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**LOST IN FACEBOOK:
INDIVIDUAL AND SOCIAL CORRELATES OF PROBLEMATIC FACEBOOK USE
IN ADOLESCENTS AND YOUNG ADULTS**

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Abstract

Over the last decade, Social Networking Sites (SNSs) have become increasingly important in the way people interact with others and social groups (Ryan, Chester, Reece, & Xenos, 2014). Facebook is the most popular SNS in the world, with about 2 billion users. Despite the resources and the innovative social features offered by Facebook (Lee, Cheung, & Thadani, 2012), research has been indicating that its use may become problematic especially amongst adolescents and young adults (Kuss & Griffiths, 2011a) suggesting that the problematic use of Facebook may manifest as a new potential mental health problem (Kuss & Griffiths, 2011a). However, there are currently no accepted diagnostic criteria nor theories assessing Problematic Facebook Use. Therefore, for the purpose of the current thesis, we adapted Caplan's Generalized Problematic Internet Use model (2010) to the Facebook context. We conceptualized Problematic Facebook Use as the maladaptive use of Facebook characterized by cognitive and behavioural factors which negatively impact users' well-being. While in recent years researchers have been showing an increasing interest in the conceptualization of Problematic Facebook Use, and its associations with individual characteristics and psychological adjustment, it is becoming difficult to have a full picture of its correlates and specific characteristics. Therefore, the first aim of this work is to systematically synthesize findings from research on Problematic Facebook Use.

Study 1: The meta-analysis aimed to understand the specific features of Problematic Facebook Use (that is, the associations with the time spent online and the broader concept of Internet addiction), the individual characteristics of problematic Facebook users (including gender differences, personality traits, self-esteem levels, and motivations for using Facebook), and the associations between Problematic Facebook Use and psychological distress and well-being. Fifty-four independent samples with a total of 26707 participants (59.49% females; mean age = 25.31 years, $SD = 4.75$) were included. 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 were observed between Problematic Facebook Use and motives with internal source and motives with negative valence. Finally, Problematic Facebook Use was positively correlated with signs of psychological distress, including anxiety and depression, whereas a comparatively smaller negative correlation between Problematic Facebook Use and well-being (including life satisfaction and other indices of subjective well-being) emerged. This comprehensive meta-analysis makes contributions to understanding the phenomenon of Problematic Facebook Use and its correlates.

As a second aim, three studies have been conducted with the purpose of clarifying some debated results emerged in the meta-analysis.

Study 2: The aim of the second study was to examine the unique role of personality traits and social influence processes (i.e., subjective norms, group norms, and social identity) to frequency of Facebook Use and Problematic Facebook Use in a sample of adolescents. A total of 968 Italian adolescents (37.7% females; mean age = 17.19, $SD = 1.48$) participated in the study. Structural equation modeling showed that emotional stability, extraversion, conscientiousness and subjective norms directly predicted Problematic Facebook Use, whereas group norms and social identity predicted frequency of Facebook use. In conclusion, both personal and social variables appear to explain frequency of Facebook use and Problematic Facebook Use among adolescents.

Study 3: The third study aimed to test a model designed to assess the unique contribution of personality traits, motives for using Facebook and metacognitions on Problematic Facebook Use among young adults. A total of 815 Italian university students (77.2% females; mean age = 21.17, $SD = 2.16$) participated in the study. Path analysis

revealed that three of the four motives to use Facebook, and two of the five metacognitions, predicted Problematic Facebook Use. Moreover, only one personality trait (extraversion) appeared to be directly linked to Problematic Facebook Use, while emotional stability indirectly influenced Problematic Facebook Use via motives (coping and conformity) and metacognitions (negative beliefs about worry and cognitive confidence).

Study 4: The aim of the fourth study was to test whether, and how much, specific objective Facebook behaviours are more frequent in problematic than in non-problematic Facebook users. Differences between problematic and non-problematic Facebook users in objective Facebook behaviours were examined using both frequentist and Bayesian *t*-tests. Participants were 297 undergraduate students (80.8% females; mean age = 21.05, *SD* = 1.88). 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 Problematic Facebook Use.

In conclusion, taken together, the findings of the four studies suggested possible emotional and behavioural (dis)regulation mechanisms underlying Problematic Facebook Use. Therefore, the current thesis may have some important implications for the theoretical conceptualization of Problematic Facebook Use, for clinical interventions tackling problematic Facebook use, and for prevention programmes for young users.

Abstract (Italian)

Nell'ultimo decennio i social network sono diventati sempre più importanti nelle relazioni interpersonali e nelle interazioni di gruppo (Ryan, Chester, Reece, & Xenos, 2014). Tra i tanti social network esistenti, Facebook è il più popolare al mondo con circa due miliardi di utenti. Nonostante le numerose risorse e le funzioni sociali offerte da Facebook (Lee, Cheung, & Thadani, 2012), la ricerca scientifica sembra suggerire che l'uso di Facebook possa diventare problematico, specialmente per gli adolescenti e i giovani adulti (Kuss & Griffiths, 2011a), e che, perciò, l'uso problematico del social network potrebbe manifestarsi nella forma di un nuovo potenziale disturbo mentale (Kuss & Griffiths, 2011a). Ciononostante, nella comunità scientifica non c'è ancora accordo rispetto ai criteri diagnostici da utilizzare e alla teoria da adottare per comprendere e classificare l'uso problematico di Facebook. Per questo motivo, nel presente progetto di ricerca, abbiamo adattato al contesto di Facebook il modello dell'uso problematico di Internet sviluppato da Caplan (2010). L'uso problematico di Facebook è stato, quindi, definito come l'uso maladattivo del social network caratterizzato da aspetti cognitivi e comportamentali che hanno un impatto negativo sul benessere degli utenti. Mentre negli ultimi anni la ricerca sta continuando a mostrare un crescente interesse verso la concettualizzazione dell'uso problematico di Facebook e la sua associazione con le caratteristiche individuali e l'adattamento psicologico, è sempre più difficile avere un quadro completo di quali siano le caratteristiche specifiche e i correlati di tale fenomeno. Quindi, il primo obiettivo del presente lavoro è stato fare una rassegna sistematica dei risultati della ricerca scientifica sull'uso problematico di Facebook.

Studio 1: Lo studio meta-analitico aveva lo scopo di comprendere quali fossero le caratteristiche specifiche dell'uso problematico di Facebook (cioè, l'eventuale sovrapposizione con il tempo speso online e il concetto più generale della dipendenza da Internet), le caratteristiche individuali degli utenti di Facebook (comprese le differenze di genere, i tratti di personalità, l'autostima e le motivazioni per usare il social network), e

l'associazione dell'uso problematico di Facebook con il malessere e il benessere psicologico. Cinquantaquattro campioni indipendenti sono stati inseriti nelle analisi per un totale di 26707 partecipanti (59.49% di genere femminile; età media = 25.31 anni, $DS = 4.75$). In sintesi, i risultati hanno mostrato un piccolo effetto del genere in favore delle donne e un'associazione positiva tra uso problematico di Facebook, tempo speso online e dipendenza da Internet. Al contrario, è emersa una relazione negativa con l'autostima. Il nevroticismo e la coscienziosità sono i due tratti di personalità chiaramente associati con l'uso problematico di Facebook. Inoltre, le relazioni più forti sono emerse tra l'uso problematico di Facebook e le motivazioni interne e le motivazioni con valenza negativa. Infine, l'uso problematico di Facebook correla positivamente con i sintomi di malessere psicologico, compresi ansia e depressione, mentre è emersa una associazione relativamente meno forte tra l'uso problematico di Facebook e benessere (compresi la soddisfazione per la vita e altri indici di benessere soggettivo). La presente meta-analisi potrebbe essere utile per una più completa comprensione del fenomeno e dei suoi correlati.

Come secondo obiettivo del progetto di ricerca, sono stati condotti tre studi con lo scopo specifico di chiarire alcuni risultati ancora incerti emersi nella meta-analisi.

Studio 2: Il secondo studio aveva l'obiettivo di analizzare il ruolo dei tratti di personalità e dei processi di influenza sociale (le norme soggettive, le norme di gruppo e l'identità sociale) nella spiegazione della frequenza d'uso e nell'uso problematico di Facebook in un campione di adolescenti. Allo studio hanno partecipato 968 adolescenti italiani (37.7% di genere femminile; età media = 17.19, $DS = 1.48$). Il modello di equazioni strutturali ha mostrato che la stabilità emotiva (il rovescio del nevroticismo), l'estroversione, la coscienziosità e le norme soggettive predicano direttamente l'uso problematico di Facebook, mentre le norme di gruppo e l'identità sociale predicano la frequenza d'uso. In conclusione, sia le variabili personali che quelle sociali sembrano spiegare l'uso (problematico) di Facebook tra gli adolescenti.

Studio 3: Il terzo studio aveva lo scopo di testare, in un unico modello, il contributo dei tratti di personalità, delle motivazioni per usare Facebook e delle metacognizioni nel predire l'uso problematico di Facebook tra i giovani adulti. Allo studio hanno partecipato 815 studenti universitari italiani (77.2% di genere femminile; età media = 21.17, $DS = 2.16$). La path analysis ha mostrato che tre delle quattro motivazioni per usare Facebook e due delle cinque metacognizioni predicono l'uso problematico di Facebook. Inoltre, soltanto un tratto di personalità (l'estroversione) sembra essere direttamente legato all'uso problematico di Facebook, mentre la stabilità emotiva sembra influenzare l'uso problematico di Facebook indirettamente attraverso le motivazioni (coping e conformismo) e le metacognizioni (credenze negative sulla preoccupazione e sicurezza cognitiva).

