**A Comprehensive Meta-Analysis on Problematic Facebook Use**

*Review*

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**Abstract**

In recent years, researchers have been showing an increasing interest in the conceptualization of problematic Facebook use, and its associations with individual characteristics. The present meta-analysis aimed to summarize the findings of the recent literature on this topic with the aim of understanding the specific features of this phenomenon (that is, its associations with the time spent online and the broader concept of Internet addiction), and the individual characteristics of Facebook users (including gender differences, personality traits, self-esteem levels, and motivations for using Facebook). The sample included 56 independent samples with a total of 27,867 participants (59.22% females; mean age = 23.94 years (*SD*=4.75). Briefly, results showed a small gender effect favoring females and a positive association between problematic Facebook use, time spent online and Internet addiction, whereas a negative association was found with self-esteem. Neuroticism and conscientiousness were the most clearly personality traits associated with problematic Facebook use, and the strongest associations observed between problematic Facebook use and motives with internal source and motives with negative valence. This comprehensive meta-analysis makes contributions to understanding the phenomenon of problematic Facebook use and its relation with individual characteristics.

**Keywords:** meta-analysis; problematic Facebook use; Internet addiction; personality; self-esteem; motives.

**1. Introduction**

In recent years, researchers have been showing an increasing interest in the conceptualization of problematic Facebook use (henceforth PFU), and its associations with individual characteristics and psychological adjustment (Marino, Gini, Vieno, & Spada, 2018; Satici & Uysal, 2015; Wilson, Gosling, & Graham, 2012). While the seemingly increase in the number of empirical studies on this topic testimonies its relevance, it is becoming difficult to have a clear picture of the phenomenon due to the variety of different conceptualizations, terms and approaches used to study PFU and its correlates (Marino et al., 2018). For this reason, in the present meta-analysis we aimed to summarize the findings of the recent literature on this topic with the aim of understanding the specific features of this phenomenon (that is, its associations with the time spent online and the broader concept of Internet addiction), and the individual characteristics of Facebook users (including personality traits, self-esteem levels, and motivations for using Facebook).

* 1. **The issue of Defining and Assessing Problematic Facebook Use**

PFU has been considered as a problematic behaviour which creates problems and impairments in different domains of one’s life, such as school, work, friendships, and romantic relationships (Lee, Cheung, & Thadani, 2012). Authors in this field have suggested that Facebook use may become “problematic” when it pervades users’ everyday life, leading to any distress related to such use including cognitive failures (Xanidis & Brignell, 2016) and poor subjective well-being (Denti, Barbopoulos, Nılsson, et al., 2012; Marino et al., 2018).

However, the problematic use of the Internet in general and of social networking sites like Facebook in particular, have not been recognized as a legitimate disorder in the last edition of the DSM (American Psychological Association, 2013). Therefore, disagreements regarding proper diagnostic criteria and the lack of consistency underlying the broader concept of Internet and Facebook addiction make it difficult to establish a sole definition of these phenomena (e.g., Caci, Cardaci, Scrima, & Tabacch, 2017). Indeed, different approaches and terms have been applied, first, to Internet addiction and, subsequently, to Facebook context. These include (i) “Facebook addiction”, used when the criteria of addiction (i.e., salience, mood modification, tolerance, withdrawal, conflict, and relapse) or similar factors based on the definition of gambling addiction (e.g. interpersonal problems, time management, and performance problems) (Andreassen, Torsheim, Brunborg, & Pallesen, 2012) have been applied; (ii) “Facebook intrusion”, which is based on Brown’s behavioral addiction components; and (iii) “problematic Facebook use” that includes both addictive-like symptoms and specific features such as preference for online social interaction as a means of mood regulation (Caplan, 2010; Marino, Vieno, Altoè, & Spada, 2017).

The lack of a shared definition is reflected by the use of a variety of instruments assessing PFU (Pontes, Kuss, & Griffiths, 2015). To this respect, it has been argued that the use of different measures may have contributed to the confusion around this phenomenon (e.g., Caci et al., 2017; Ryan, Chester, Reece, & Xenos, 2014) because instruments have been often created as ad-hoc measures or adapting extant items originally developed to assess other addictive behaviours (for a review on this topic see Ryan et al., 2014; Marino et al., 2017). For example, the Internet Addiction Test (IAT), proposed by Young (1998), has been adapted several times to Facebook context by simply replacing the word “Internet” with the word “Facebook”. Some items included in the IAT are based on the criteria of pathological gambling (Young, 1996), such as preoccupation with the Internet and concealment of use; however, other items do not have a clear basis recognized in the psychological literature. The most widely used measure is the Bergen Facebook Addiction Scale (BFAS; Andreassen et al., 2012) which assesses PFU through six items representing the six core elements of addiction designed to assess gambling disorder and gaming addiction. Despite the good psychometric properties of the BFAS, a recognized weakness is that it is based on other behavioural addictions’ criteria (Ryan et al., 2014). Applying slightly different behavioral addiction components and the mobile phone involvement questionnaire (Brown, 1997; Walsh, White, & Young, 2010), Elphinston and Noller (2011) proposed the Facebook Intrusion Questionnaire which covers elements like: cognitive salience, behavioural salience, interpersonal conflict, conflict with other activities, euphoria, loss of control, withdrawal, relapse, and reinstatement. More recently, another measure of PFU (i.e., the Problematic Facebook Use Scale) has been proposed adopting a theoretical model specifically developed to capture the cognitive-behavioural aspects of problematic Internet use (Caplan, 2010). This scale (Assunção & Matos, 2017; Marino et al., 2017) is based on Caplan’s Generalized Problematic Internet Use 2 model and includes dimensions like preference for online social interactions, cognitive, behavioural, and emotional regulation, and negative consequences.

In sum, despite this variety of approaches, and in line with a recent meta-analysis on this topic (Marino et al. 2018), in this study we define PFU as a problematic behaviour that is likely to be characterized by addictive-like symptoms and/or self-regulation difficulties leading to negative consequences in personal and social life (e.g., Griffiths, Kuss, & Demetrovics, 2014; Marino, Vieno, Moss, Caselli, Nikčević, & Spada, 2016a).

**1.2. Towards a Clearer Conceptualization of Problematic Facebook Use**

The theoretical limitations, including a lack of agreed definition, that still characterize this field of research have been contributing to the general scientific confusion about the specific features of PFU. For example, some authors have considered the high frequency of Facebook use or the greater and greater amount of time spent on Facebook as problematic or addictive behaviours per se (e.g., Chou, Condron, & Belland, 2005). However, others have argued that time or frequency of use is not enough to characterize problematic behavior online (e.g., Pontes, Kuss, & Griffiths, 2015). Similarly, because Facebook is one application of the Internet, PFU and problematic Internet use have been sometimes considered as overlapping concepts, with Blachnio and colleagues even stating that “Facebook addiction and Internet addiction are the same phenomenon” (Blachnio, Przepiorka, Senol-Durak, Durak, & Sherstyuk, 2017, p. 272). However, the relatively modest correlations found between PFU and both time spent online (e.g., Hong & Chiu, 2014; Hong, Huang, Lin, & Chiu, 2014; Orosz, Tóth-Király, & Bőthe, 2016) and measures of Internet addiction (e.g., Hormes, Kearns, & Timko, 2014; Sigerson, Li, Cheung, & Cheng, 2017) suggest that PFU could be probably considered as a distinct behaviour happening on the Internet but with specific characteristics and psychological issues involved, which merits to be conceptualized and analyzed on its own.

**1.2.1. Problematic Facebook Use, Time Spent Online and Internet Addiction**

Previous studies (e.g., Hormes et al., 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 et al., 2015); nonetheless, it is plausible that Facebook use contributes to, or maintains, problematic patterns of Internet use (Kittinger, Correia, & Irons, 2012). Specifically, as regard the controversial definition of problematic Internet use (or Internet addiction), Pontes and colleagues (2015) argued that it is crucial to distinguish between excessive Internet use (that is, too high frequency of use or too much time spent online) and Internet addiction due to the possible overlapping of the two concepts. Whereas it is very likely that Internet addicts tend to excessively use the Internet, the intense or prolonged use per se does not imply addictive symptoms (Griffiths, 2010) or problematic behaviour. In other words, people intensively using the Internet may experience less negative consequences in respect to Internet addicts and they may not present all the behavioural addiction criteria. Indeed, according to Caplan (2003), PIU has more to do with the negative outcomes and with the deficient impulse control than excessive Internet use. The latter has been defined as the amount of Internet use exceeding what individuals consider a normal or planned use (Caplan, 2006), but it should be also noted that people usually consider problematic or addictive their own use of the Internet if it influences or delays their daily activities. As an application of the Internet, Facebook has been usually considered as a specific type of problematic Internet use (Hong, Huang, Lin, & Chiu, 2014) and many authors tend to consider the findings for PIU also true for PFU. Therefore, we may hypothesize that the distinction between frequent use (i.e., time spent online) and problematic use does exist for problematic Facebook use as in the case of PIU. The first aim of the current study was therefore to quantify the association between time spent online and PFU, in order to test whether time spent online explains much of the variance of problematic Facebook use or, as we anticipate, time of use is a component of problematic Facebook use that is not exhaustive of this phenomenon.

