and problematic users will not differ in objective Facebook behaviour scores*

**H1.** *Problematic users will have higher objective Facebook behaviour scores than non-problematic users*

The probability of a hypothesis conditional on observed data was computed through the Bayes Factor (BF; Jeffreys, 1961) for each dependent variable. Concretely, “the Bayes factor *B* comparing an alternative hypothesis to the null hypothesis means that the data are *B* times more likely under the alternative than under the null” (Dienes, 2014, p. 4); for example, a Bayes factor of four indicates that the observed level of evidence favors the alternative over the null hypothesis by a ratio of 4:1. In general, the bigger the Bayes factor, the stronger the evidence. BF interpretation is straightforward and, in this study, it helps to better understand the probability that users belonging to different groups may be more or less likely to engage in different Facebook behaviour.

R package ‘BayesFactor’ was used to run analysis (Morey & Rouder, 2014), and a default Cauchy prior was assumed (Rouder et al., 2009).

### 3. Results

Table 2 shows the means, standard deviations, *t*-test and BFs for the dependent variables included in the study. *T*-tests indicated that non-problematic and problematic users significantly differ in several objective Facebook behaviours. Specifically, as regard to friendship, problematic users scored higher than non-problematic users in the number of friendships established and number of friends requests sent. With regard to events variables, problematic users scored higher than non-problematic only in the number of events attended in that period of time, whereas they scored higher than non-problematic users in all wall activities. That is, problematic users showed more status updates, liked posts, shared posts, and new photos updates. Additionally, the two groups also differed in private messages sent, with problematic users scoring higher than non-problematic.

Bayesian analyses confirmed *t*-test results and supported the alternative hypothesis ( $H_1$ ): Problematic users scored higher than non-problematic users in several dependent variables. In general, the probability that the alternative hypothesis is true is about BF times higher than the null hypothesis. For example, problematic

**Table 2**

Descriptive statistics, t-tests, Bayes factors, and interpretation for BF.

	Non-problematic users		Problematic users		<i>t</i>	<i>p</i>	Cohen's <i>d</i>	BF <sub>10</sub>	Interpretation
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>					
<i>Friendship</i>									
Friend	86.09	76.65	123.74	149.27	−2.87	0.002	−0.35	12.71	Strong evidence for <i>H</i> <sub>1</sub>
Received requests	45.46	99.63	44.16	91.41	0.11	0.544	0.01	0.12	Strong evidence for <i>H</i> <sub>0</sub>
Unfriend	59.31	125.71	83.96	179.59	−1.39	0.083	−0.17	0.60	Anecdotal evidence for <i>H</i> <sub>0</sub>
Sent requests	10.31	10.62	15.99	27.77	−2.51	0.006	−0.30	5.12	Substantial evidence for <i>H</i> <sub>1</sub>
<i>Events</i>									
Going	15.29	23.87	27.41	42.94	−3.13	<0.001	−0.38	26.09	Strong evidence for <i>H</i> <sub>1</sub>
Interested	2.11	4.88	3.53	12.94	−1.34	0.090	−0.16	0.56	Anecdotal evidence for <i>H</i> <sub>0</sub>
Rejected	8.38	20.66	14.92	56.96	−1.42	0.078	−0.17	0.63	Anecdotal evidence for <i>H</i> <sub>0</sub>
Not answered	135.77	161.66	165.94	187.37	−1.46	0.072	−0.18	0.67	Anecdotal evidence for <i>H</i> <sub>0</sub>
<i>Wall activities</i>									
Status updated	30.74	46.79	49.09	91.54	−2.28	0.012	−0.27	3.07	Substantial evidence for <i>H</i> <sub>1</sub>
Likes	66.62	96.45	114.22	159.83	−3.20	<0.001	−0.39	32.74	Very strong evidence for <i>H</i> <sub>1</sub>
Share	6.36	18.54	21.49	78.28	−2.53	0.006	−0.30	5.37	Substantial evidence for <i>H</i> <sub>1</sub>
Photos	43.35	108.39	91.95	181.54	−2.89	0.002	−0.35	13.49	Strong evidence for <i>H</i> <sub>1</sub>
Messages	4161.09	13548.99	9742.56	23971.01	−2.56	0.005	−0.31	5.80	Substantial evidence for <i>H</i> <sub>1</sub>