Studio 4: Lo scopo del quarto studio era testare se e in quale misura alcuni comportamenti reali su Facebook fossero più frequenti tra gli utenti problematici rispetto agli utenti non problematici. Le differenze nei comportamenti reali su Facebook tra “problematici” e “non problematici” sono stati analizzati mediante una serie di t -test sia secondo l'approccio frequentista sia seguendo l'approccio bayesiano. Allo studio hanno partecipato 297 studenti universitari (80.8% di genere femminile; età media = 21.05, $DS = 1.88$). Per ottenere i dati relativi ai comportamenti reali messi in atto su Facebook (cioè, attività relative ad amicizie, eventi, bacheca e messaggi di testo), è stata creata un'apposita libreria di R. I t -test hanno indicato che i problematici e i non problematici differiscono significativamente in diversi comportamenti reali su Facebook. Le analisi bayesiane hanno confermato i risultati delle analisi frequentiste supportando l'evidenza che i problematici hanno punteggi più alti rispetto ai non problematici in molte variabili reali, come il numero di amicizie strette, il numero di eventi a cui si è partecipato, tutte le attività sulla bacheca (per esempio, il numero di *mi piace*), e il numero di messaggi privati. L'analisi dei dati oggettivi relativi ai comportamenti realmente messi in atto su Facebook permette di superare il problema della misurazione di tali comportamenti attraverso rilevazioni self-report. Tale approccio può aiutare a comprendere

come alcune attività su Facebook (che possono potenzialmente “dare dipendenza”) siano in grado di predire l’uso problematico di Facebook.

In conclusione, presi nel loro complesso, i risultati dei quattro studi suggeriscono che possano esserci dei meccanismi di auto-regolazione emotiva e comportamentale sottostanti l’uso problematico di Facebook. Per questo motivo, la presente tesi potrebbe avere delle implicazioni utili sia per la concettualizzazione stessa del fenomeno dell’uso problematico di Facebook, sia per gli interventi clinici volti ad affrontare il problema che per gli interventi di prevenzione destinati ai più giovani.

Overview

There are empirical evidences suggesting that Facebook use could become problematic for certain users. Despite the lack of consensus regarding the theoretical framework to be adopted to understanding this phenomenon, studies on problematic Facebook use has been growing highlighting a number of possible correlates. Although the existing evidence suggests that maladaptive Facebook use might be addictive, there is still a lack of theory driven studies on this topic. The present thesis aims to summarize the literature on problematic Facebook use in order to offer a clearer picture of the phenomenon and to expand the existing evidence by examining how social and individual factors and specific Facebook features are involved in explaining problematic Facebook use among adolescents and young adults.

Chapter 1 will give an overview presentation of the main conceptual issues underlying problematic Internet and Facebook use. The history of these phenomena will be briefly outlined along with the theoretical background adopted in this thesis. Possible models and respective measures for problematic Facebook use will be presented.

In order to summarize the knowledge on problematic Facebook use, **Chapter 2** will present a systematic review and meta-analysis of the existing literature, focusing on the relationships between problematic Facebook use and (i) its specific features (i.e. the association with Internet addiction, and time spent online); (ii) individual characteristics (gender, personality, self-esteem, and motives); and (iii) psychological distress (i.e. consequences for mental health and well-being) (Study 1). Part of the results has been published in *Journal of Affective Disorders* (Marino, Gini, Vieno, & Spada, 2018). Other findings have been reported in a manuscript submitted to a peer-reviewed journal.

This provides context for Study 2, Study 3, and Study 4. Based on core conceptual frameworks of risk behaviours (motivational model, and social influence processes), the

studies presented in this thesis have been conducted following a succession for an in-depth investigation of problematic Facebook use among adolescents and young adults.

Chapter 3 will present a study (Study 2) aimed at understanding the social influence processes and personality traits involved in adolescent problematic Facebook use. The main results have been published in *Addictive Behaviors* (Marino, Vieno, Pastore, Albery, Frings, & Spada, 2016).

Chapter 4 will show an in-depth understanding of the complex association between personality traits and problematic Facebook use among young adults (Study 3). Specifically, the mediating role of motives for Facebook use and metacognitions will be presented. The main results have been published in *Personality and Individual Differences* (Marino, Vieno, Moss, Caselli, Nikčević, & Spada, 2016).

Chapter 5 will present an attempt to explore objective Facebook behaviour beyond self-reported measures (Study 4). Specifically, using an innovative method, differences between problematic and non-problematic Facebook users will be described on the basis of what they really do on Facebook. Results have been published in *Computers in Human Behavior* (Marino, Finos, Vieno, Lenzi, & Spada, 2017).

The last section of the thesis (**Chapter 6**) will draw conclusions about the importance of understanding problematic Facebook users' characteristics and behaviours.

CHAPTER 1

Problematic Facebook Use: A New Potential Mental Health Problem?

“I’m an addict. I just get lost in Facebook” said a young woman when asked about her Facebook use. This is the incipit of the first review of the psychological literature about the use of Social Networking Sites (SNSs), and specifically Facebook (Kuss & Griffiths, 2011a), suggesting that a new potential mental disorder related to social media may exist. In the last ten years, a huge amount of anecdotal evidence from newspapers (e.g., Cohen, 2009; Hafner, 2009; Webley, 2011), has been indicating that problematic Facebook use (henceforth PFU) can be considered a potentially mental health issue that emerges as SNSs proliferate and become important in people’s life (for a review see Kuss & Griffiths, 2011a). Extreme cases of people jeopardizing private life, work, and family have been reported as well as car incidents and physical impairments - for example, lack of physical energy and weakened immunity - due to maladaptive Internet and Facebook use (e.g., Cao, Sun, Wan, Hao, & Tao, 2011; Ryan, 2015). The claim of clinicians who started to treat Facebook-related problems during therapeutic sessions also has led researchers to investigate this new socio-psychological phenomenon.

Over the last decade, SNSs use has become increasingly important in the way people interact with other people and social groups (Ryan, Chester, Reece, & Xenos, 2014). Facebook is the most popular SNS in the world, with about 2 billion users and at least 900 million of these logged into the site every day. As of July 2017, statistics released by Facebook company appeared impressive: more than 175 million people share a “Love” reaction each day; on average, over 800 million people like something on Facebook every day; more than 1 billion people use Groups every month (Facebook, 2017; Figure 1.1).

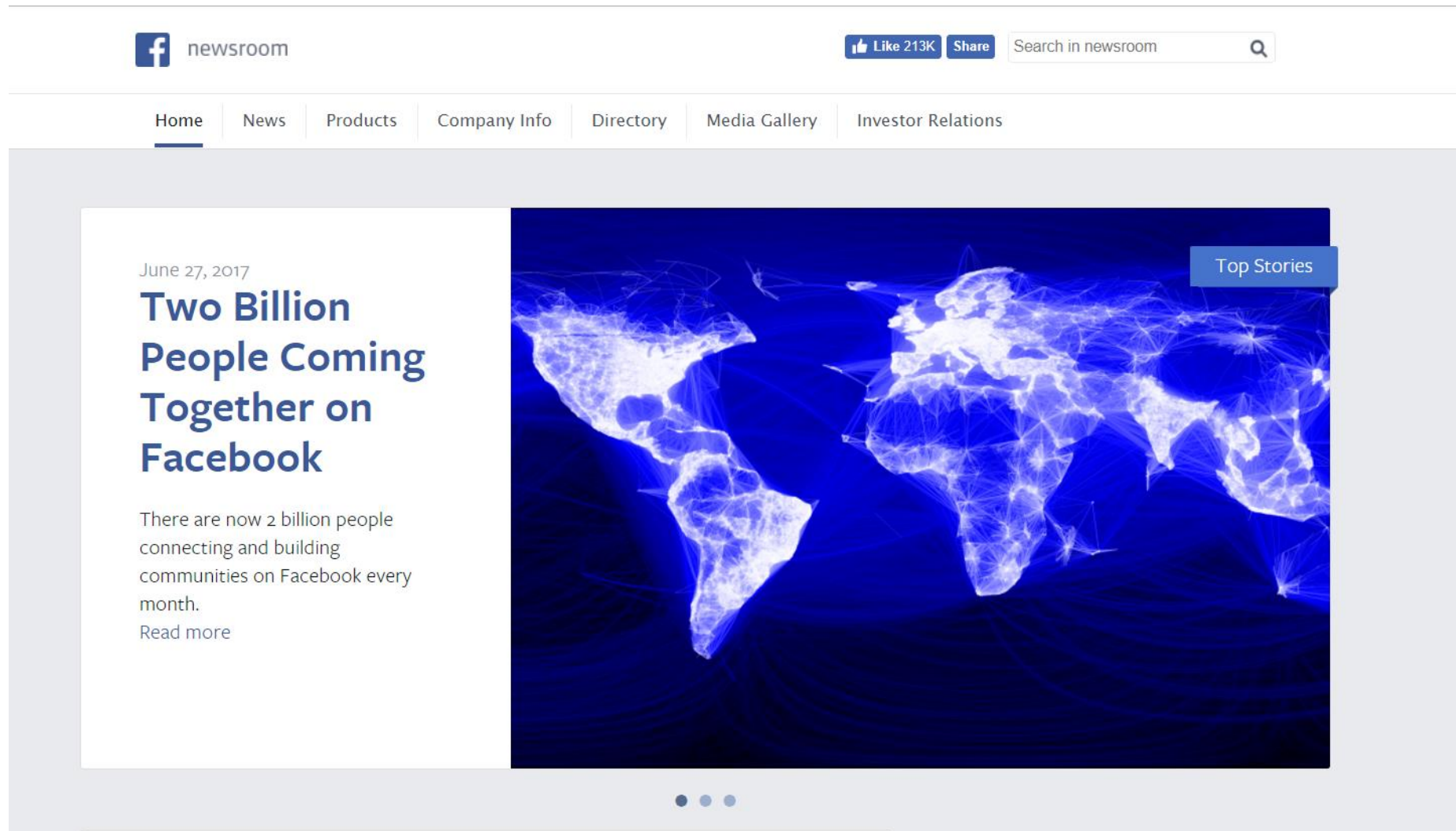
Initially designed by Mark Zuckerberg for Harvard University students in 2004, in 2006 Facebook had been launched to anyone over the age of 13 years. Since then, the number

of its users has been constantly growing, among both young and older people. The extreme popularity of Facebook makes unnecessary to list the many features of the SNS (such as, timeline, news feed, posting, liking, joining groups, fun and business pages, chatting, gaming, etc.). However, because the site regularly evolves, it could be useful to keep in mind that Facebook provides the opportunity to maintain and/or establish relationships, to share media contents and experiences with friends, and to easily communicate with them, or simply to pass time, in several and always new ways. For example, about one year ago, a new function (beyond the famous “like”) has been introduced, that is, the possibility to acknowledge and react to posts by clicking on various emoticons (love, wow, ahah, sad, and angry), thus sharing an emotional reaction to friends’ contents.