Furthermore, beyond the conceptualization of PFU as a type of PIU, several studies have found that there is a link between PIU and PFU. For example, a study by Kittinger and colleagues (2012), using a variety of self-report scales, found that Facebook use might contribute to the severity of symptoms associated with Internet addiction. Studies about PFU also strongly corroborate one of the widely held assumptions about PIU – that people who have a tendency toward PIU have a preference for online social interaction rather than face-to-face interaction (e.g., Caplan, 2005). This specific “social” aspect of PFU makes more clear the distinction between the reasons and causes for PFU from the reasons and causes for the other types of compulsive behaviours happening on the Internet (like online gambling, gaming, and shopping). For this reason, a further aim of this study was to quantify the association between PIU and PFU in order to observe to what degree they can be considered overlapped phenomenona. By clarifying these specific aspects (i.e., the association with time spent online and with PIU), a better understanding may be obtained for this emerging phenomenon that continues to generate a great deal of debate among researchers, clinicians, and educators.

**1.3. Individual Characteristics Associated with Problematic Facebook Use**

Several attempts have been made to understand the personal profiles of Facebook users. It has been argued that the problems derived from a maladaptive use of Facebook could be due to specific individual characteristics of users, including being female and having an “unsocial personality” characterized by shyness, introversion, loneliness, rejection sensitivity, and social anxiety (e.g., Eraslan-Capan, 2015; Hong et al., 2014). Specifically, given their preference for social activities on the Internet (e.g., Beranuy, Oberst, Carbonell, & Chamarro, 2009; Colley & Maltby, 2008), females have been considered at greater risk for PFU than their male counterparts who, instead, have been thought to be more engaged with other Internet-related activities, such as gaming (e.g., Yen, Ko, Yen, Chang, & Cheng, 2009). However, whereas some studies reported that female Facebook users presented more addictive-like symptoms with regard to Facebook engagement than males (e.g., Andreassen, Griffiths, Gjertsen, Krossbakken, Kvam, & Pallesen, 2013; Delfour, Moreau, Laconi, Goutaudier, & Chabrol, 2015; Turel, He, Xue, Xiao, & Bechara, 2014), other studies showed that such difference is likely to be small or even null (Beyens, Frison, & Eggermont, 2016; Lee, 2015). Overall, whether gender plays a role in problematic Facebook use is still unclear. For this reason, it could be worthy to meta-analytically summarize findings on gender differences related to PFU to establish if males and females do present different levels of PFU.

Moreover, people with low levels of social skills and self-esteem are thought to be at increased risk to engage in problematic social networking sites use (Cam & Isbulan, 2012), as are people with certain personality traits, attachment styles, and motivations for use (e.g., Chabrol, Laconi, Delfour, & Moreau, 2017; Monacis, de Palo, Griffiths, & Sinatra, 2017; Moreau, Laconi, Delfour, & Chabrol, 2015; Ross, Orr, Sisic, Arseneault, Simmering, & Orr, 2009; Shaw, Timpano, Tran, & Joormann, 2015; Sheldon, 2008; Sheldon, Abad, & Hinsch, 2011). In other words, having a vulnerable personality, suffering from the judgement of significant others, or using Facebook to, for example, regulate unwanted moods have been considered as risk factors that might make users more prone to develop Facebook-related problems.

Among others, the Social Enhancement Theory and the Social Compensation Hypothesis (McKenna, Green, & Gleason, 2002; Valkenburg, Schouten, & Peter, 2005) are two opposite theoretical models most frequently used to explain the association between frequent Facebook use and individual characteristics. The first assumes that people with high levels of social skills tend to use Facebook in order to further improve their social connections (for example, this could be the case for extrovert people who are allowed to further express themselves on Facebook; Valkenburg et al., 2005). Conversely, the Social Compensation Theory proposes that people who perceive their social skills to be insufficient are more likely to extensively use social networking sites as an alternative to face-to-face social interactions (McKenna et al., 2002; Valkenburg et al., 2005). However, reducing problematic Facebook use simply to frequency of use is misleading. We argued that it could make a huge difference distinguishing the positive use of Facebook and the problematic features defining PFU. For this reason, one aim of the current study is to quantify the link between individual characteristics and PFU, not just frequency of use. The following paragraphs briefly review the major findings on the relationship between PFU and individual characteristics, that is, personality traits, self-esteem, and motivations for using Facebook.

**1.3.1. Problematic Facebook Use and Personality Traits**

A classic approach of categorizing personality is the widely used Five-Factor Model (Caprara, Barbaranelli, Borgogni, & Perugini, 1993; Caprara, Barbaranelli, & Livi, 1994). Briefly, this model identifies five dimensions in human personality: Extraversion (reflecting expansiveness and energy), Agreeableness (reflecting concern and politeness), Conscientiousness (reflecting orderliness and precision), Neuroticism (reflecting the incapacity to cope with anxiety and emotionality), and Openness (reflecting openness to novelty and interest toward different people and cultures). Given that model and measures for these five traits have been validated across several cultures (McCrae, Costa, del Pilar, Rolland, & Parker, 1998) and that most of the studies on PFU used this classification, this model has also been used as reference for the investigation of the associations between personality traits and problematic Facebook use in the current meta-analysis.

Personality traits are among the most investigated risk factors for PFU, following the recognition of these characteristics as vulnerable factors for the development of alcohol and substance dependence and behavioural addictions, including gambling and addiction to social network sites (Canale, Rubaltelli, Vieno, Pittarello, & Billieux, 2017; Grant, Potenza, Weinstein, & Gorelick, 2010). Whether considered as a proper behavioural addiction or not, problematic Facebook use has been investigated focusing on the role of certain personality traits in predicting both the use and the maladaptive use of the social network (e.g., Andreassen, Griffiths, Gjertsen, Krossbakken, Kvam, & Pallesen, 2013) because traits are likely to reflect individual differences related to skills and behaviours engaged in solving adaptive problems (Buss, 1991). In this view, several previous studies that have investigated the role personality traits in predicting different patterns of Facebook use and problematic use tried to explain which types of trait might associated with higher levels of PFU (e.g., Andreassen, Torsheim, Brunborg, & Pallesen, 2012). However, the real relationship between personality and PFU is still unclear (Błachnio, Przepiorka, & Pantic, 2016), with research sometimes showing opposite findings or, at least, inconsistent results. For example, low levels of emotional stability (i.e., neuroticism) appears to be the trait most frequently found to be associated with PFU due to the possibility that neurotic people tend to be less emotionally stable and may tend to use Facebook to regulate their mood. Nonetheless, whereas some studies found a clear positive association between high levels of neuroticism and PFU (e.g., Andreassen et al., 2012; Tang, Chen, Yang, Chung, & Lee, 2016), other studies found relatively weak associations (e.g., Andreassen et al., 2013; Lee, 2015). For this reason, it is crucial to meta-analytically understand the actual magnitude of this association. Moreover, while people low in extraversion were found to be more likely to engage in Facebook use in order to avoid the discomfort of real-world self-expression (as would be explained by the social compensation hypothesis; e.g., Bodroža & Jovanović, 2016; Amichai-Hamburger, Wainapel, & Fox, 2002), another study of Facebook addiction found extraversion to be positively related to PFU (Andreassen et al., 2012), thus suggesting that the more people are extrovert the more they will tend to engage in PFU. Similarly, people high in agreeableness have been found to use Facebook to enhance their interpersonal successes by posting and connecting with others (Marshall, Lefringhausen, & Ferenczi, 2015) and more likely to use Facebook problematically (e.g., Orosz, Tóth-Király, & Bőthe, 2016), while negative (e.g., Andreassen et al., 2012; 2013; Bodroža & Jovanović, 2016) or non-significant associations were found between this trait and PFU (e.g., Błachnio, Przepiorka, Senol-Durak, Durak, & Sherstyuk, 2017; Lee, 2015). Furthermore, people high in openness to experience have been observed to frequently find and share information (Hughes, Rowe, Batey, & Lee, 2012), but negative (e.g., Andreassen et al., 2013; Błachnio et al., 2017) or non-significant (e.g., Bodroža & Jovanović, 2016; Tang et al., 2016) associations have been found between this trait and PFU. Finally, those high in conscientiousness may strive for an ever-increasing number of friends or may overuse the organizing tools provided by Facebook (Amichai-Hamburger & Vinitzky, 2010) but negative relationships have been found also between PFU and this trait (e.g., Andressen et al., 2013; Blachnio et al., 2017; Bodroža & Jovanović, 2016; Lee, 2015).