Notes: Degrees of freedom = 295; for all tests, the alternative hypothesis specifies that problematic group's score is higher than non-problematic group; BF<sub>10</sub> = Bayes' factor; Interpretation (according to Sirota, Juanchich, Kostopoulou, & Hanak, 2014) = evidence to support *H*<sub>1</sub> (anecdotal evidence: 1–3, substantial evidence: 3–10, strong evidence: 10–30, very strong evidence: 30–100); evidence to support *H*<sub>0</sub> (anecdotal evidence: 1/3–1, substantial evidence: 1/10–1/3, strong evidence: 1/30–1/10, very strong evidence: 1/100–1/30).

users are 32 times more likely to “like” others' posts than non-problematic users, and about 13 times more likely to add new photos to their profiles than non-problematic. BF values below 0.3 support the null hypothesis (that is, no difference between the two groups), and values between 0.3 and 1 indicated that ‘the findings were inconclusive as to whether or not a difference/association was present’ (Beard, Dienes, Muirhead, & West, 2016, p. 2245).

#### 4. Discussion

The goal of the present study was to examine the relation between objective Facebook behaviour and self-reported PFU among young adults. Overall, results indicated that people identifiable as problematic Facebook users differ from non-problematic users in terms of frequency of several Facebook behaviours. Beyond the “general” frequency of Facebook use, the purpose of the present study was to highlight the more frequent behaviours problematic users engage in.

With regard to friendship variables, results showed that problematic users tend to add friends and to send friendship requests more frequently than non-problematic users. This result is supported by Choi and Lim (2016) who argued that, when overloaded, “the addition of new friends creates circumstances that require additional time, which leads to addictive behavior and ultimately undermines the user's well-being” (p.248). Additionally, problematic users also appear to send a large number of private messages, showing that chatting is an important Facebook feature for them and, given the real-time synchronous instant messaging, these users may be encouraged to spend more time on the site for relationship maintenance with their “friends” (Ryan et al., 2014). Also, sending a large number of private messages may entail the expectation to receive replies, thus increasing the probability that problematic users with high levels of cognitive preoccupation or social anxiety might spend an increasing amount of time checking notifications and, even further, experience more negative feelings when such notifications are delayed or do not appear. It has been postulated that identifying a significant association between PFU and different Facebook activities (such as establishing relationships and communicating with others) would offer support to compensatory model of Internet use (Ryan et al., 2016). According to this model (Kardefelt-Winther, 2014), Internet users are driven to use different applications because of their desire to escape from

negative moods. If this were the case, problematic Facebook users with social anxiety may tend to prefer frequent social online interactions thus bypassing the discomfort of face-to-face interactions, through the establishment and maintenance of online relationships (e.g. Caplan, 2010; Sheldon, 2008). In other words, it is possible that social anxiety and negative affect lead users to escape real world interaction and invest more in online contacts (subjective perception) (e.g. Casale & Fioravanti, 2017); this might translate into an increase in the use of Facebook allowing to create a large network of online friends (objective behavior) aimed at compensating dissatisfying offline relationships.

Moreover, problematic users are much more likely to click “going” in event pages than non-problematic users. It is possible that problematic users tend to value this Facebook application in order to satisfy their need to emphasize a socially desirable identity through a positive self-presentation of how “social” they could also be in “real life” (Mehdizadeh, 2010). Furthermore, whereas problematic and non-problematic users might not differ in “silent” event-related activities (that is, activities that are not visible in other users' news feeds such as “not answering” or “rejecting” events participation), problematic users' tendency to click “going” might also serve as a means to increase the number of posts in other users' home updates and, more generally, as an active strategy to get noticed within the Facebook social community. Additionally, problematic users were found to score higher than non-problematic users in all wall activities. Specifically, strong evidence appears to support the view that problematic users are more likely to “like” other users' posts and to “share” others' posts on their timeline. It is plausible that problematic users may constantly check for news feeds, look for updates and like or share friends' contents (e.g., videos, photos, links, etc.). This may lead them to spend a greater amount of time (and energy) looking at friends' profiles and posts, to attain the negative reinforcement of mood alteration (Ryan et al., 2014). This desire to monitor what is happening on Facebook has also been associated to PFU (Ryan et al., 2016). Specifically, the authors claimed that social monitoring (the tendency to constantly check the news feeds for updates) may be the result of the fear of missing out (FOMO) on important updates. From this perspective objective data about number of “like” and “shared” contents presented in this paper may provide a more empirical basis for the idea that some problematic user may try to alleviate their FOMO through the sense of connectedness and mood