As an example of how young people declare to use Facebook, Ponzoni (2013) reported the transcription of a focus group, when an Italian adolescent said: “I use Facebook to chat with my friends, to share information – because everyone is on Facebook! – and if I need something (...) I post a message because I know they use it every day. (...) You can also look at your friends’ movements, where they go, what interesting things they do: they tag themselves in a certain spot, then upload photos, so that you can acknowledge that there is an interesting place you can visit in your spare time... nothing special” (pp.142-143).

Figure 1.1. Distribution of Facebook users in the world

(Screenshot from <https://newsroom.fb.com/news/2017/06/two-billion-people-coming-together-on-facebook/> - last access: June 28th 2017)



A considerable amount of research has studied the effects of Facebook use on people's life and well-being and yielded that Facebook could constitute, to a certain degree, a positive tool to bringing social capital among socially anxious people (Ellison, Steinfield, & Lampe, 2007; Steinfield, Ellison, & Lampe, 2008) and to enhancing civic engagement among adolescents (Lenzi et al., 2015). However, despite the resources and the innovative social features offered by Facebook (Lee, Cheung, & Thadani, 2012), research has also been indicating that its use may become problematic especially amongst adolescents and young adults (Kuss & Griffiths, 2011b), with negative consequences on personal psycho-social well-being. Indeed, PFU has been found to be related to depression symptomology (Pantic, et al., 2012), anxiety (Rosen, Whaling, Rab, Carrier, & Cheever, 2013), and decreased self-esteem (Satici & Uysal, 2015) leading to the suggestion that the use, over-use, or misuse of Facebook may manifest as a new potential mental health problem (Kuss & Griffiths, 2011a). Despite the evidence of Facebook to have an impact on users' psychological well-being, there are currently no accepted diagnostic criteria nor theories assessing PFU. The next paragraphs are aimed at reviewing the literature on this topic, highlighting the theories most commonly used as models to define and assess PFU.

1.1. From Problematic Internet Use to Problematic Facebook Use: A Literature Review

Over 3 billion people use the Internet worldwide (International Telecommunications Union, 2015) to share information, play, shop, and socialise. While most Internet usage is beneficial for the user (for example, a study by Cotten, Anderson, and McCullough (2013) of older adults showed Internet use decreased isolation and loneliness), concerns have arisen regarding a phenomenon variously termed Internet addiction (IA; Griffiths, 2000a; Young, 1996), problematic Internet use (PIU; Caplan, 2002, 2010), Internet Use Disorder (IUD; Petry & O'Brien, 2013), Internet dependence or pathological Internet use (Davis, 2001).

1.1.1. Terminology

Problematic Internet Use (PIU) is a widely accepted term that describes an inability to control Internet use to the degree that it begins to cause harm to daily life (e.g., Spada, 2014). PIU is essentially very similar in definition as the terms “pathological Internet use” (Davis, 2001), “Internet dependence” (Scherer, 1997), and “compulsive Internet use” (Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009). Importantly, using the term PIU avoids the word “addiction” which is controversial (see paragraph 1.2). Internet addiction, a term widely used in the media, originated in the work of Brenner (1997) and Young (1996, 1998a). However, the word “addiction” has been often avoided by scholars in the field as previous versions of the DSM endorsed the word “dependence” (DSM III-R, IV; APA, 1987, 1994, 2000; O’Brien, Volkow, & Li, 2006) when referring to addiction to substance use, and then “disorder” (DSM V; APA, 2013) referring to substance and non-substance related addictions, including behavioural addictions like gambling.

Young (1998a) discussed Internet addiction as a new clinical disorder related to the maladaptive use people do of the Internet. She also argued that there are five different types of Internet addiction, namely computer addiction (i.e., computer game addiction), information overload (i.e., web surfing addiction), net compulsions (i.e., online gambling or online shopping addiction), cybersexual addiction (i.e., online pornography or online sex addiction), and cyber-relationship addiction (i.e., an addiction to online relationships). However, there is dispute as to whether PIU rises to the level of addiction, or if addiction is an appropriate term to use when describing the behaviour. For example, as regard the neurobiology of PIU, Leeman and Potenza (2013) examined the neurobiology of behavioural addictions, including gambling, kleptomania, video game use, and Internet use. The study did find some support for a biological base, including some evidence for heritability of behavioural addictions as well as neurochemistry responses in the brain similar to what happens in substance addiction. However, there is still a lack of evidence supporting these preliminary findings and more

studies are warranted in order to establish the nature of behavioural addictions. Moreover, it seems that the terms (and thus operational definitions and implications for practice) change as the words and definitions for other behaviours, like gambling, change (see also paragraph 1.2.). For this reason, according to the current literature, in this thesis the term “problematic use” is preferred to “addiction” when referring to both Internet and Facebook use.

1.1.2. Online Behaviours: Internet as a Medium

Because the Internet is a medium rather than an activity, a distinction could be drawn between Internet use as a problem in itself and specific activities that the Internet makes available and that may become problematic (Griffiths, Kuss, Billieux, & Pontes, 2016). For example, Griffiths (2000) claimed that people with PIU are using the Internet to fuel other addictive behaviours, thus distinguishing between dependence *on* the Internet and dependence *to* the Internet. In this line of reasoning, problematic online gambling could be better classed as gambling disorder, rather than Internet addiction (Starcevic, 2012). Similarly, problematic online shopping and sexual behaviour should be excluded in a discussion of problematic Internet use; rather, these behaviours could be clustered with already-established addictions/compulsive behaviours with widely accepted measuring metrics and evidence-based methods of treatment (Griffiths et al., 2016). It is also important to note that information and communication technology continues to change, so that full agreement on a definition or measuring tool of PIU is difficult.

Because Internet versions of compulsive behaviours that already exist in non-digital forms confuse the issue of defining PIU as described above, many researchers have begun to focus on problematic social media use, specifically PFU.

1.1.3. Why Facebook

The focus on Facebook derived from two main arguments: (i) Facebook has been more spread than any other SNS in the last ten years and it is still the most accessed website apart from Google (indeed, as of March 2017, Whatsapp, Instagram, and Twitter had 1.2 billion, 700 million, and 328 million of users respectively; Facebook, 2017); (ii) researchers claimed the need to examine “addiction” to specific SNSs rather than to SNSs in general, due to the differences in SNSs functions and the relative psychological implications (Griffiths, 2012; Ryan et al., 2014). For example, Griffiths and colleagues (2014) described SNSs addiction as an unclear phenomenon because of the possibility to engage in problematic “social” patterns by misusing certain Facebook functions or in problematic gaming when games like Farmville represent the preferred activity. Therefore it has been proposed that Facebook is worthy to be studied per se among other SNSs.

Kuss and colleagues (2011) indicated that PFU appears to fall in the “cyber-relationship addiction” category proposed by Young (1999) to differentiate diverse types of Internet addiction. As briefly mentioned above, and in line with Young’s arguments, Griffiths and colleagues (2016) discussed that, due to the variety of activities available on the Internet, it is more likely that people become addicted to *specific activities* on the Internet rather than becoming addicted to the Internet per se. Therefore, Kuss and Griffiths (2011a) sustained that SNS addiction (and so Facebook addiction) can be considered a cyber-relational addiction because of the key social nature of the SNS, which is explicitly designed to establish and maintain both online and offline relationships. Moreover, they stated that “from a clinical psychologist’s perspective, it may be plausible to speak specifically of ‘Facebook Addiction Disorder’ (or more generally ‘SNS Addiction Disorder’) because addiction criteria, such as neglect of personal life, mental preoccupation, escapism, mood modifying experiences, tolerance, and concealing the addictive behavior, appear to be present in some people who use SNSs excessively” (Kuss & Griffiths, 2011a, p. 3529).

As mentioned above, problematic Internet use (PIU) has not yet been recognized as a mental disorder or as a behavioural addiction in the fifth edition of DSM, which included only Internet Gaming Disorder in Supporting information, Appendix III, as a condition that first requires further research (for a review on this topic, see Kuss, Griffiths, Karila, & Billieux, 2014). Moreover, there is still a lack of consensus about terminology and definition of both PIU and PFU (Moreau, Laconi, Delfour, & Chabrol, 2015). Nonetheless, several researchers agreed in highlighting that Internet use, and especially SNSs use, could be problematic for some users (Kuss & Griffiths, 2011a; Satici & Uysal, 2015). In this view, different theories have been applied to this phenomenon drawing from other problematic or addictive behaviours, such as gambling, and alcohol and substance dependence. The following paragraph presents a brief review of such theories.

1.2. A Theoretical Background for Facebook: Addiction or Problematic Use?

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 (Lee et al., 2012). 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).

As an application on the Internet, PFU has been often studied within a PIU framework that, as outlined above, suffers itself a lack of consensus in definition and diagnostic criteria (for a review see Spada, 2014). Therefore, in order to understand the different conceptualizations of PFU, it is necessary to first have a clear picture of what PIU is and of the theories applied to PIU. Although, unfortunately, this is not the case for PIU, the major psychological theories about Internet also relevant for Facebook context will be also presented in this paragraph. Indeed, disagreements regarding diagnostic criteria and the lack

of consistency underlying the concept of PIU have resulted in difficulties in establishing a shared definition of the phenomenon, thus hampering the possibility to refer to a sole theoretical background.

Discussion about PIU started about twenty years ago, when researchers began to examine the issue of the maladaptive use of the Internet showing that a variety of negative outcomes was associated with the development of compulsive Internet use (e.g., Brenner, 1997; Greenfield, 1999; Young, 1996). The fact that Internet addiction was not included in the DSM IV (APA, 1994) led Young (1996) to consider pathological gambling the most akin to the issue of Internet use. Therefore, she borrowed the definition of pathological gambling and defined Internet addiction “as an impulse-control disorder which does not involve an intoxicant” (Young, 1999, p.3). Young also proposed a first screening tool (Young’s Diagnostic Questionnaire (YDQ); Young, 1996) to differentiate normal use from “pathological addictive Internet use” by modifying the criteria for pathological gambling (sample items of that tool include: “Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?”; “Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)?”; the full list of items is reported in Appendix A).