The discrepancy between findings for Facebook use and PFU could be considered as a further sign that the quantity of Facebook use may significantly differ from problematic Facebook use. Moreover, the differences in direction and magnitude of the findings across studies indicated the need for a clear picture of which personality traits are actually more likely to play a role in PFU.

**1.3.2. Problematic Facebook Use and Self-Esteem**

A number of studies have supported that, like Internet addiction, PFU is likely to be related to low levels of social competence and self-esteem, and high levels of loneliness, shyness, and interpersonal sensitivity (e.g., Baturay & Toker, 2016; Eraslan-Capan, 2015; Hong et al., 2014; Malik & Khan, 2015). Eraslan-Capan (2015) argued that people with a personality style characterized by an excessive awareness of what others may think or feel about them are at greater risk to be problematic users. In other words, the oversensitivity about interpersonal relations and the perception of potentially negative judgements from others can lead to control behaviours, thus experiencing feeling of inferiority and inadequacy (Boyce & Parker, 1989). In Facebook context, the need for approval, the fragile inner self, having a fragile self-esteem and low self-worth are all factors that may help to understand the link between interpersonal sensitivity and the dependency on others thus limiting the quality of social relations (Hong et al., 2014). In this view, people with low levels of self-esteem and high social anxiety may encounter difficulties in social life and may tend to prefer to communicate online, for example via Facebook, because of their perception to have inadequate social skills, and their feeling uncomfortable in face-to-face communication (Boyce & Parker 1989). According to this tenet, Facebook could constitute a tool to promote individual self-esteem (Gonzales & Hancock, 2011; Steinfield, Ellison, & Lampe, 2008) by satisfying the need of belonging through communicating (Zhao, Grasmuck, & Martin, 2008) and enhancing peer acceptance (Yu, Tian, Vogel, & Kwok, 2010).

Moreover, Facebook allows people to present themselves through photographs, profile information, wall posts and self-presentational activities that may become problematic if considered the only possible way to interact with other people. Despite the positive mean Facebook may constitute, users holding a negative view of themselves have indeed been found to show a maladaptive use of the Internet and Facebook (Blachnio et al., 2016; Bozoglan, Demirer, & Sahin, 2013; De Cock, Vangeel, Klein, Minotte, Rosas, & Meerkerk, 2014).

In this specific field, two main models that explain the relations between self-esteem and Facebook use are known: the social compensation (that is, “the poor get richer”) and the “rich get richer” hypotheses. The first hypothesis sustains that Facebook had more beneficial effects for those with lower self-esteem by bridging social capital (Steinfield et al., 2008). According to Kraut and colleagues (2002) people with low self-esteem compensate their difficulties in social relations when using the Internet. The second hypothesis assumes that people with a high level of self-esteem also receive strong benefits on the Internet by reaching huge numbers of friends, being active online, “which means people who manage well in the real world will also manage well in the virtual world” (Błachnio et al., 2016, p. 702). Whereas these theories would predict that having both low and high levels of self-esteem could lead to frequently use Facebook for different, specific purposes, less is known about the particular relation between self-esteem and the actual problematic use beyond the frequency and purposes. Therefore, a further aim of the current study was to quantitatively summarize the magnitude of the association between self-esteem and problematic Facebook use in order to establish whether Facebook might be more detrimental for people with low or high levels of self-esteem.

**1.3.3. Problematic Facebook Use and Motivations for Using Facebook**

Motivations have been among the most commonly investigated antecedents of Facebook use in the last decade (Joinson, 2008; Papacharissi & Mendelson, 2011; for a review, see Ryan et al., 2014). A number of motivations have been outlined trying to explain why people engage in frequent Facebook use (for example, self-expression, information sharing, social connection, and using applications; e.g., Alhabash, Chiang, & Huang, 2014; Giannakos, Chorianopoulos, Giotopoulos, & Vlamos, 2013; Ryan et al., 2014). As highlighted in the narrative review by Ryan and colleagues (2014), most of these works used the Uses and Gratification paradigm (Papacharissi & Mendelson, 2011), the traditional theory used to explain the popularity of specific types of mass media by exploring the factors underlying their use (Katz, Blumler, & Gurevitch, 1973). About ten years ago, a first attempt to apply the Uses and Gratification theory to SNSs context was made by Raacke and Bonds-Raacke (2008) who reported that the main motivation for university students to use Facebook and MySpace was to form and maintain social connections. Since then, a wide number of studies have argued that the main motivation to use Facebook might be that of establishing and/or maintaining both online and offline relationships (e.g., Joinson, 2008; Kuss &Griffiths, 2011; Sheldon, 2008, 2009). Moreover, using this approach, it has been found the existence of instrumental motivations, directly linked to the tools Facebook provides, such as relationship maintenance through sending messages and posting on the friends’ wall, entertainment through reading other people’s profiles, passing time (Sheldon, 2008), developing new friendship relationships, and escapism (Floros & Siomos, 2013).

However, the majority of these studies investigated the relationship between gratifications and the sole frequency or the quantity of Facebook use but they did not include a measure for PFU (Ryan et al., 2014). At the time of Ryan’s review (2014), only few studies had directly explored the association between Facebook addiction and specific motivations such as social interaction, passing time, entertainment, companionship, and communication (e.g., Sharifah, Omar, Bolong, & Osman, 2011). Thereafter, other studies have been published specifically focusing on the link between different motives for Facebook use and problematic/addictive use (e.g., Dhaha, 2013; Koc & Gulyagci, 2013; Masur, Reinecke, Ziegele, & Quiring, 2014). As an example, studies showed that motives related to *social* purposes for Facebook use - for example, socialization (Bodroža & Jovanović, 2016; Koc & Gulyagci, 2013; Tang et al., 2016), companionship (Sharifah et al., 2011), communication, social interaction (Dhaha, 2013) - and motives related to *regulating one’s feelings* - for example, escapism (Masur et al., 2014) and passing time (Sharifah et al., 2011) - were likely to lead to PFU. In other words, it seems that people may engage in PFU if they use the social network to constantly interact with others or to escape from negative moods.

Therefore, beyond the motivations explaining a certain frequency of Facebook use, it has been outlined the importance of taking a closer look at the specific motivations that are more likely to be involved in the development of PFU, like the desire for mood modification, social facilitation, or boredom (Ryan, Reece, Chester, & Xenos, 2016). Indeed, according to the compensatory model of Internet use (Kardefelt-Winther, 2014), users are driven to use different Internet applications like SNSs to escape from negative moods, or to prefer frequent social online interactions if experiencing social anxiety (e.g., Caplan, 2010; Sheldon, 2008).

In this view, one of the keys to understanding the manifestation of PFU may be the types of psychological motives users maintain to satisfy their needs. However, as outlined above, different studies used different labels to assess approximately the same or very similar concepts. This fact hampers the possibility to have a clear picture of the types of psychological motivations involved in PFU. Moreover, to date, few studies have attempted to investigate such motivations by adopting a strong theoretically-based approach and the use of different operationalizations for motives made it difficult to meta-analyze each motive separately (e.g., Ryan et al., 2016). Therefore, another aim of the current study was to quantitatively summarize the association between problematic Facebook use and types of psychological motives so far found in the field.

For the purpose of the current study, the traditional motivational model for addictive behaviours has been used in order to group the different motives according to a theory-driven classification (Bischof-Kastner, Kuntsche, & Wolstein, 2014; Cox & Klinger, 1988). In this model, adults and adolescents’ problematic behaviours are driven by certain expectations to achieve desired effects. Firstly developed to understand alcohol use among adolescents (Cox & Klinger, 1988; Mazzardis, Vieno, Kuntsche, & Santinello, 2010), this model has been successfully adapted to several problematic behaviours, including gambling (Canale, Vieno, Griffiths, Rubaltelli, & Santinello, 2015), and Internet use (Bischof-Kastner et al., 2014). The motivational model allows to classify the list of motives for Facebook use through two orthogonal dimensions, that is, positive or negative *valence* (motives related to enhancing or reducing positive or negative feelings, respectively), and internal or external *source* (motives related to dealing with one’s own sensations or significant others, respectively). In this way, we would capture the two main reasons to engage in a problematic behaviour, that is regulating one’s own affection (trying to enhance positive feeling and reducing negative ones) and valuing the internal needs more important than the external ones or vice versa, in order to show which types of motive are more clearly associated with PFU. It should be noted that certain types of motives (e.g., communication: positive valence and external source) belong to more than one category depending on whether the source or the valence is considered.