alteration provided by a specific use of Facebook (Ryan et al., 2016). These self-presentation concerns and the FOMO might be the main triggers lead to constant checking, liking and sharing other people posts on their walls; at the same time, these concerns might encourage young people to pay attention to the events promoted via Facebook and show their intention to participate. The use of these specific Facebook tools is consistent with the paradigm of 'compulsory Facebook use' that characterizes problematic Facebook use.

Moreover, problematic users are 14 and 3 times more likely to add photos and status updates, respectively. Such active applications have been found to be connected with heavy Facebook use (Alhabash, Park, Kononova, Chiang, & Wise, 2012) and with addictive behavioural symptoms such as salience (Balakrishnan & Shamim, 2013). The tendency to constantly update one's status and add photos has also been linked to users' willingness to seek attention from friends (Balakrishnan & Shamim, 2013) and to select self-promoting contents and attractive photos in order to control the information about the self, thus enhancing individual social image and self-esteem through friends' feedback (that is, positive comments, likes, sharing) (e.g., Mehdizadeh, 2010; Valkenburg, Peter, & Schouten, 2006). These results could be also viewed in light of the socio-cognitive model of unregulated Internet use (Caplan, 2010; LaRose, Lin, & Eastin, 2003) according to which online social interactions could mitigate anxiety about self-presentation (Casale & Fioravanti, 2017). From this perspective frequent status and photos updates may serve as a mood regulation strategy, for example by expecting to reduce negative feelings as a consequence of positive feedback by friends.

Overall, consistent with the model adopted in the current study (Caplan, 2010), our findings suggest that problematic Facebook users tend to frequently use some Facebook applications that have been associated with satisfying mood and cognitive regulation needs. For example, in support of this view, Papacharissi and Mendelson (2011) found that people who often use Facebook are likely to develop a greater affinity with the site and, thus, to check the site frequently in order to attain the goal of escaping from negative emotions. Moreover, in accordance with the Use and Gratification perspective (Rubin, 1994), these authors also claimed that Facebook is often used in order to satisfy other specific instrumental needs (such as social interaction, information sharing, habitual passing time, cool and new trend identification, companionship, etc.) through the use of a variety of Facebook tools, such as wall, instant messaging, and games (Papacharissi & Mendelson, 2011). In sum, consistent with this paradigm, it could be argued that the most frequent Facebook behaviours problematic users engage in might fulfill several functions: for example, social interaction motivation through adding friends, self-expression and passing time through wall activities, and relationship maintenance through private messages.

In summary, our findings showed a consistency between the subjective perception of problematic Facebook use and specific objective online behaviors. In addition, a common "psychological motivation/basis" was identified for different kinds of Facebook use and perceived problematic behavior, thus giving credibility to the correspondence between perceived and observed behavior. This allows to better predict what kinds of problematic behaviors (e.g., an excessive number of likes) can be developed based on adolescents' personality characteristics and interaction styles.

While the present study has important strengths, especially the analysis of data about objective Facebook behaviour (instead of simply relying on self-reported information about such activities), some limitations must be considered. First, the small sample size does not easily allow generalization. Second, we did not take into account the amount of time spent on Facebook nor how this

compares to actual use versus perceived use. Third, due to technical restrictions of Facebook data availability, several other Facebook activities could not be included (e.g., playing games like Farmville, gambling, video-games, creating fan pages, etc.). We agree with Griffiths (2012) that future studies should deepen the investigation of the different Facebook activities and their correlates. Despite these limitations, this study highlights what problematic users actually do on Facebook, and how often they do it compared to non-problematic users, thus establishing important links between objective Facebook behaviour and levels of problematic use.