Subsequently, another instrument, the Internet Addiction Test (IAT), was proposed by Young (1998b) and, since then, it has been adapted several times to Facebook context (simply replacing the word “Internet” with the word “Facebook”). Some examples of items included in the IAT are the following: “Staying online longer than intended” and “Grades or school-work suffering because of time spent online” (Appendix B). Despite this test has been widely used worldwide, it is still not clear how the 20 items of the IAT were developed: it seems that some items are based on the criteria of the YDQ, including preoccupation with the Internet and concealment of use; however, other items (e.g., “Preferring the excitement of the Internet to intimacy with a partner”, “Checking email before something else that needs to be done”,

“Fearing that life without the Internet would be boring, empty, and joyless”, “Snapping, yelling, or acting annoyed if someone bothers them while they are online”) do not have a clear basis recognized in the psychological literature (Appendix B). Moreover, the IAT suffers from several problems including: (i) it has never been published in a peer reviewed journal and no psychometric properties have been reported; (ii) the scoring (20-39: “not at risk”; 40-69: “at risk of becoming Internet addicted”; 70-100: “addicted”) served as a self-assessment tool rather than as a measure to be used for research purposes. Above all, the IAT lacks a theoretical background. Therefore, given the several doubts raised about its ability to achieve construct validity, it is curious that many scholars opted for this measure for a “shared” assessment of Internet addiction (i.e., PIU) and its different forms, including Facebook.

In sum, despite the growing scientific interest in PIU from the late 1990s, the construct remains controversial and no consensus has been achieved about the legitimacy of Internet misuse to be a proper mental disorder (Pies, 2009). Some authors considered PIU as similar to existing form of mental disorder (APA, 2000), that is very close to pathological gambling or substance dependence (Young, 1996), or as a behavioural addiction (Griffiths, 2000). Others defined it as an obsessive-compulsive disorder (Shapira et al., 2000), and others as a combination of several existing disorders (Tao et al., 2010). For this reason, it is unsurprising that such “conceptual chaos” (Meerkerkerk et al., 2009) has reflected in a specular chaos in PFU. As a matter of fact, the lack of scientific discussion about the applicability of borrowing criteria and items from more widely accepted forms of addictions appears to be problematic per se, and hampers the possibility to achieve a construct validity for PIU and, thus, PFU.

Indeed, several theoretical approaches of “digital technology” have been devised, including the established “components model” according to which, Internet-related addictions, similar to substance-related ones, are “the result of biopsychosocial processes, and share neurobiological and psychosocial risk factors (...) by addictive behaviours” (Kuss &

Billieux, 2017, p. 231). Although Griffiths (2000b), as described above, conceptualized PIU as a behavioural addiction, PIU has not yet achieved such status (APA, 2013). Moreover, the DSM V did not legitimate the SNSs addiction as a potential psychological disorder stating that “excessive use of the Internet not involving playing of online games (e.g. excessive use of social media, such as Facebook; viewing pornography online) is not considered analogous to Internet gaming disorder, and future research on other excessive uses of the Internet would need to follow similar guidelines as suggested herein” (APA, 2013, pp. 795–796).

A very recent re-definition of what can be considered a behavioural addiction has been proposed by experts in the field (Kardefelt-Winther et al., 2017). Therefore, it seems that a clearer definition of PIU and PFU is needed in order to establish the nature of these phenomena. Authors proposed a conceptualization of behavioural addiction without pathologising normal behaviours people commonly engage in. In recent years, indeed, a more or less founded list of possible behavioural addictions emerged, such as technology (Griffiths, 1995), physical exercise (Berczik et al., 2012), tango (Targhetta, Nalpas, & Perney 2013), working (Robinson, 1999), and studying (Atroszko, Andreassen, Griffiths, & Pallesen, 2015). The relatively too easy process leading a normal behaviour to be defined as a behavioural addiction, however, has led researchers to questioning the definition of “behavioural addiction”, apart from the absence of ingestion of psychoactive substances. Kardefelt-Winther et al. (2017, p. 2) proposed some “crucial exclusion criteria together with the definition and contend that a behaviour should not be conceptualized as behavioural addiction if: (1) the behaviour is better explained by an underlying disorder (e.g. a depressive disorder or impulse-control disorder); (2) the functional impairment results from an activity that, although potentially harmful, is the consequence of a willful choice (e.g. high-level sports); (3) the behaviour can be characterized as a period of prolonged intensive involvement that detracts time and focus from other aspects of life, but does not lead to significant functional impairment or distress for the individual; (4) the behaviour is the result of a coping strategy”.

Then, although similarities between PIU and behavioural addictions may exist, it appears clear that the conceptualization of PFU as a form of addiction needs caution (Carbonell & Panova, 2017). In this view, the problematic use of technologies could be symptomatic of other primary disorders (Fioravanti, Primi, & Casale, 2013). Moreover, Facebook use can be also considered as a normal behaviour, and it is plausible that the social network could constitute a coping strategy to deal with negative internal states. Therefore, it seems that a critical in-depth examination of PFU is needed.

1.2.1. Davis' Cognitive Behavioural Model of Pathological Internet Use

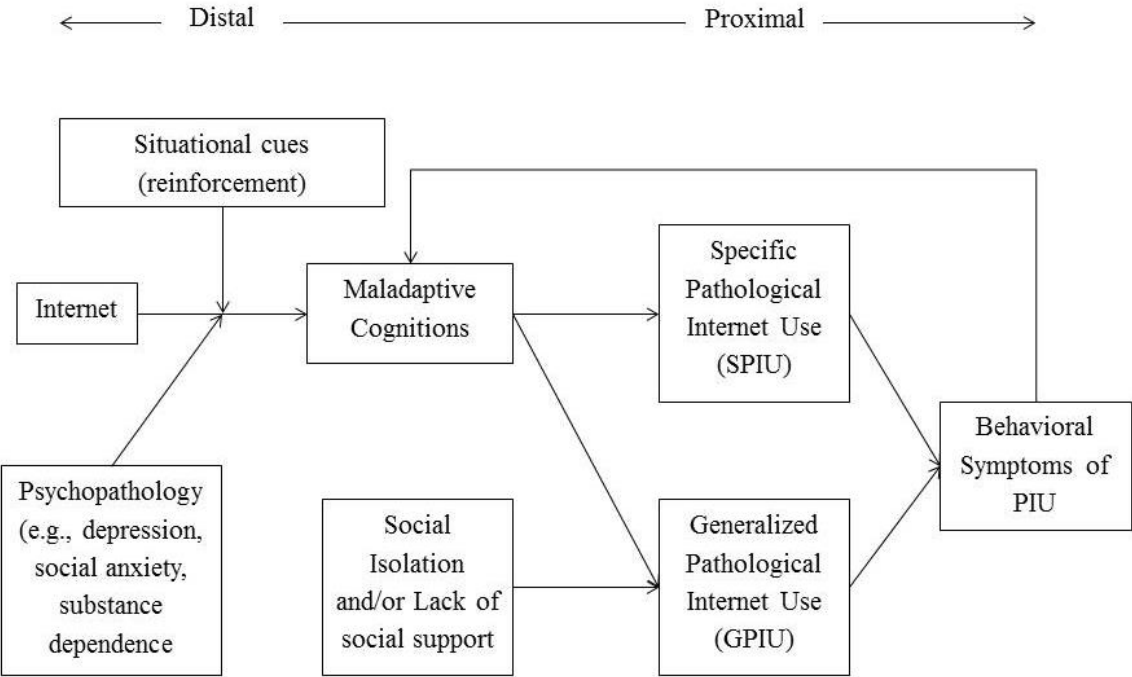
As outlined above, several authors have criticized the conceptualization of PIU within an addiction perspective claiming that it fails to achieve two main issues: (i) a construct validity of Internet or technology addiction; and (ii) the consideration of the different activities people really do on the Internet. Despite the initial attempt made by Young (1999) to distinguish between the different types of “addictions” on the Internet, there were no addiction-like models explaining “to what people are actually addicted” (Fioravanti et al., 2013, p. 1). In this perspective, Davis (2001) and Caplan (Caplan, 2002, 2010) have proposed valid theory-driven models aimed to explain the general and specific problematic aspects of PIU.

In our opinion, Davis' (2001) cognitive behavioural model of Pathological Internet Use (Figure 1.2) represents the first convincing attempt made to propose a theoretical model of the etiology and development of PIU. The author conceptualized PIU within a multidimensional perspective taking into account its cognitive, emotional, and behavioural symptoms. This model defined two distinct types of PIU, namely specific and generalized pathological Internet use (SPIU and GPIU, respectively). SPIU included the overuse or abuse of content-specific functions of the Internet that would exist also in offline life, that is, “online sexual material/services, online auction services, online stock trading, and online gambling” (Davis,

2001, p. 188). GPIU was characterized by a multidimensional abuse of the Internet including wasting time online without a clear objective and engaging in virtual social activities like chats and emails, that offers a sort of reinforcement for social contact needs.

Davis (2001) regarded the second type of PIU (GPIU) as more critical from a social point of view. In other words, he stated that PIU is also a result of a lack of social support from family and peers and that the Internet may serve for socially isolated people as a way to communicate with the world. In 2001, Facebook had not been yet created but it is plausible that Davis would had included the problematic use of SNSs in this second type of PIU. The author employed a cognitive-behavioural approach according to which problematic cognitions related to the Internet *and* behaviours are responsible for leading and maintaining maladaptive patterns of Internet use.

Figure 1.2. Davis’ cognitive behavioural model of Pathological Internet Use (adapted from Davis, 2001).