**1.4. The Present Study**

While research on problematic Facebook use has dramatically increased in the last years, it is becoming difficult to have a full picture of its correlates and specific characteristics. The primary aim of this work is to synthesize findings from research on this topic. Moreover, as reviewed above, there are some debated issues that a meta-analysis on this topic could help clarify, such as the argument that females are more likely to be involved in PFU than male counterpart, the association (or possible overlap) of PFU with the more general construct of “Internet addiction” and with the frequency of use of the social network as well as the role played by some individual characteristics (e.g., personality traits), and motives. To this respect, the use of meta-analysis has distinct advantages over primary studies in providing greater statistical power because it aggregates data across samples from all studies.

In sum, in this study we summarized the relations between problematic Facebook use and both time spent online and on Facebook and Internet addiction in order to contribute to better define the phenomenon. Moreover we tested whether gender differences in levels of reported problematic Facebook use can be reliably detected. Furthermore, we reviewed the more frequently analyzed individual characteristics (i.e., personality traits and self-esteem) possibly involved in PFU, and motivations for Facebook use which have been usually considered as important predictors for PFU.

In reviewing the literature on problematic Facebook use, following what has been recently done in a meta-analysis on the associations between problematic Facebook use and psychological distress and well-being (Marino et al., 2017), we looked at the actual measurement items and construct definitions, rather than blindly relying on an article’s choice of term. That is, “problematic Facebook use,” “Facebook abuse,” “ Facebook intrusion,” and “Facebook addiction” were treated as the same construct; similarly, different types of motivation for Facebook use were categorized following the two dimensions described by the motivational model: (i) internal/external source and (ii) positive/negative valence (Bischof-Kastner et al., 2014; Cox & Klinger, 1988; for example “emotional motivation” and “coping” were both treated as internal motives, whereas “use of Facebook to be social” and “communication” were considered external motives; simultaneously, “emotional motivation” was also classified in the negative valence category, whereas “communication” and “to be social” were classified in the positive valence category).

Specifically, we hypothesized a series of associations between PFU and the variables of interest:

*H1: PFU will be positively associated with time spent online (and on Facebook) and with Internet addiction. However, we do expect these constructs to be moderately correlated, but not overlapping.*

*H2: PFU will be positively associated with neuroticism, extraversion and openness, and negatively associated with conscientiousness and agreeableness.*

*H3: PFU will be negatively associated with self-esteem.*

*H4: PFU will be positively associated with the four grouped motives. No specific hypotheses were formulated regarding the relative strength of the associations with the different categories of motives.*

As a secondary goal, when significant heterogeneity emerged, we explored the potential moderators to explain between-study variability of these effects. Sample characteristics, including mean age of participants, proportion of females, and geographic location of the sample were considered as potential moderators. First, similar to what has been found for other negative experiences online (Fisher, Gardella, & Teurbe-Tolon, 2016; Kowalski, Giumetti, Schroeder, & Lattanner, 2014) and for problematic Facebook use itself (Marino et al., 2017), the associations between problematic Facebook use and variables included in this studies (with relative signs) were hypothesized to be larger in older samples. Compared to adolescents, indeed, young adults are more likely to have longer experiences with this type of social network misuse and, therefore, may have more established individual characteristics related to such use. Second, we may expect the same associations to be stronger in samples with more females, who generally tend to be more sensitive than males to the adverse effects of stressful life experiences (e.g., Rose & Rudolph, 2006; Rudolph, 2002) and who have been hypothesized to be more susceptible than males, for examples, to lower levels of emotional stability or self-esteem. Third, testing for the potential effect of geographic location of the sample allowed us to explore whether the current findings can be generalized across countries and, in particular, whether the negative correlates of problematic Facebook use differ between Western and Asian countries, as Asian users have been found to be more addicted to the Internet in general than Western users (Kuss, Griffiths, Karila, & Billieux, 2014).

Finally, publication bias is a potential threat to any meta-analytic review, with concerns that unpublished studies are more likely to have smaller or statistically non-significant results and less likely to be included in a meta-analysis than published studies, yielding estimated effect sizes larger than those that actually exist. To reduce publication bias, efforts were made to include as many unpublished studies as possible. Moreover, a series of tests on publication bias were performed to verify any threat that could exist in our sample of data (see Method section). In addition, to check whether a significant difference existed between published and unpublished studies in the reported effect sizes, when possible, we also tested for the moderating effect of publication status.

**2. Method**

**2.1. Literature Search**

Multiple methods were used to search for eligible studies. Firstly, electronic search was conducted in April 2017 in PsychInfo, Pubmed, Scopus, ResearchGate, and Google Scholar with any of the following terms: “Facebook addiction,” “problematic Facebook use,” “Facebook abuse,” “excessive Facebook use,” “misuse of Facebook,” “Facebook intrusion,” “Facebook overuse,” “compulsive Facebook use,” “compulsive use of Facebook.” Secondly, recent review articles on Facebook and social networking sites (Andreassen, 2015; Baker & Algorta, 2016; Ryan, Chester, Reece, & Xenos, 2014) were reviewed for relevant citations. Thirdly, a “backward search” procedure was used to search for relevant earlier references across the reference sections of the collected articles. Moreover, because the Bergen Facebook Addiction Scale appears to be the most widely used scale, the “cited by” function in Google Scholar was used to find potentially relevant papers that cited the scale validation article by Andreassen and colleagues (2012). Authors of the retrieved articles were also asked for additional studies or unpublished datasets (we obtained four positive replies with this information). Moreover, the conference programs of the previous four editions of the International Conference on Behavioral Addiction (held in 2014, 2015, 2016, and 2017) were inspected in order to maximize the possibility of finding unpublished studies. Doctoral theses were also searched via Dissertation Abstracts International, Pro-Quest Dissertations and Theses Open, Open Access Theses and Dissertations, and Google. Finally, we searched the websites of relevant journals for recently added content, including Computers in Human Behavior, Cyberpsychology, Behavior and Social Networking, and Addictive Behaviors.

**2.2. Inclusion Criteria**

The key requisite for inclusion in the current meta-analysis was consideration of measures of problematic Facebook use. Studies were excluded if they measured problematic Internet use in general, instead of specifically problematic Facebook use, and if they included simple measures of Facebook use (e.g., frequency of Facebook use) but not of problematic Facebook use. Second, eligible studies were required to have enough quantitative information to calculate effect sizes. Therefore, qualitative studies based on focus groups or open-ended questions were excluded. Not only reports written in English were eligible for inclusion; also manuscripts written in other languages were included in the final sample of studies. Finally, both published reports (i.e., journal articles) and unpublished studies (e.g., conference papers, doctoral theses, unpublished datasets) were eligible. A flowchart that visually depicts the search process is provided in Figure 1. Once duplicates had been removed, the search produced 152 records. A screening of titles and abstracts identified 91 studies potentially eligible for inclusion (for 11 of them we were not able to obtain full-texts). Of these studies, 80 initially met the inclusion criteria. However, for 32 of them the information required for the computation of effect sizes were not available. Using our a-priori inclusion criteria, the final sample of the current meta-analysis included 47 studies reporting data from 52 independent samples. More specifically, as shown in Table 1, some studies reported data for more than one sample and they have been considered separately (e.g., Bodroža et al., 2016; Orosz et al., 2015).

All included studies were coded independently by the first and the second author, recording authors and year of publication, publication status, the type of problematic Facebook use measure, sample size, national setting, and demographic characteristics of samples (mean age, proportion of females). In the few cases when there was disagreement among the coders, discrepancies were discussed until agreement was met.

**2.3. Data Analysis**

Gender differences in problematic Facebook use were computed as standardized mean difference (Cohen’s *d*), whereas the association between problematic Facebook use and all other variables was coded as a Pearson’s correlation coefficient (*r*). This information was directly extracted from the research reports when available or was calculated from the reported data (e.g., means and standard deviations of problematic Facebook use of male and female participants for Cohen’s *d*) following standard procedures (e.g., Borenstein, Hedges, Higgins, & Rothstein, 2009; Card, 2012). When enough information to compute effect sizes was not reported, we contacted the corresponding authors to ask for an ad hoc analysis (if no response was received, a second e-mail was sent two weeks after the first one; we received the requested data for 17 out of 38 requests).