In conclusion, frequent Facebook use appears to be part of most young adults' daily life (Balakrishnan & Shamim, 2013). Such use may become problematic when self-regulation skills fail; that is when users compulsively use specific applications, become preoccupied about their being online, and experience negative consequences (Caplan, 2010). Indeed, overuse and misuse of social networking sites, and more generally of the Internet, may significantly affect young people's lives and psychological well-being (Bevan, Gomez, & Sparks, 2014; Satici & Uysal, 2015). Previous studies have highlighted that problematic Internet use is associated with negative metacognitions and low levels of emotion regulation skills (Spada & Marino, 2017), and that problematic social networking sites use is linked to with a variety of negative psychological states (e.g. the feeling of shame, depressive moods, and low life satisfaction) suggesting that these negative psychological states should be taken into account when addressing the detrimental effects of PFU on problematic users' well-being (e.g., Casale & Fioravanti, 2017; van Rooij, Ferguson, Van de Mheen, & Schoenmakers, 2017). Since Facebook use provides an easy way to fulfill self-regulation deficits and to escape from negative situations, the results of this study may have some practical implications for educational programmes and clinical interventions targeting young adults. For example, by pointing out the "objective translation" of perceived problematic behaviors, our findings have the potential to inform intervention programmes for young people through the identification of specific online behaviors to target. Moreover, researchers and clinicians tackling PFU could benefit from the knowledge of what problematic users actually do on Facebook in keeping with the recent clinical interest in the associations between the maladaptive use of the Internet and psychological problems, such as dissociative states and traumatic experiences (Schimmenti & Caretti, 2017; Schimmenti et al., 2017).

## References

- Alhabash, S., Park, H., Kononova, A., Chiang, Y.-H., & Wise, K. (2012). Exploring the motivations of Facebook use in Taiwan. *Cyberpsychology, Behavior, and Social Networking*, 15(6), 304–311.
- Balakrishnan, V., & Shamim, A. (2013). Malaysian Facebookers: Motives and addictive behaviours unraveled. *Computers in Human Behavior*, 29(4), 1342–1349.
- Beard, E., Dienes, Z., Muirhead, C., & West, R. (2016). Using Bayes factors for testing hypotheses about intervention effectiveness in addictions research. *Addiction*, 111(12), 2230–2247.
- Bevan, J. L., Gomez, R., & Sparks, L. (2014). Disclosures about important life events on Facebook: Relationships with stress and quality of life. *Computers in Human Behavior*, 39, 246–253.
- Caplan, S. E. (2010). Theory and measurement of generalized problematic internet use: A two-step approach. *Computers in Human Behavior*, 26, 1089–1097.
- Casale, S., & Fioravanti, G. (2017). Shame experiences and problematic social networking sites use: An unexplored association. *Clinical Neuropsychiatry*, 14(1), 44–48.
- Choi, S. B., & Lim, M. S. (2016). Effects of social and technology overload on psychological well-being in young South Korean adults: The mediatory role of social network service addiction. *Computers in Human Behavior*, 61, 245–254.
- Dantlgraber, M., Wetzel, E., Schützenberger, P., Stieger, S., & Reips, U. D. (2016). Simple construct evaluation with latent class analysis: An investigation of Facebook addiction and the development of a short form of the Facebook Addiction Test (F-AT). *Behavior Research Methods*, 1–11.
- Denti, L., Barbopoulos, I., Nilsson, I., Holmberg, L., Thulin, M., Wendeblad, M., et al. (2012). Sweden's largest Facebook study. Gothenburg Research Institute School