In this way, Davis stressed the role played by maladaptive cognitions associated with PIU and not only by Internet-related behaviours (as in Young's view) or negative consequences in daily life (Davis, Smith, Rodrigue, & Pulvers, 1999). Specifically, this model is based on the broader diathesis-stress framework and operant conditioning. Davis argued that both the diathesis (pre-existing psychopathology) and the stressor (the Internet) are *necessary* causes involved in PIU, whereas maladaptive cognitions are *sufficient* causes for PIU. In Davis' words: "psychopathology must be present or must have occurred in order for the symptoms of PIU to occur. Note however, that underlying psychopathology does not in itself result in symptoms of PIU, but are a necessary element in its etiology. (...) The exposure to such technologies is a distal necessary cause of symptoms of PIU" (Davis, 2001, p. 190). Moreover, a central factor as well as a sufficient cause in Davis' model is represented by the presence of maladaptive cognitions. With respect to such cognitions, Davis distinguished between thoughts related to the self and thoughts related to the world. The first type of maladaptive cognitions concerns rumination about one's own problems with the Internet, self-doubt, low self-efficacy, and negative self-appraisal. Examples of such cognitive distortions are: "I am only good on the Internet," "I am worthless offline, but online I am someone," and "I am a failure when I am offline" (Davis, 2001, p. 191). Maladaptive cognitions about the world are associated with all-or-nothing thoughts about the generalization of specific events to global trends, and include: "The Internet is the only place I am respected," "Nobody loves me offline," "The Internet is my only friend," or "People treat me badly offline" (Davis, 2001, p. 191-192).

Davis also listed a series of symptoms of PIU, such as "obsessive thoughts about the Internet, diminished impulse control, inability to cease Internet usage, and importantly, feeling that the Internet is an individual's only friend" (Davis, 2001, p. 193). Such symptoms, adding loneliness/depression and distraction, have been measured with the Online Cognition Scale (OCS; Davis, Flett, & Besser, 2002). Whereas this tool appeared to offer support for the

theoretical model, it did not distinguish between SPIU and GPIU and, more importantly, it has not been endorsed in a sufficient number of studies.

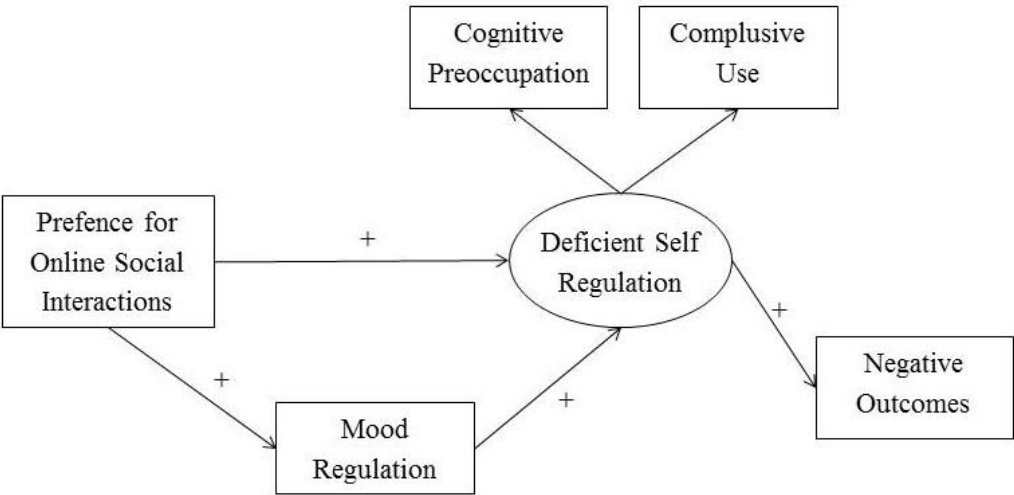
1.2.2. Caplan's Generalized Problematic Internet Use model

Within the cognitive-behavioural approach, a second relevant model aimed to explain the general and specific problematic aspects of PIU has been proposed by Caplan (Caplan, 2002, 2010). The central aspect of Caplan's conceptualization of PIU is the role played by social benefits and control in the development of PIU. Specifically, Caplan (2003), narrowing on Davis's model, proposed that lonely or depressed people are at major risk to develop PIU because they may tend to prefer online social interactions, feeling more efficacious online rather than in face-to-face relationships. From a methodological point of view, Caplan's social skills model was the starting point for the author to develop the Generalized Problematic Internet Use Scale (GPIUS; Caplan, 2002). The first version of this scale comprised 29 items developed to empirically apply the cognitive-behavioural model of GPIU, through the measure of cognitions, behaviours, and outcomes related to PIU. The scale produced a total score of PIU and seven sub-scores measuring different dimensions: three factors assess the cognitive elements (perceived social benefits, interpersonal control, withdrawal), three factors assess the behavioural symptoms (mood alteration, compulsivity, excessive time), and one factor assesses negative outcomes (e.g., problems in social life).

Subsequently, Caplan (2010) proposed an updated model (GPIUS2; Figure 1.3), which states that individuals preferring online social interactions to a face-to-face context use the Internet to regulate their moods and they are more likely to engage in cognitive preoccupation and compulsive use of the Internet (indicators of deficient self-regulation) that, in turn, predict negative outcomes of Internet use (Caplan, 2010). This model combined elements drawn from Davis' model and from the socio-cognitive model of unregulated Internet use (Kim, LaRose, & Peng, 2009; LaRose, Lin, & Eastin, 2003), as well as results of his own research (Caplan,

2003, 2005, 2007), in order to create a new valid measure for the assessment of PIU. To assess these dimensions, Caplan (2010) developed and validated a 15-items scale which can be used to obtain both an overall GPIU score and a set of five separate scores, including the second-order factor “deficient self-regulation” made of cognitive preoccupation and compulsive use subscales.

Figure 1.3. Caplan’s social skills model of Generalized Problematic Internet Use - Scale 2 (adapted from Caplan, 2010).



Specifically, the model included both cognitive and behavioral constructs that are associated with negative outcomes of Internet use, outlining five subscales: preference for online social interactions, mood alteration, cognitive preoccupation, compulsive behavior, and negative outcomes (Table 1.1). The GPIUS2 showed good psychometric properties and it has been widely used and validated in several languages, including Portuguese (Pontes, Caplan, & Griffiths, 2016), German (Barke, Nyenhuis, & Kröner-Herwig, 2014), Spanish (Gámez-Guadix, Orue, & Calvete, 2013), and Italian (Fioravanti, Primi, & Casale, 2013).

Compared to the different approaches endorsed to explain PIU (the addiction-like model and the problematic use model) described in this chapter, the GPIU model emerged as a

theory-driven approach able to catch also the problems related to the social context the Internet represents. In this view, Caplan’s model appears particularly useful to help describing and understanding the problematic cognitive and behavioural elements involved in the development of PFU.

Table 1.1. Generalized Problematic Internet Use Scale 2 (GPIUS2; Caplan, 2010).

Subscale	Definition	Items
<i>Preference for Online Social Interactions (POSI)</i>	<p>POSI “is a cognitive individual-difference construct characterized by beliefs that one is safer, more efficacious, more confident, and more comfortable with online interpersonal interactions and relationships than with traditional FtF social activities” (Caplan, 2003, p. 629). It is the result of the combination of the two social elements of GPIU (benefits and control).</p> <p>This core factor of the model has a central role in the development of PIU itself and essentially distinguished the Internet-oriented approach and the addiction perspective.</p>	<ol style="list-style-type: none"> 1. I prefer online social interaction over face-to-face communication 2. Online social interaction is more comfortable for me than face-to-face interaction 3. I prefer communicating with people online rather than face-to-face
<i>Mood regulation</i>	<p>Termed “mood alteration” in the previous version of the scale, this factor indicated the use of the Internet with the purpose of modifying or alleviated negative or unwanted moods.</p> <p>This element derives from Caplan’s (2002, 2007) and LaRose et al. (2003) socio-cognitive model.</p>	<ol style="list-style-type: none"> 1. I have used the Internet to talk with others when I was feeling isolated 2. I have used the Internet to make myself feel better when I was down 3. I have used the Internet to make myself feel better when I’ve felt upset
<i>Cognitive preoccupation</i>	<p>Cognitive preoccupation (named withdrawal in GPIU) “refers to obsessive thought patterns involving the Internet use” (Caplan, 2010, p.1090). Caplan explained that this dimension might exacerbate the negative consequences of PIU in people’s life, sustaining that “how” people think about the Internet may influence negative outcomes.</p>	<ol style="list-style-type: none"> 1. When I haven’t been online for some time, I become preoccupied with the thought of going online 2. I would feel lost if I was unable to go online 3. I think obsessively about going online when I am offline
<i>Compulsive use</i>	<p>Compulsive use is the behavioural factor involved in the deficient self-regulation together with the cognitive factor (i.e. cognitive preoccupation). It reflects the inability to control or regulate Internet use which interfere with daily life activities.</p> <p>This dimension constitute, to a degree, a crucial factor used to sustain the disordered impulse-control nature of PIU (Shapira et al., 2003).</p>	<ol style="list-style-type: none"> 1. I have difficulty controlling the amount of time I spend online 2. I find it difficult to control my Internet use 3. When offline, I have a hard time trying to resist the urge to go online

Subscale	Definition	Items
<i>Negative outcomes</i>	Negative outcomes describes to which extent the personal, social, and professional life is impaired by the maladaptive use of the Internet.	<ol style="list-style-type: none"> 1. My internet use has made it difficult for me to manage my life 2. I have missed social engagements or activities because of my Internet use 3. My Internet use has created problems for me in my life

1.3. The Issue of Measuring Problematic Facebook Use

As described above, the fact that there is no accepted theory of either PIU or PFU impacts also on the consensus about the terminology to be used (e.g., “addiction”, “problematic use”, “compulsive use”) and on the degree to which available instruments are able to validly assess these phenomena (Pontes, Kuss, & Griffiths, 2015).

A recent review (Ryan et al., 2014) has highlighted that a number of different measures of PFU may lack construct validity. This is because most of these measures have been developed, in the first instance, as ad-hoc measures or by adapting existing measures of Internet addiction which, in turn, were originally designed to assess other addictive behaviours (e.g., pathological gambling, substance misuse) (for a review on this topic see Ryan et al., 2014). For example, the widely used Bergen Facebook Addiction Scale (BFAS; Andreassen, Torsheim, Brunborg, & Pallesen, 2012) assesses PFU through six items representing the six core elements of addiction designed to assess gambling disorder and gaming addiction (i.e., salience, mood modification, tolerance, withdrawal, conflict, and relapse; Appendix C). The BFAS presents very good psychometric properties and represents the first important attempt to assess PFU through a valid measure. However, the fact that it is based on criteria associated with other behavioural addictions can constitute a possible weakness because it is arguable that social networking site addiction differs from gaming addiction.