Data analyses were performed with the statistical software R (R Core Team, 2013) using the metafor R package (Viechtbauer, 2010). Prior to combining effect sizes, data from each study were weighted by the inverse of their variance (Hedges & Olkin, 1985) and then combined using a random effects model, which assumes a distribution of effect sizes as compared to the fixed effect model that assumes a single population effect size (Card, 2012; Field & Gillett, 2010; Hedges & Vevea, 1998). Because the use of correlation coefficients can result in problematic error formulation, the correlation coefficient for each study was converted to the Fisher’s *z* scale, and all analyses were performed using the transformed values (Lipsey & Wilson, 2001; Rosenthal, 1991). Then, the resulting summary effect and its confidence interval were converted back to correlations for ease of interpretation. A 95% confidence interval (CI) was computed around each mean effect size. Confidence intervals not including zero were interpreted as indicating a statistically detectable result supporting (i) gender differences in mean levels of problematic Facebook use or (ii) associations between problematic Facebook use and individual characteristics.

Heterogeneity was assessed using the *Q* statistic (which is distributed as χ2 with *df* = *k*-1, where *k* represents the number of effect sizes; Lipsey & Wilson, 2001), evaluating whether the pooled studies representeda homogeneous distribution of effect sizes. Significant heterogeneityindicates that variations in effect sizes are likely due to sources other than sampling error (e.g., study characteristics). Also reported is the *I2* statistic, indicating the proportion of observed variance that reflects real differences in effect size (Higgins, Thompson, Deeks, & Altman, 2003). Moderator analyses (mixed-effects metaregressions) were conducted to examine this variability. Due to the small number of studies in each category and concerns about statistical power, we assessed the effects of moderators one at a time.

**2.4. Publication Bias**

We also evaluated the potential “publication bias” in different ways. The association between the effect sizes and the variances of these effects was analyzed by rank correlation with use of the Kendall’s *tau* method. If small studies with negative results were less likely to be published, the correlation between variance and effect size would be high. Conversely, lack of significant correlation can be interpreted as absence of publication bias (Begg & Mazumdar, 1994). However, the rank correlation test may only have moderate power for small meta-analyses (Begg & Mazumdar, 1994; Sterne, Gavaghan, & Egger, 2000). An alternative test that is better suited to smaller meta-analyses is Egger’s regression test (Egger, Davey Smith, Schneider, & Minder, 1997). The latter tests for the symmetry of the funnel plot, with significant asymmetry indicating possible publication bias. Finally, the trim-and-fill method tests whether any study need to be imputed in an asymmetric funnel plot and how this imputation changes the effect size estimate (Duval & Tweedie, 2000). This collection of multiple approaches represents a thorough examination of potential publication bias: both the Kendall’s tau and Egger’s regression quantify whether publication bias is present. The trim-and-fill method suggests corrections to effect sizes based on any evidence of publication bias.

**3. Results**

We begin our presentation of results by briefly describing the general characteristics of the studies included in the meta-analysis. The 56 independent samples analyzed in this meta-analysis included data on 27,867 participants (59.22% females). The mean age of the participants across the collection of studies was 23.94 years (*SD*=4.75; information not available for 4 samples), with sample means ranging from 16.5 to 46.4 years. Participants were from several different countries across the world: 9 samples were from Asian countries, 45 from Western countries, plus 2 from Africa. All studies used self-report scales to measure both problematic Facebook use and individual characteristics. 45 out of 56 studies used either the Bergen Facebook Addiction scale (*k*= 20) or the Internet Addiction test (IAT; *k*=25) as measure of problematic Facebook use; the remaining studies used a variety of other measures including the Problematic Facebook Use scale, Facebook Intrusion, Excessive Facebook Use, etc. A summary of information about each study is presented in Table 1. In the next paragraphs we described the results of the meta-analyses separately for each construct. Results of these analyses are summarized in Table 2.

**3.1. Gender Differences in Problematic Facebook Use**

Data for analysis on gender differences were available for 41 independent samples. For each of these samples we coded a standardized mean difference (Cohen’s *d*) in problematic Facebook use as comparison between female and male participants, that is, a positive effect *d* is indicative of a higher problematic Facebook use in females, whereas a negative *d* indicates the opposite result. Meta-analytic results of the random-effects model showed a small, positive effect *d* = .15, which was significantly different from zero (*Z* = 3.56, *p* < .001), with a 95% CI ranging from .07 to .24.

There was significant heterogeneity among the 41 effect sizes (*Q*(40) = 294.84, *p* < .001; *I2* = 86.9%). Therefore, we performed mixed effects moderator analyses to identify potential sources of this heterogeneity (Borenstein et al., 2009; Hedges & Vevea, 1998; Lipsey & Wilson, 2001). Results of metaregression analysis , which are summarized in Table 3, did not yield statistically significant effects of moderators.

**3.2. Associations between Problematic Facebook Use, Time Spent Online and Internet Addiction**

The pooled effect size for the association between problematic Facebook use and overall time spent online was *r* = .32, 95% CI [.28, .36], *k*=30, *Z* = 14.15, *p* < .001. Heterogeneity of effects across studies (*Q*(29)=193.56, *p*<.001, *I2* =87.6%) was explored through moderator analysis. The estimated correlation was significantly larger in samples with more females (*β* =.006, *p*<.001). Age and national setting did not significantly moderate this effect. A subsequent analysis on a subgroup of studies that considered the amount of time specifically spent on Facebook yielded a similar mean correlation of *r* = .34, 95% CI [.29, .38], *k*=26, *Z* = 13.63, *p* < .001.

Regarding Internet addiction, the estimated correlation with problematic Facebook use was *r* = .59, 95% CI [.52, .65], *k*=14, *Z* = 13.89, *p* < .001. Significant heterogeneity emerged *Q*(13)=206.74, *p*<.001, *I2* = 94.7%. However, none of the possible moderators significantly explained such heterogeneity.

**3.3. Associations between Problematic Facebook Use, Personality and Self-Esteem**

Results about the Big Five personality traits showed that the traits more clearly correlated with problematic Facebook use were neuroticism and conscientiousness with opposite signs: a mean positive correlation of *r* = .22, 95% CI [.19, .26], *k*=16, *Z* = 10.96, *p* < .001 for neuroticism, and a mean negative correlation of *r* = -.16, 95% CI [-.21, -.09], *k*=15, *Z* = -4.82, *p* < .001 for conscientiousness. The other three traits were negatively, but only mildly associated with problematic Facebook use (for detailed results see Table 2). Moderator analyses showed that the mean age of the sample significantly moderated the link between problematic Facebook use and openness (*β* =.017, *p*<.001), indicating that this effect was larger for older samples.

Regarding self-esteem, as expected the effect was negative, *r* = -.23, 95% CI [-.28, -.18], *k*=8, *Z* = -8.39, *p* < .001. Significant heterogeneity emerged also for this variable (*Q*(7)= 15.65, *p*<.05) but none of the moderators were significant.

**3.4. Associations between Problematic Facebook Use and Motives**

Finally, we tested the associations between problematic Facebook use and different types of motives. As detailed in the introduction, a first conceptual distinction was made between motives with an internal source (i.e., coping, information seeking, etc.) and those with external sources (i.e., socialization, conformity, etc.). Both types of motives were positively associated with problematic Facebook use (*r* = .44, 95% CI [.36, .51] for internal sources; *r* = .33, 95% CI [.27, .38] for external sources), but the effect was comparatively larger for motives related to internal sources (difference = .11, 95% CI [.02, .20]).

Similarly, regarding the second type of categorization, both motives with negative valence (*r* = .44, 95% CI [.37, .51]) and motives with positive valence (*r* = .34, 95% CI [.29, .39]) were positively associated with problematic Facebook use. The effect related to motives with negative valence was significantly larger (difference = .10, 95% CI [.01, .19]).

Significant heterogeneity emerged for all these effects. Age did moderate the link between motives with external source and problematic Facebook use (*β* = -.011, *p*<.05); that is, external sources were more associated with problematic Facebook use in younger samples. Moreover, geographical location of the samples moderated the effect related to motives with negative valence (*β* =.202, *p*<.01) indicating that this effect was larger in samples from Western countries compared to Asian countries. However, only 3 samples from Asian countries were available for this analysis.

**3.5. Publication Bias**

Finally, we evaluated potential publication bias in different ways (see Table 4). First we calculated the rank correlation Kendall *tau* and the Egger’s regression test. Second, we checked whether additional studies needed to be imputed according to the trim and fill method. Overall, the results of these sets of analyses suggested that the results of our meta-analyses were unlikely to be impacted by publication bias. Only in two cases (i.e., conscientiousness and motivations for using Facebook with positive valence), the estimated effects were potentially threatened by publication bias. Kendall’s and Egger’s tests indicated significant funnel plot asymmetry and the trim and fill method suggested the imputation of three additional studies on the right side of the funnel plot for conscientiousness, and the imputation of one additional study on the left side of the funnel plot for motives with positive valence. However, in both cases, the “corrected” effect size remained substantially unchanged (*r* = -.12 and *r* = .34, respectively). In two further case (i.e., openness and agreeableness), whereas Kendall’s and Egger’s tests were not significant, the trim and fill method suggested the imputation of 5 and 4 additional studies on the right side of the funnel plot respectively, which produced a smaller corrected effect of -.02 in both cases.