- of Business, Economics and Law, University of Gothenburg.
- Dienes, Z. (2014). Using Bayes to get the most out of non-significant results. *Frontiers in Psychology*, 5, 781.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends": Social capital and college students' use of online social network sites. *Journal of Computer-mediated Communication*, 12(4), 1143–1168.
- Fenichel, M. G. (2009). *Facebook addiction disorder (FAD)* Accessed 19.10.16 <http://www.fenichel.com/facebook.shtml>.
- Goodman, S. N. (1999). Toward evidence-based medical statistics. 2: The Bayes factor. *Annals of Internal Medicine*, 130(12), 1005–1013.
- Griffiths, M. D. (2012). Facebook addiction: Concerns, criticism, and recommendations – a response to Andreassen and colleagues. *Psychological Reports*, 110, 518–520.
- Hormes, J. M., Kearns, B., & Timko, C. A. (2014). Craving Facebook? Behavioral addiction to online social networking and its association with emotion regulation deficits. *Addiction*, 109(12), 2079–2088.
- Jeffreys, H. (1961). *Theory of probability*. Oxford, England: Oxford University Press.
- Junco, R. (2012). The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Computers & Education*, 58(1), 162–171.
- Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior*, 31, 351–354.
- Kittinger, R., Correia, C. J., & Irons, J. G. (2012). Relationship between Facebook use and problematic Internet use among college students. *Cyberpsychology, Behavior, and Social Networking*, 15(6), 324–327.
- Koc, M., & Gulyagci, S. (2013). Facebook addiction among Turkish college students: The role of psychological health, demographic, and usage characteristics. *Cyberpsychology, Behavior and Social Networking*, 16(4), 279–284.
- Kuss, D. J., & Griffiths, M. D. (2011). Addiction to social networks on the internet: A literature review of empirical research. *International Journal of Environment and Public Health*, 8, 3528–3552.
- LaRose, R., Lin, C. A., & Eastin, M. S. (2003). Unregulated Internet usage: Addiction, habit, or deficient self-regulation? *Media Psychology*, 5, 225–253.
- Lenzi, M., Vieno, A., Altoè, G., Scacchi, L., Perkins, D. D., Zukauskienė, R., et al. (2015). Can Facebook informational use foster adolescent civic engagement? *American Journal of Community Psychology*, 55, 444–454.
- Marino, C., Vieno, A., Moss, A. C., Caselli, G., Nikčević, A. V., & Spada, M. M. (2016). Personality, motives and metacognitions as predictors of problematic Facebook use in university students. *Personality and Individual Differences*, 101, 70–77.
- Mehdzadeh, S. (2010). Self-presentation 2.0: Narcissism and self-esteem on Facebook. *Cyberpsychology, Behavior, and Social Networking*, 13(4), 357–364.
- Morey, R. D., & Rouder, J. N. (2014). *BayesFactor: Computation of Bayes factors for common designs*. R package version 0.9.9 <http://CRAN.R-project.org/package=BayesFactor>.
- Oberst, U., Renau, V., Chamorro, A., & Carbonell, X. (2016). Gender stereotypes in Facebook profiles: Are women more female online? *Computers in Human Behavior*, 60, 559–564.
- Ong, E. Y., Ang, R. P., Ho, J. C., Lim, J. C., Goh, D. H., Lee, C. S., et al. (2011). Narcissism, extraversion and adolescents' self-presentation on Facebook. *Personality and Individual Differences*, 50(2), 180–185.
- Papacharissi, Z., & Mendelson, A. (2011). Toward a new(er) sociability: Uses, gratifications and social capital on Facebook. In S. Papathanassopoulos (Ed.), *Media perspectives for the 21st century* (pp. 212–230). Oxon, UK: Routledge.
- Pontes, H. M., Kuss, D. J., & Griffiths, M. D. (2015). Clinical psychology of internet addiction: A review of its conceptualization, prevalence, neuronal processes, and implications for treatment. *Neuroscience and Neuroeconomics*, 4, 11–23.
- van Rooij, T., Ferguson, C. J., Van de Mheen, D., & Schoenmakers, T. M. (2017). Time to abandon Internet Addiction? Predicting problematic internet, game, and social media use from psychosocial well-being and application use. *Clinical Neuropsychiatry*, 14(1), 113–121.