Ryan and colleagues (2014) argued that Facebook has much more in common with the Internet than gambling or gaming. Therefore, they claimed that a theory specifically developed for PIU should provide the basis for the development of a valid measure to assess problematic Facebook Use. In their review of the literature, they identified Caplan's (2010) model of Generalized Problematic Internet Use (GPIU) and the relative measure "Generalized Problematic Internet Use Scale 2" (GPIUS2) as the best option for conceptualizing and measuring PFU. In accordance with this model, the term "problematic Facebook use" (PFU) has been chosen in the current research project. Even though both the BFAS and the GPIUS2 include mood-related and negative consequences factors, the latter adds the preference for online social interaction factor, particularly appropriate for Facebook context, given the "social" predominant functions offered by this social network (Lee et al., 2012).

In this view, the GPIU model appears to offer a good base for conceptualizing and investigating PFU because it focuses on elements that are specifically implicated in this potential behavioural addiction, that is, preference for online social interactions, Internet use for cognitive and emotional regulation, and negative consequences of maladaptive use of the Internet. Given the supporting literature about the use of Facebook for mood regulation (Hong, Huang, Lin, & Chiu, 2014), self-regulation problems (Błachnio & Przepiorka, 2015), and negative outcomes concerning Facebook use, this model has been adopted as main conceptual framework in the present thesis. To this end, we have also conducted a first adaptation of the GPIUS2 to Facebook use, as well as the validation of the PFU Scale (PFUS) with Italian adolescents and young adults; this enabled us to include an Internet-specific measure in the studies conducted for the current research project (see Appendix D; Marino, Vieno, Altoè, & Spada, 2017). A further adaptation of the GPIU scale to Facebook has been very recently reported in a work by Assunção and Matos (2017a), who showed that such cognitive-behavioral model is also applicable to the Facebook context in a sample of Portuguese adolescents. Firstly, the authors validated the Portuguese version of the GPIUS2

adapted to Facebook use, showing good psychometric properties of the scale (i.e. confirmatory factorial analysis with adequate fit and good reliability for the global scale and for the five subscales) and supporting the original factorial structure (with three first-order factors and a second-order factor made of two first-order factors; Assunção & Matos, 2017a; Caplan, 2010). Secondly, Assunção and Matos (2017a) showed that the theoretical model was replicated for Facebook use: indeed, they tested Caplan's original model (Figure 1.3) for Facebook use and results sustained all the direct and indirect links among factors as originally proposed by Caplan (Assunção & Matos, 2017a; Caplan, 2010).

1.4. Target Population: Adolescents and Young Adults

Adolescents and young adults were specifically chosen as participants in the current research project because these populations appear to be at the greatest risk to engage in PFU, especially due to the relevant role played by Facebook in facing developmental tasks and challenges of these life periods. From a theoretical point of view (Sugarman, 2004), adolescence and young adulthood are two different developmental stages with specific developmental tasks – for example, establishing peer relationships and becoming more self-sufficient for adolescents (Bee, 1994), and making professional choices and developing romantic relationships for young adults (Rice, 1995). Therefore, the transition from adolescence to young adulthood constitutes a crucial moment characterized by different levels of perceived well-being and behavioural patterns (Sugarman, 2004). In this view, it could be supposed that adolescents and young adults might both tend to heavily engage in Facebook use but may also differ in the way they engage in Internet and Facebook use. As an example, Griffiths sustained that adolescents tend to have more free time to use Internet applications and, thus, are more likely to develop a stronger attachment to the medium than older people who have to deal with more responsibilities (Griffiths, Davies, & Chappell, 2004).

From an empirical point of view, some research has recently showed that Facebook is frequently used by adolescents to shape their relationships with peers (Doornwaard, Moreno, van den Eijnden, Vanwesenbeeck, & Ter Bogt, 2014), and by young adults mainly to satisfy specific psychological needs, such as self-presentation, socializing, and escapism (Papacharissi & Mendelsohn, 2011). However, despite the claim that PFU could be particularly dangerous for young people, most of the previous research has focused on adult users whereas very few studies have investigated the issue of PFU especially among adolescents.

1.5. Aims

While research on PFU has dramatically increased in the last years, it is becoming difficult to have a full picture of its correlates and specific characteristics. Therefore, the first aim of this work is to systematically synthesize findings from research on PFU. To achieve this purpose, a comprehensive meta-analysis (Study 1) has been conducted on the most frequently investigated variables associated with PFU and it is reported in Chapter 2. Given the rising attention devoted to the topic of PFU in the psychological literature, especially in view of its relations with individual characteristics, (mal)adjustment, and well-being, it is important to examine the magnitude of effects that have been found thus far in this field to draw informed conclusions as to whether problematic Facebook use is worthy of continued investigation and, if this is the case, in which direction.

As a second aim, three studies have been conducted with the purpose of contributing to clarifying some debated results emerged in the meta-analysis, that is, (i) the lack of theory-driven models endorsed to explain PFU in previous studies, (ii) the unclear role of personality traits in predicting PFU, (iii) the types of psychological motives involved in the development of PFU, and (iv) the issue of the frequency of Facebook use as a characterization of PFU itself.

Briefly, Study 2 (reported in Chapter 3) has been specifically designed to analyze the external motives leading adolescents to PFU in order to explain how age-specific mechanisms (that is, subjective and group norms and social identity) could lead to PFU in adolescence, while taking into account differences in personality traits.

Study 3 (reported in Chapter 4) aimed at clarifying the role of individual characteristics leading to PFU in young adulthood. In particular, due to the lack of evidence for personality traits to be the best predictors for PFU, different mediators (i.e., theory-driven motives and metacognitions) for this association will be presented (Study 1 and Study 2).

Study 4 (reported in Chapter 5) is methodologically innovative in the current literature on PFU because it employed a newly developed method to measure the objective engagement on Facebook, through the analysis of real-data downloaded by participants' Facebook profiles, thus overcoming the common limitations of self-reported estimations of frequency of Facebook use.

CHAPTER 2

Study 1. A Comprehensive Meta-Analysis on Problematic Facebook Use: the Associations with Phenomenon Features, Individual Characteristics, and Psychological Adjustment

The increasing amount of time people spend using Facebook, the addictive-like symptoms showed by problematic Internet users, the variety of motives leading people to use Facebook, and the consequent psychological importance it assumes in people's lives have led researchers to analyze a number of correlates of PFU. Overall, the prevalence of PFU appears to range between 2% and 10% among adolescents and young adults worldwide (Alabi, 2013; Chabrol et al., 2017; Marcial, 2013; Moreau et al., 2015) showing the need to understand this global phenomenon in more depth (Błachnio et al., 2015). In this view, in recent years, researchers have been showing an increasing interest in the conceptualization of PFU, and in the association between PFU, individual characteristics, and psychological adjustment (Satici & Uysal, 2015). While the seemingly increase in the number of empirical studies on this topic testimonies its relevance, it has becoming difficult to have a clear picture of the phenomenon due to the variety of different conceptualization, terms and approaches used to study PFU and its correlates (see chapter 1). For this reason, the present meta-analysis tried to summarize the findings of the recent literature on this topic. Specifically, it aimed at understand the specific characteristics of this phenomenon (such as, the association with the time spent online and the broader concept of Internet addiction), the individual characteristics of Facebook users (including personality traits, self-esteem levels, and motivations for using Facebook), and the effect PFU may have on users' mental health and well-being (for example, in terms of depressive and anxious symptoms and satisfaction with life) (Ryan, Reece, Chester, & Xenos, 2016). Due to the lack of a shared definition, for the purpose of the current meta-analysis, PFU has been defined as a problematic behaviour characterized by either addictive-like

symptoms and/or scarce self-regulation related to Facebook use reflecting in social and personal problems.

2.1. Towards a Clearer Conceptualization of Problematic Facebook Use

The (already mentioned) 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. Pontes et al., 2015). However, others have argued that time or frequency of use are not enough to characterize problematic behaviors online (Pontes et al., 2015). Similarly, because Facebook is an application of the Internet, PFU and PIU have been sometimes considered as overlapping concepts with Blachnio and colleagues even stating “Facebook addiction and Internet addiction are the same phenomenon” (Blachnio, Przepiorka, Senol-Durak, Durak, & Sherstyuk, 2017, p. 272). However, the relatively modest to medium correlations found between PFU and time spent online (e.g. Hong & Chiu, 2014; Orosz, Tóth-Király, & Bóthe, 2016; Hong, Huang, Lin, & Chiu, 2014) and measures of Internet addiction (e.g. Hormes, Kearns, & Timko, 2014; Sigerson, Li, Cheung, & Cheng, 2017) suggest that PFU could be probably considered as an outstanding behaviour happening on the Internet but with specific characteristics and psychological issues involved, which merits to be analyzed on its own. In this view, the following paragraph shows a brief overview of the associations between PFU, time spent online and Internet addiction.

2.1.1. 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 the 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 using intensively 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 et al., 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 PFU 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 PFU or, as we anticipate, time of use is a component of PFU 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 is to quantify the association between PIU and PFU in order to observe to what degree they can be considered overlapped phenomena. 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.

2.2. 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 PFU 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 et al., 2015; Orr, Sisic, Ross, Simmering, Arseneault, & Orr, 2009; Shaw, Timpano, Tran, & Joormann, 2015; Sheldon, 2008a; 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 PFU 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 the most frequently examined individual characteristics, that is, personality traits, self-esteem, and motivations for using Facebook.

2.2.1. 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 (that is, low levels of emotional stability 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 PFU 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, PFU 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 et al., 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 et al., 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; Błachnio 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 PFU. 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.

2.2.2. 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 et al., 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” (Blachnio 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 PFU in order to establish whether Facebook might be more detrimental for people with low or high levels of self-esteem.

2.2.3. 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, 2011a; Sheldon, 2008a, 2009a; Valentine, 2012). 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, 2008a), 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, Reinecke, Ziegele, & Quiring, 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, 2008b).

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 PFU 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; 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.