**4. Discussion**

In this comprehensive meta-analysis, we summarized for the first time the research findings on the association between problematic Facebook use (PFU), time spent online, and Internet addiction, as well as gender differences, and individual correlates of PFU. The main findings showed a small gender effect favoring females. Moreover, problematic Facebook use was positively correlated with time spent online and Internet addiction, and negatively with self-esteem. Among the Big Five personality traits, neuroticism and conscientiousness were the most clearly traits associated with PFU. Furthermore, all types of motives were associated with PFU with the strongest associations observed between PFU and motives with internal source and motives with negative valence. Importantly, analyses on publication bias showed that these results were quite robust.

Beyond statistical significance, of interest in meta-analysis is the interpretation of effect sizes to determine whether their magnitude represents something psychologically important. The effect sizes yielded by the present meta-analysis can be considered small-to-medium according to Cohen’s criteria, and medium-to-large according to Hemphill’s criteria[[1]](#footnote-1). These “standard” benchmarks, however, have been criticized because they are purely conventional, and somewhat arbitrary, whereas practical and clinical importance depends on the situation researchers are dealing with (e.g., Kline, 2004; Thompson, 2002).

As regard the association between PFU and time spent online, the medium correlation found in our results indicated that the amount of use of Internet applications including Facebook is, as expected, part of PFU. Nonetheless, this association is not big enough to allow inferences about the “equivalence” between engagement and problematic engagement. In other words, our meta-analytic finding clearly indicated that the amount of time spent online be considered a component of problematic Facebook use—with more time spent online indicative of potential problematic use—but it is not exhaustive of this phenomenon. Indeed, it is plausible that the majority of people who frequently use the Internet to achieve positive and functional outcomes (such as, school or work purposes) do not suffer from addictive symptoms (Pontes et al., 2015). On one hand, spending time on SNSs is probably an adaptive behaviour in the current “communication landscape” (Carbonell & Panova, 2017). On the other hand, as recently pointed out by Carbonell and Panova (2017), engagement in prolonged periods of time in SNSs use, when excessive, may cause negative consequences (for example, sleep deprivation and school jeopardizing). For this reason, it could be argued that the time spent online is just a part, although important, of the story to tell about PFU. Moreover, all the studies included in this work used self-reported estimations for the amount of time spent online, thus actually hampering the possibility to understand the proper association with self-reported PFU. Indeed, it has been showed that non-problematic users tend to over-estimate the amount of time they actually spend online whereas problematic users tend to underestimate it (e.g.,; Fenichel, 2009; Junco, 2012; Rosen, Whaling, Rab, Carrier, & Cheever, 2013). Therefore, this result might be considered cautiously.

Another important result of the current meta-analysis that may speak for a better conceptualization of PFU itself is the relatively large correlation between Internet addiction and PFU. In line with our hypothesis, this association indicated that PFU could be considered, to an extent, a subtype of PIU (e.g., Hong et al., 2014). At the same time, such correlation also suggests that PIU and PFU are not fully overlapping phenomena, but they are likely to have distinctive features. Hence, deepening our understanding of the specific features of PFU and PIU could be of value in order to highlight if is the “social” nature of the SNS (or other characteristics) which does differentiate the two concepts. Overall, this finding supports the importance of studying problematic Facebook use as a unique phenomenon. Research on this topic may benefit from similar research of problematic Internet use, but should also try to identify unique features and correlates of this phenomenon.

With regard to the individual characteristics of Facebook users, results yielded that being female could be considered a weak risk factor for PFU, despite the large literature suggesting otherwise (e.g., Przepiorka & Blachnio, 2016; Turel et al., 2014). A reasonable explanation of this gender difference may lie in females’ preference for social activities on the Internet (e.g., Beranuy et al., 2009; Colley & Maltby, 2008) that may more easily escalate in problematic use with more addictive-like symptoms (e.g., Andreassen et al., 2013; Delfour et al., 2015; Turel et al., 2014).

Moreover, despite a large body of research focusing on the role of personality in problematic use, only two personality traits appeared to be clearly linked to PFU, namely neuroticism and conscientiousness. The positive, though not large, correlation between neuroticism and PFU appeared to sustain the hypothesis that Facebook could constitute a strategy for mood regulation and support seeking for people with low levels of emotional stability (Andreassen et al., 2012). Conversely, people high in conscientiousness seem to be less likely to engage in PFU. Andreassen has provided a possible explanation for this result and colleagues (2012) who argued that conscientious people might be more occupied with other duties and deadlines, thus giving less importance to unnecessary activities like Facebook (Wilson, Fornasier, & White, 2010). Furthermore, this “protective” effect of conscientiousness is in line with previous findings about other types of problematic behaviours, showing that such trait reduced the likelihood of abusing alcohol and illicit substances (Kloos, Weller, Chan, & Weller, 2009).

The correlation between PFU and the other three traits appeared to be almost null. In fact, results suggested that extraversion might be not that important as outlined in previous studies in predicting PFU (e.g., Andreassen et al., 2012; Błachnio et al., 2017) and hypothesis on this association should be taken with prudence. In sum, because only two personality traits appeared to play a relatively moderate role in PFU, design of future studies should consider that personality traits might not be the best predictors for PFU. Research efforts, therefore, should be better devoted to the identification of other, more meaningful correlates of problematic Facebook use.

As regard self-esteem, the small-to-medium correlation found in the present study appeared to be weaker than generally expected (Baturay & Toker, 2016). Nonetheless, this negative association indicated that PFU may be more frequent in people with low self-esteem, thus sustaining the social compensation hypothesis (McKenna et al., 2002; Valkenburg et al., 2005). However, there is no consensus on whether low self-esteem can be considered as a cause of PFU or a detrimental effect (e.g., Gonzales & Hancock, 2011). Therefore, longitudinal studies are warranted to explore the direction of this link.

Finally, motives for Facebook use appeared to be the most meaningful correlates of PFU included in this meta-analysis, with motives with internal source and those with negative valence being the strongest. The robustness of these results is supported by similar findings in other fields showing that these two dimensions are the most problematic for risky behaviours (Bischof-Kastner et al., 2014). The two main reasons leading to PFU appeared (i) using Facebook to be able to regulate one’s own affection and, specifically, trying to reduce negative moods, and (ii) using Facebook to try to meet the internal/emotional needs (such as, coping or passing time – e.g., Ryan et al., 2016). In other words, it seems that the major motive involved in PFU is a self-regulation motive and this is potentially interesting also for the definition of the phenomenon itself: in fact, the attempt to reduce unwanted feelings and to feel better are motives that corroborate the conceptualization of PFU as a maladaptive coping strategy rather than a proper behavioral addiction (Kardefelt-Winther et al., 2017).

**4.1. Moderators**

As expected, significant heterogeneity across effect sizes was also observed, and some significant a-priori moderators were tested. Although the limited number of studies in some moderator categories tempers this contribution, the results are nevertheless suggestive and worthy of consideration in future research.

Regarding the age of samples, results of the meta-regression showed that the association between external motives and PFU was larger in younger samples (that is, samples with lower mean age). A possible explanation for the first result could be based on the different meaning the use of Facebook (perhaps even more than other Internet applications) has for adolescents compared to adults in everyday life. Indeed, given the different developmental tasks adolescents and adults have to deal with (Sugerman, 2004), it could be supposed that Facebook users might tend to differ in the motivations underlying their engagement in this social network. For example, adolescents may use Facebook more for recreational and social motives, because social interactions with peers, social inclusion, and social comparison represent important characteristics and goals of this stage of life (e.g., Bee, 1994; Brechwald & Prinstein, 2011). Conversely, for adults focused on work, family, and responsibilities (Rice, 1995), Facebook might represent a way to escape from everyday problems and stress, and to seek for pleasant emotions (Bee, 1994).

Second, the association between openness and PFU was larger in older samples (that is, samples with higher mean age). A possible explanation for the larger, though weak, association between openness and PFU among older samples is that this trait had been found to become more relevant from adolescence to young adulthood (Roberts & Mroczek, 2008). Therefore, it could be speculated that openness to novelty, interest in new people, and the tendency to frequently find and share information (typical of people high in openness) may more easily escalate in a more problematic use of Facebook for older users.