- Rosen, L. D., Whaling, K., Rab, S., Carrier, L. M., & Cheever, N. A. (2013). Is Facebook creating "iDisorders"? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. *Computers in Human Behavior*, 29(3), 1243–1254.
- Ross, C., Orr, E. S., Sisic, M., Arseneault, J. M., Simmering, M. G., & Orr, R. R. (2009). Personality and motivations associated with Facebook use. *Computers in Human Behavior*, 25(2), 578–586.
- Rouder, J. N., Speckman, P. L., Sun, D., Morey, R. D., & Iverson, G. (2009). Bayesian t tests for accepting and rejecting the null hypothesis. *Psychonomic Bulletin & Review*, 16(2), 225–237.
- Rubin, A. M. (1994). Media uses and effects: A uses-and-gratifications perspective. In J. Zillmann, & D. Bryant (Eds.), *Media Effects: Advances in theory and research*. London: Lawrence Erlbaum Associates.
- Ryan, T., Chester, A., Reece, J., & Xenos, S. (2014). The uses and abuses of Facebook: A review of Facebook addiction. *Journal of Behavioral Addictions*, 3, 133–148.
- Ryan, T., Reece, J., Chester, A., & Xenos, S. (2016). Who gets hooked on Facebook? An exploratory typology of problematic Facebook users. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 10(3). <http://dx.doi.org/10.5817/CP2016-3-4>. article 4.
- Satici, S. A., & Uysal, R. (2015). Well-being and problematic Facebook use. *Computers in Human Behavior*, 49, 185–190.
- Schimmenti, A., & Caretti, V. (2017). Video-terminal dissociative trance: Toward a psychodynamic understanding of problematic internet use. *Clinical Neuropsychiatry*, 14(1), 64–72.
- Schimmenti, A., Passanisi, A., Caretti, V., La Marca, L., Granieri, A., Iacolino, C., ... Billieux, J. (2017). Traumatic experiences, alexithymia, and internet addiction symptoms among late adolescents: A moderated mediation analysis. *Addictive Behaviors*, 64, 314–320.
- Sheldon, P. (2008). The relationship between unwillingness-to-communicate and students' Facebook use. *Journal of Media Psychology: Theories, Methods, and Applications*, 20, 67–75.
- Sirota, M., Juanchich, M., Kostopoulou, O., & Hanak, R. (2014). Decisive evidence on a smaller-than-you-think phenomenon revisiting the "1-in-X" effect on subjective medical probabilities. *Medical Decision Making*, 34(4), 419–429.
- Spada, M. M., & Marino, C. (2017). Metacognitions and emotion regulation as predictors of problematic Internet use in adolescents. *Clinical Neuropsychiatry*, 14(1), 59–63.
- Tang, J. H., Chen, M. C., Yang, C. Y., Chung, T. Y., & Lee, Y. A. (2016). Personality traits, interpersonal relationships, online social support, and Facebook addiction. *Telematics and Informatics*, 33(1), 102–108.
- Valenzuela, S., Park, N., & Kee, K. F. (2009). Is there social capital in a social network site?: Facebook use and college students' life satisfaction, trust, and participation. *Journal of Computer-mediated Communication*, 14(4), 875–901.
- Valkenburg, P. M., Peter, J., & Schouten, A. P. (2006). Friend networking sites and their relationship to adolescents' well-being and social self-esteem. *CyberPsychology & Behavior*, 9(5), 584–590.
- Vogel, E. A., Rose, J. P., Okdie, B. M., Eckles, K., & Franz, B. (2015). Who compares and despairs? The effect of social comparison orientation on social media use and its outcomes. *Personality and Individual Differences*, 86, 249–256.
- Vogel, E. A., Rose, J. P., Roberts, L. R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. *Psychology of Popular Media Culture*, 3(4), 206.
- Wagenmakers, E. J., Wetzels, R., Borsboom, D., & van der Maas, H. L. (2011). Why psychologists must change the way they analyze their data: The case of psi: Comment on Bem (2011). *Journal of Personality and Social Psychology*, 100(3), 426–432.
- Xanidis, N., & Brignell, C. M. (2016). The association between the use of social network sites, sleep quality and cognitive function during the day. *Computers in Human Behavior*, 55, 121–126.