2.3. Problematic Facebook Use and Psychological Adjustment: Risk Factor or Negative Consequence?

Whereas some authors considered PFU as a potential risk factor for psychological distress and low levels of well-being (Andreassen & Pallesen, 2014; Balci & Gölcü, 2013; Baker & Algorta, 2016), other researchers suggested that PFU is rather a consequence of other aspects of psychological well-being, such as depression, loneliness, or poor psychosocial health (Balci & Gölcü, 2013; Satici, Saricali, Satici, & Çapan, 2014). There is, thus, no consensus on whether PFU should be regarded as an effect or a cause of psychological distress and well-being. In order to establish, in the first place, whether such relation does exist and how strong it might be, a meta-analysis focused on studies on PFU and its association with psychological distress and well-being is proposed. According to the World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Callahan, 1973, p. 78), this meta-analysis included studies that focused on of both "negative" correlates (psychological distress) and "positive" correlates (well-being).

2.3.1. Problematic Facebook Use and Psychological Distress

Much research on PFU has focused on the idea that problematic users are more likely to present symptoms of psychological distress than non-problematic users (Denti et al., 2012; Koc & Gulyagci, 2013; Uysal, Satici, & Akin, 2013). Specifically, several studies (e.g., Chabrol et al., 2017; Moreau et al., 2015) found positive associations between mental health problems, such as anxiety/social anxiety and depressive symptoms, and PFU. To explain this relation, authors argued that depressed users tend to problematically use Facebook to regulate their mood online (Hong et al., 2014), and that especially socially anxious users tend to compensate their low self-esteem and poor face-to-face communication skills through maladaptive Facebook use (Bodroža & Jovanović, 2016), thus decreasing their perceived

sense of loneliness (Olufadi, 2016). In these cases, what makes Facebook use “problematic” is the fact that users experiencing unwanted feelings or a sense of loneliness usually expect to feel better, albeit in the short-term, when on Facebook, but that they usually do not translate such benefits in increased social skills to be spent in offline relationships with non-Facebook friends (Baker & Oswald, 2010). Moreover, depressive symptoms and suicidal ideation have been found among problematic Facebook users who consider Facebook an easy escape from their real life problems (Walburg, Mialhes, & Moncla, 2016). In line with these findings, Satici and colleagues (2013) showed that people with high levels of psychological vulnerability are more likely to fulfill their everyday social needs, such as acceptance and sense of belonging, by problematically using Facebook (Satici et al., 2014). Overall, PFU was found to be associated with a variety of negative outcomes for users’ life. Therefore, another aim of the current study was to quantitatively summarize the magnitude of the association between PFU and psychological distress so far found in the field.

2.3.2. Problematic Facebook Use and General Well-Being

Previous studies have indicated a positive effect of moderate Facebook use on subjective well-being, for example in terms of increased social capital (Valenzuela, Park, & Kee, 2009) and civic engagement (Lenzi et al., 2015), but recent research has drawn attention also to the potential detrimental effects of PFU on different indicators of well-being, such as social and emotional adjustment, and quality of life (Bevan, Gomez, & Sparks, 2014; Kalpidou, Costin, & Morris, 2011; Satici & Uysal, 2015).

Negative associations have been found between life satisfaction (Błachnio, Przepiorka, & Pantic, 2016), subjective vitality, subjective happiness (Satici & Uysal, 2015) and PFU. For example, Kross and colleagues (2013) found that the more participants used Facebook, the more their life satisfaction levels declined. In line with these findings, it has also been argued that problematic behaviours on Facebook co-occur with low levels of satisfaction with social

relationships (Elphinston & Noller, 2011) and self-worth (Rae & Lonborg, 2015). Overall, literature indicates that problematic use of SNSs like Facebook may be associated with a lower general well-being (Kuss & Griffiths, 2011a). Therefore, the last aim of the current meta-analysis was to investigate the relation between PFU and well-being as suggested by studies in the field so far.

2.4. The Present Study

While research on PFU 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 broader construct of “Internet addiction” (i.e. PIU), and with the frequency of use of the social network, as well as the role played by some individual characteristics (e.g. personality traits), motives, and personal adjustment. 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 PFU 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 PFU can be reliably detected. Furthermore, we reviewed the more frequent 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. Finally, we showed the association of PFU with psychological distress (and specifically

with depression and anxiety) and with general well-being with a particular attention to users' satisfaction with life.

In reviewing the literature on PFU, 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; similarly, different types of motivation for Facebook use were categorized following the two dimensions as 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).

Similarly, various types of problems, such as "psychological vulnerability," "poor mental health" and "psychological symptoms" were all categorized as "psychological distress". 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 types of motive. No specific hypotheses were formulated regarding the relative strength of the associations with the different categories of motives.

H5: PFU will be positively associated with psychological distress (e.g., depression, anxiety, etc.) and negatively associated with well-being (e.g., satisfaction with life, etc.).

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), the associations between PFU 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 and report more psychological problems related to such use. However, the opposite direction could also be true, that is, levels of psychological distress associated with PFU may decrease as age increases because users may be better able to cope with their problematic life online. Given that research on PFU has never explicitly analyzed developmental changes in how this social network is used and how its problematic use may be differently associated with individual well-being, this hypothesis should be considered tentative. Second, we may expect the same associations could 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 PFU 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 et al., 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.

2.5. Methods

2.5.1. Literature Search

We adopted multiple methods to search for eligible studies. First, electronic search was conducted in March 2017 in PsychInfo, Pubmed, Scopus, ResearchGate, and Google Scholar with any of the following term: “problematic Facebook use”, “PFU”, “Facebook addiction”, “Facebook abuse”, “excessive Facebook use”, “misuse of Facebook”, “Facebook intrusion”, “Facebook overuse”, “compulsive Facebook use”, “compulsive use of Facebook”. Second, recent review articles on Facebook (Andreassen, 2015; Ryan et al., 2014) were reviewed for relevant citations. Third, the reference sections of the collected articles were searched for relevant earlier references (i.e., “backward search” procedure) and the “cited by” function in Google Scholar was used to find potentially relevant papers that cited the article by Andreassen and colleagues (2012), which presents the validation of the most used Bergen Facebook Addiction Scale. Authors of the retrieved articles were also asked for additional studies or unpublished datasets (we obtained 2 positive replies with this information). To maximize the possibility of finding unpublished studies, we inspected the conference programs of the previous three editions of the International Conference on Behavioral

Addiction (held in 2014, 2015, and 2016). 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. The literature search, data analysis, and reporting of this study adhered to MOOSE guidelines for meta-analyses of observational studies (Stroup et al., 2000).

2.5.2. Inclusion Criteria

The key requisite for inclusion in the current meta-analysis was consideration of measures of PFU. Studies were excluded if they measured problematic Internet use in general or SNSs in general, instead of specifically PFU, and if they included simple measures of Facebook use (e.g., frequency of Facebook use) but not of PFU. 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.

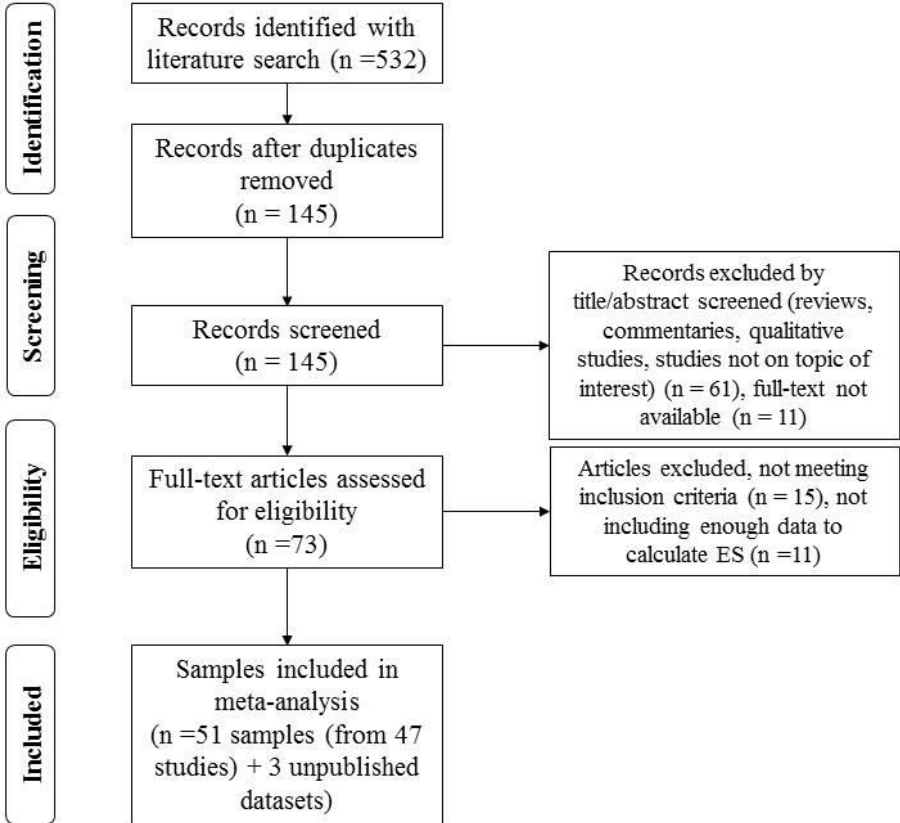
A flowchart that visually depicts the search process is provided in Figure 2.1. Once duplicates had been removed, the search produced 145 records. A screening of titles and abstracts identified 72 studies potentially eligible for inclusion (for 11 of them we were not able to obtain full-texts). Of these studies, 15 initially met the inclusion criteria. However, for 11 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 46 studies reporting data from 51 independent samples and 3 unpublished dataset

provided by email by authors. As shown in Table 2.1, some studies reported data for more than one sample and they have been considered separately (e.g., Bodroža & Jovanović, 2016; Orosz et al., 2015). Moreover, the studies by Chabrol et al. (2016) and Delfour et al. (2015) reported data for different variables but using the same sample, thus they were considered separately.

All included studies were coded independently by the author of the current thesis and by a research assistant, 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.

Figure 2.1. Flow Diagram of Study Inclusion.



2.5.3. Data Analysis

Gender differences in PFU were computed as standardized mean difference (Cohen's d), whereas the association between PFU 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 PFU 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 Development 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 PFU or (ii) associations between PFU and all other variables.