With regard to the percentage of females of the samples, results showed that the association between time spent online (and specifically on Facebook) and PFU tended to be stronger in samples with more females. Previous studies proposed that females spend more time on Facebook because they are more inclined to social activities than male counterparts (Lee, Chang, Lin, & Cheng, 2014); and the “social” nature of Facebook might encourage women to frequently engage in SNSs use (Kittinger et al., 2012), thus increasing the probability to problematically use Facebook.

Finally, with regard to the geographical location of the studies included in the current meta-analysis, meta-regression showed that only the association between motives with negative valence and PFU tended to be larger in samples from Western countries than in samples from Asian countries. However, this finding should be taken with great caution because we were able to compare only three samples from Asian countries with more samples from Western countries. It would be interesting for future cross-cultural studies to explore the possibility that the motives for using Facebook are somewhat different in different cultural contexts. Results of such studies would deepen our understanding of the phenomenon, but would also better inform prevention and education strategies aimed at different cultural groups.

Regarding the remaining associations between PFU and individual variables, none of the moderators significantly explained between-study variability of effect sizes. First, in our review it was apparent that almost all available studies analyzed either one type of individual characteristic or very few variables together. Future studies that concurrently analyze, for example, different individual and contextual characteristics in people who use Facebook problematically are warranted.

**4.2. Limitations and Future Directions**

Although this first, comprehensive meta-analysis makes important contributions to understanding the phenomenon of PFU and the relations between PFU and individual characteristics, there are limitations that need to be kept in mind. First, this meta-analysis relied exclusively on concurrent associations. Even though this reliance was imposed by the extant studies, findings should be taken cautiously. Unfortunately, this research field is still dominated by cross-sectional studies that hamper the possibility to establish the direction of the association between problematic Facebook use and individual characteristics. Time is ready for longitudinal investigations able to shed light on the long-term relations between problematic Facebook use and various correlates of this phenomenon. Moreover, this type of studies would be able to answer the question whether such relations tend to remain stable over time, or they change in strength in different life periods.

Second, in the current study, we were not able to include the frequency of use of different Facebook activities due to the extreme (and non-comparable) variety of measures of such activities used across studies. Therefore, future studies should adopt different strategies to collect data about the specific activities problematic Facebook users engage in; in particular, it would be important to avoid relying only on general self-report measures, whereas other methodologies, including the collection of information about participants’ real Facebook activities (see for example Marino, Finos, Vieno, Lenzi, & Spada, 2017), may be particularly informative.

Third, although we aimed to identify studies conducted throughout the world, the eventual pool of eligible studies contained almost only samples from Western countries. There was very limited representation from other countries of the world where most of the world’s population is located (Asia, Africa, and South America). This restricted sample limits the generalizability of the current findings. A useful direction for the field of problematic Facebook use will be to investigate these relations across a wider range of countries and cultures, which may differ in the availability of technology, especially to adolescents, the amount of adult monitoring of technology use, and so forth.

Moreover, although the positive associations between PFU and several individual variables are established, in reviewing studies for this meta-analysis the lack of research investigating moderators and mediators of these associations was readily apparent. Little is known about how problematic Facebook use interacts with other individual risk factors, such as lack of face-to-face interaction skills and lack of social support among many others, that may make some people more likely to use Facebook in an unsafe manner or that may worsen the negative effects of PFU (Marino et al., 2017). Overall, the individual and contextual factors that may buffer or exacerbate the relation of PFU with personality traits or motives remain unclear. This further confirms that the research on PFU is still in its infancy and future studies about related risks and protective factors would advance this research line and may better inform clinical and prevention work on PFU.

Table 1. Summary of Studies Included in the Meta-Analysis

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| First author (Year)  | Sample size  | % of females | Mean age of sample | National setting | Publication status | Variables included in meta-analysis |
| Andreassen (2012) | 423 | 53.7 | 22 | Norway | Published | Gender, time spent on Facebook, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) |
| Andreassen (2013)  | 218 | 79.2 | 20.7 | Norway | Published | Gender, Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) |
| Balci (2013) | 903 | 59.4 | 21.1 | Turkey | Published | Time spent on Facebook |
| Baturay (2016) | 120 | 52.5 | 21.46 | Turkey | Published | Time spent on Facebook, self-esteem |
| Beyens (2016) | 371 | 57 | 16.41 | Belgium | Published | Gender, motives (external source, negative valence, positive valence) |
| Blachnio (2015) | 672 | 65 | 27.53 | Poland | Published | Daily Internet time |
| Blachnio (2016) | 445 | 79.1 | 26.95 | Serbia | Published | Self-esteem |
| Blachnio (2016)  | 452 | 67 | 21.04 | Poland | Published | Personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) |
| Blachnio (2017, sample 1) | 350 | 67 | 20.87 | Poland | Published | Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) |
| Blachnio (2017, sample 2) | 320 | 66 | 21.94 | Turkey | Published | Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) |
| Blachnio (2017, sample 3) | 341 | 66 | 21.7 | Ukraine | Published | Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) |
| Bodroža (2016, sample 1)  | 359 | 79.4 | 21.29 | Serbia | Published | Gender, time spent on Facebook, self-esteem, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (external source, positive valence) |
| Bodroža (2016, sample 2) | 445 | 79.1 | 26.95 | Serbia | Published | Gender, time spent on Facebook, self-esteem, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (external source, positive valence)  |
| Caci (2017) | 300 | 49 | 46.40 | Italy | Published | Gender, time spent on Facebook, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) |
| Çam (2012) | 1257 | 58.8 | / | Turkey  | Published | Gender |
| Chabrol (2016) | 456 | 76 | 20.5 | France | Published | Gender, motives (internal source, external source, negative valence, positive valence) |
| Dantlgraber (2016) | 841 | 62 | 27.5 | Austria | Published | Gender |
| Dhaha | 309 | 16 | 30 | Somalia | Published | Motives (internal source, external source, positive valence) |
| Elphinston (2013) | 305 | 63.9 | 19.75 | Australia | Published | Gender, time spent on Facebook |
| Eraslan-Capan (2015)  | 349 | 64.2 | 20.8 | Turkey | Published | Self-esteem |
| Gerson (2016)  | 337 | 59.6 | 36.5 | United Kingdom | Published | Gender, motives (external source, negative valence) |
| Hong (2014) | 241 | 41.5 | 20 | Taiwan | Published | Gender, time spent on Facebook, self-esteem, personality traits (neuroticism, extraversion) |
| Hong (2016) | 225 | 30.2 | 20 | Taiwan | Published | Gender, time spent on Facebook, motives (internal source, negative valence, positive valence) |
| Hormes (2014) | 253 | 62.8 | 19.68 | United States | Published | Gender, time spent on Facebook, Internet addiction  |
| Jafarkarimi (2016) | 441 | 49 | 24.8 | Malaysia | Published | Gender, time spent on Facebook,  |
| Khumsri (2015) | 872 | 63 | 16.6 | Thailand | Published | Time spent on Facebook, |
| Kimpton (2016) | 273 | 71.8 | 19.72 | Australia  | Published | Gender |
| Kittinger (2012)  | 281 | 72 | 20.17 | United States | Published | Internet addiction |
| Koc (2013) | 447 | 22 | 21.64 | Turkey | Published | Time spent on Facebook, motives (internal source, external source, positive valence) |
| Laconi (2016a) ^ | 822 | 55.3 | 21.64 | France | Unpublished | Gender, Internet addiction, self-esteem |
| Laconi (2016b) ^ | 1068 | 62.7 | 26.64 | France | Unpublished | Gender, Internet addiction |
| Lee E.B. (2015) | 304 | 56 | 22.45 | United States | Published | Gender, personality traits (neuroticism, extraversion, agreeableness, conscientiousness) |
| Lee Y.L. (2015) | 188 | 63.8 | / | Malaysia | Published | Gender, time spent on Facebook |
| Lee Z.W.Y. (2012)  | 200 | 52 | 21.26 | Hong Kong | Published | Gender, time spent on Facebook |
| Malik (2015) | 200 | 50 | / | Pakistan | Published | Gender, self-esteem |
| Marino (2016a) | 822 | 77.1 | 21.17 | Italy | Published | Gender, time spent on Facebook, Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (internal source, external source, negative valence, positive valence) |
| Marino (2016b) | 968 | 37.3 | 17.19 | Italy | Published | Gender, Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (internal source, external source, negative valence, positive valence) |
| Marino (2016c) ^ | 637 | 62 | 16.62 | Italy | Unpublished | Gender, time spent on Facebook, Internet addiction, self-esteem |
| Marino (2016d) ^ | 455 | 83.5 | 22.38 | Italy | Unpublished | Gender, time spent on Facebook, Internet addiction, self-esteem, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (internal source, external source, negative valence, positive valence) |
| Masur (2014) | 581 | 67.1 | 28.84 | Germany | Published | Gender, motives (internal source, external source, negative valence, positive valence) |
| Muench (2015) | 489 | 65.6 | / | United States | Published | Time spent on Facebook |
| Olufadi (2016) | 2049 | 57 | 32.43 | Nigeria | Published | Daily Internet time |
| Orosz (2016, sample 1) | 512 | 64 | 22.11 | Hungary | Published | Gender, time spent on Facebook |
| Orosz (2016, sample 2) | 566 | 64.1 | 24.21 | Hungary | Published | Gender, time spent on Facebook, online sociability, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)  |
| Orosz (2016, sample 3) | 531 | 74 | 23.81 | Hungary | Published | Gender, time spent on Facebook |
| Orosz (2016) | 257 | 70 | 20.04 | Hungary | Published | Gender, time spent on Facebook, motive (positive valence) |
| Przepiorka (2016 | 756 | 59 | 21.38 | Poland | Published | Gender, daily Internet time, Internet addiction |
| Ryan (2016) | 417 | 68.6 | 31.57 | Australia | Published | Gender, time spent on Facebook, motives (external source, positive valence) |
| Satici (2014) | 248 | 56 | 21.5 | Turkey | Published | Gender, daily Internet time |
| Satici (2015) | 311 | 58 | 20.86 | Turkey | Published | Gender |
| Sharifah (2011) | 380 | 100 | 23.5 | Malaysia | Published | Motives (internal source, external source, negative valence, positive valence) |
| Sigerson (2017) | 978 | 56.2 | 35 | United States | Published | Gender, Internet addiction |
| Tang (2016) | 894 | 65 | 20.5 | Taiwan  | Published | Gender, time spent on Facebook, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (internal source, external source, positive valence)  |
| Turel (2014) | 45 | 50 | 20.03 | United States | Published | Gender, motive (negative valence) |
| Uysal (2013) | 297 | 53 | 20.1 | Turkey | Published | Gender |
| Walburg (2015) | 286 | 59.8 | 16.5 | France | Published | Gender |

Notes: ^= Unpublished datasets provided by authors without title or related draft paper.

Table 2. Summary of Meta-Analytic Results

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | *k* | *N* | *ES* | 95% CI | Z | *Q*(df=k-1) | *I2*(%) |
| Gender (females vs. males) | 41 | 20065 | .15 | .07, .24 | 3.56\*\* | 294.84\*\* | 86.9 |
| Time spent online | 30 | 15593 | .32 | .28, .36 | 14.15\*\* | 193.56\*\* | 87.6 |
| Time spent on Facebook | 26 | 11868 | .34 | .29, .38 | 13.63\*\* | 152.36\*\* | 86.5 |
| Internet addiction | 14 | 8252 | .59 | .52, .65 | 13.89\*\* | 206.74\*\* | 94.7 |
| Personality traits |  |  |  |  |  |  |  |
| Neuroticism | 16 | 7458 | .22 | .19, .26 | 10.96\*\* | 45.93\*\* | 66.9 |
| Extraversion | 16 | 7458 | -.06 | -.11, -.001 | -1.998\* | 103.03\*\* | 81.6 |
| Openness | 14 | 6913 | -.07 | -.13, .001 | -1.96^ | 80.43\*\* | 87.2 |
| Agreeableness | 15 | 7217 | -.06 | -.12, .001 | -1.92^ | 90.03\*\* | 84.0 |
| Conscientiousness | 15 | 7217 | -.16 | -.21, -.09 | -4.82\*\* | 106.16\*\* | 86.3 |
| Self-esteem | 8 | 3205 | -.23 | -.28, -.18 | -8.39\*\* | 15.65\* | 53.8 |
| Motives for Facebook use |  |  |  |  |  |  |  |
| Internal source | 10 | 5537 | .44 | .36, .51 | 10.12\*\* | 106.24\*\* | 91.2 |
| External source | 14 | 7241 | .33 | .27, .38 | 11.64\*\* | 80.23\*\* | 82.9 |
| Negative valence | 10 | 5489 | .44 | .37, .51 | 10.74\*\* | 102.32\*\* | 90.1 |
| Positive valence | 15 | 7386 | .34 | .29, .39 | 12.34\*\* | 76.67\*\* | 82.6 |

Notes: ^*p*<.06, \**p*<.05, \*\**p*<.001; *k* = number of independent samples; *N* = number of participants; *ES* = effect size; CI = confidence interval.

Table 3. Moderator Analyses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Mean age | % females | Geographical locationa | Publication statusa |
| Genderb | .007 | /  | .159 | -.093 |
| Time spent online | -.003 | .006\*\*\* | .060 | -.101 |
| Time spent on Facebook | -.002 | .006\*\*\* | .081 | -.085 |
| Internet addiction | -.005 | .004 | / | .126 |
| Personality traits |  |  |  |  |
| Neuroticism | .004 | -.002 | -.052 | .097 |
| Extraversion | .008 | .0002 | -.085 | .066 |
| Openness | .017\*\*\* | -.001 | -.084 | -.025 |
| Agreeableness | .008 | -.001 | .024 | -.036 |
| Conscientiousness | -.003 | -.002 | -.028 | -.239\* |
| Self-esteem | -.003 | -.001 | -.099 | -.013 |
| Motives for Facebook use |  |  |  |  |
| Internal source | .011 | .001 | .147 | / |
| External source | -.011\* | .001 | .049 | / |
| Negative valence | -.006 | .001 | .202\*\* | / |
| Positive valence | -.009 | .0003 | .009 | / |

Note: \**p*<.05, \*\**p*<.01, \*\*\**p*<.001; a analyses were performed only when at least two studies per category were available; b Proportion of females in the sample was not tested for gender differences because it is not meaningful for this effect.

Table 4. Summary of Analyses Evaluating Publication Bias

|  |  |  |  |
| --- | --- | --- | --- |
|  | Kendall’s rank correlation | Egger’s test | *N* of studies to be imputeda |
| Tau | *p* | *Z* | *p* |
| Gender  | .010 | .938 | 1.428 | .153 | 0 |
| Time spent online | -.028 | .830 | -0.802 | .422 | 0 |
| Time spent on Facebook | -.129 | .355 | -1.405 | .160 | 0 |
| Internet addiction | .287 | .154 | 1.820 | .069 | 0 |
| Personality traits |  |  |  |  |  |
| Neuroticism | -.300 | .116 |  -2.011 | .044 | 0 |
| Extraversion | .217 | .265 | 1.912 | .056 | 0 |
| Openness | -.121 | .591 | .246 | .806 | 5 |
| Agreeableness | .086 | .697 | -.218 | .828 | 4 |
| Conscientiousness | -.448 | .021 | -3.073 | .002 | 3 |
| Self-esteem | -.143 | .720 | -1.045 | .296 | 0 |
| Motives for Facebook use |  |  |  |  |  |
| Internal source | -.289 | .291 | -.338 | .735 | 0 |
| External source | -.297 | .157 | -1.798 | .072 | 0 |
| Negative valence | -.333 | .216 | -.942 | .346 | 0 |
| Positive valence | -.543 | .004 | -2.711 | .007 | 1 |

Note: a according to trim and fill method

Figure 1. Flow Diagram of Study Inclusion

Records identified with literature search (n =504)

## Screening

## Included

## Eligibility

## Identification

Records after duplicates removed
(n = 151)

Records screened
(n = 151)

Full-text articles assessed for eligibility
(n = 80)

Articles excluded, not meeting inclusion criteria (n = 24), not including enough data to calculate ES (n =8)

Samples included in meta-analysis
(n =52\* + 4 unpublished datasets)

Records excluded by title/abstract screened (reviews, commentaries, qualitative studies, studies not on topic of interest) (n = 61), full-text not available (n = 10)

Note: \*samples retrieved in 47 different papers.

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**Highlights**

- Problematic Facebook Use is positively associated with Internet addiction and time spent online

- PFU is negatively associated with self-esteem

- PFU is clearly positively associated with neuroticism and conscientiousness

- PFU is positively associated with motive for using Facebook and especially with motives with internal source and negative valence.

1. Cohen (1992) proposed conventional values as benchmarks for what are considered to be “small”, “medium”, and “large” effects (*r* = .1, .3, and .5, respectively). More recently, based on empirical findings, Hemphill (2003) recommended a reconceptualization of effect sizes in psychological research, in which *r =* .1 is “small”, *r =* .2 is “medium”, and *r =* .3 is “large” (see also Huang, 2011). [↑](#footnote-ref-1)
2. References marked with an asterisk indicate studies included in the meta-analysis. [↑](#footnote-ref-2)