Heterogeneity was assessed using the Q statistic (which is distributed as χ^2 with $df = k - 1$, where k represents the number of effect sizes; Lipsey & Wilson, 2001), evaluating whether

the pooled studies represented a homogeneous distribution of effect sizes. Significant heterogeneity indicates that variations in effect sizes are likely due to sources other than sampling error (e.g., study characteristics). Also reported is the I^2 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.

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.

Table 2.1. 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	Facebook addiction, gender, time spent on Facebook, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)
Andreassen (2013)	218	79.2	20.7	Norway	published	Facebook addiction, gender, Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)
Balci (2013)	903	59.4	21.1	Turkey	published	Facebook addiction, time spent on Facebook, other psychological problems
Baturay (2016)	120	52.5	21.46	Turkey	published	Facebook addiction, time spent on Facebook, self-esteem
Beyens (2016)	371	57	16.41	Belgium	published	Facebook intensity, gender, motives (external source, negative valence, positive valence)
Blachnio (2015)	672	65	27.53	Poland	published	Facebook intrusion, daily Internet time, depression
Blachnio (2016a)	445	79.1	26.95	Serbia	published	Facebook addiction, self-esteem, well-being, life satisfaction
Blachnio (2016b)	452	67	21.04	Poland	published	Facebook addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)

First author (Year)	Sample size	% of females	Mean age of sample	National setting	Publication status	Variables included in meta-analysis
Blachnio (2017, sample 1)	350	67	20,87	Poland	published	Facebook addiction, Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)
Blachnio (2017, sample 2)	320	66	21,94	Turkey	published	Facebook addiction, Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)
Blachnio (2017, sample 3)	341	66	21,7	Ukraine	published	Facebook addiction, Internet addiction, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)
Bodroža (2016, sample 1)	359	79.4	21.29	Serbia	published	Facebook addiction, gender, time spent on Facebook, self-esteem, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (external source, positive valence), anxiety
Bodroža (2016, sample 2)	445	79.1	26.95	Serbia	published	Facebook addiction, gender, time spent on Facebook, self-esteem, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness), motives (external source, positive valence), anxiety
Çam (2012)	1257	58.8	/	Turkey	published	Facebook addiction, gender
Chabrol (2016) [§]	456	76	20.5	France	published	Facebook addiction, gender, motives (internal source, external source, negative valence, positive valence)
Dantlgraber (2016)	841	62	27.5	Austria	published	Facebook addiction, gender

First author (Year)	Sample size	% of females	Mean age of sample	National setting	Publication status	Variables included in meta-analysis
Delfour (2015)	456	76	20.5	France	published	Facebook addiction, depression, anxiety
Dhaha (2013)	309	16	30	Somalia	published	Facebook addiction, motives (internal source, external source, positive valence)
Elphinston (2011)	305	63.9	19.75	Australia	published	Facebook intrusion, gender, time spent on Facebook, well-being
Eraslan-Capan (2015)	349	64.2	20.8	Turkey	published	Facebook addiction, self-esteem
Gerson (2016)	337	59.6	36.5	United Kingdom	published	Facebook Intensity, gender, motives (external source, negative valence)
Hong (2014)	241	41.5	31	Taiwan	published	Facebook addiction, gender, time spent on Facebook, self-esteem, personality traits (neuroticism, extraversion), depression
Hong (2016)	225	30.2	20	Taiwan	published	Facebook addiction, gender, time spent on Facebook, motives (internal source, negative valence, positive valence)
Hormes (2014)	253	62.8	19.68	United States	published	Modified DSM criteria (Facebook), gender, time spent on Facebook, Internet addiction
Jafarkarimi (2016)	441	49	24.8	Malaysia	published	Facebook addiction, gender, time spent on Facebook
Khumsri (2015)	872	63	16.6	Thailand	published	Facebook addiction, time spent on Facebook, other psychological problems
Kimpton (2016)	273	71.8	19.72	Australia	published	Facebook addiction, gender
Kittinger (2012)	281	72	20.17	United States	published	Facebook addiction, Internet addiction

First author (Year)	Sample size	% of females	Mean age of sample	National setting	Publication status	Variables included in meta-analysis
Koc (2013)	447	22	21.64	Turkey	published	Facebook addiction, time spent on Facebook, motives (internal source, external source, positive valence), depression, anxiety
Laconi (2016a)^	822	55.3	21.64	France	unpublished	Facebook addiction, gender, Internet addiction, self-esteem, depression, anxiety, other psychological problems
Laconi (2016b)^	1068	62.7	26.64	France	unpublished	Facebook addiction, gender, Internet addiction
Lee E.B. (2015)	304	56	22.45	United States	published	Facebook addiction, gender, personality traits (neuroticism, extraversion, agreeableness, conscientiousness), anxiety
Lee Y.L. (2015)	188	63.8	/	Malaysia	published	Excessive Facebook use, gender, time spent on Facebook
Lee Z.W.Y. (2012)	200	52	21.26	Hong Kong	published	Problematic Facebook use, gender, time spent on Facebook
Malik (2015)	200	50	/	Pakistan	published	Facebook addiction, gender, self-esteem
Masur (2014)	581	67.1	28.84	Germany	published	Facebook addiction, gender, motives (internal source, external source, negative valence, positive valence), well-being, life satisfaction
Muench (2015)	489	65.6	/	United States	published	Facebook addiction, time spent on Facebook
Olufadi (2016)	2049	57	32.43	Nigeria	published	Facebook addiction, daily Internet time, depression, anxiety, other psychological problems, well-being
Orosz (2016a, sample 1)	512	64	22.11	Hungary	published	Facebook addiction, gender, time spent on Facebook
Orosz (2016a, sample 2)	566	64.1	24.21	Hungary	published	Facebook addiction, gender, time spent on Facebook, online sociability, personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness)

First author (Year)	Sample size	% of females	Mean age of sample	National setting	Publication status	Variables included in meta-analysis
Orosz (2016a, sample 3)	531	74	23.81	Hungary	published	Facebook addiction, gender, time spent on Facebook
Orosz (2016b)	257	70	20.04	Hungary	published	Facebook overuse, gender, time spent on Facebook, motive (positive valence)
Przepiorka (2016a)	756	59	21.38	Poland	published	Facebook intrusion, gender, daily Internet time, Internet addiction
Przepiorka (2016b)	954	64.2	20.84	Poland	published	Facebook intrusion, gender
Ryan (2016)	417	68.6	31.57	Australia	published	Problematic Facebook use, gender, time spent on Facebook, motives (external source, positive valence)
Satici (2014)	248	56	21.5	Turkey	published	Facebook addiction, gender, daily Internet time, other psychological problems
Satici (2015)	311	58	20.86	Turkey	published	Facebook addiction, gender, well-being, life satisfaction
Sharifah (2011)	380	100	23.5	Malaysia	published	Facebook addiction, motives (internal source, external source, negative valence, positive valence)
Sigerson (2017)	978	56.2	35	United States	published	Facebook addiction, gender, Internet addiction
Tang (2016)	894	65	20.5	Taiwan	published	Facebook addiction, 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	Facebook addiction, gender, motive (negative valence)
Uysal (2013)	297	53	20.1	Turkey	published	Facebook addiction, gender, well-being

First author (Year)	Sample size	% of females	Mean age of sample	National setting	Publication status	Variables included in meta-analysis
Verseillie (2016) [^]	1068	62.7	26.64	France	unpublished	Facebook addiction, depression, anxiety
Walburg (2015)	286	59.8	16.5	France	published	Facebook addiction, gender, depression, other psychological problems, well-being

Notes: [^]= Unpublished datasets provided by authors without title nor related draft paper; [§] = same sample as Delfour (2015).

2.6. Results

The presentation of results begins by briefly describing the general characteristics of the studies included in the meta-analysis. The 53 independent samples analyzed in this meta-analysis included data on 26707 participants (59.49% females). The mean age of the participants across the collection of studies was 25.31 years (SD=4.75; information not available for 4 samples), with sample mean ages ranging from 16.4 to 36.5 years (range: 16 - 80 years). Participants were from several different countries across the world. 9 samples were from Asian countries, 41 from Western countries, plus 2 from Africa. All studies used self-report scales to measure both PFU and individual characteristics. 27 out of 47 studies used either the Bergen Facebook Addiction scale ($k=20$) or the Internet Addiction Test ($k=7$) adapted to Facebook context as measure of PFU; the remaining studies ($k=25$) used a variety of other measures (e.g., problematic Facebook use, Facebook intrusion). A summary of information about each study is presented in Table 2.1. In the next paragraphs we described the results of the meta-analyses separately for each construct. Results of these analyses are summarized in Table 2.2.

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

The pooled effect size for the association between PFU and overall time spent online was $r = .32$, 95% CI [.27, .36], $k=26$, $Z = 12.80$, $p < .001$. Heterogeneity of effects across studies ($Q_{(25)} = 170.03$, $p < .001$, $I^2 = 87.8\%$) was explored through moderator analysis. The estimated correlation was significantly larger in samples with more females ($\beta = .005$, $p < .001$). 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 $r = .33$, 95% CI [.28, .38], $k=22$, $Z = 12.15$, $p < .001$.

Regarding Internet addiction, the estimated correlation with PFU was $r = .62$, 95% CI

[.54, .69], $k=10$, $Z = 12.02$, $p < .001$. Significant heterogeneity emerged $Q_{(9)} = 161.18$, $p < .001$, $I^2 = 94.6\%$. However, none of the tested moderators significantly explained such heterogeneity.

2.6.2. Gender Differences in Problematic Facebook Use

Data for analysis on gender differences were available for 36 independent samples. For each of these samples, we coded a standardized mean difference (Cohen's d) in PFU as comparison between female and male participants, that is, a positive effect d is indicative of a higher PFU in females, whereas a negative d indicates the opposite result. Meta-analytic results of the random-effects model showed a small, positive effect $d = .14$, which was significantly different from zero ($Z = 3.04$, $p < .001$), with a 95% CI ranging from .05 to .23.

There was significant heterogeneity among the 36 effect sizes ($Q_{(35)} = 266.79$, $p < .001$; $I^2 = 86.6\%$). 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 analyses, which are summarized in Table 2.3, did not yield statistically significant effects of moderators.

2.6.3. Associations between Problematic Facebook Use, Personality Traits and Self-Esteem

Results about the Big Five personality traits showed that the trait more clearly correlated with PFU were neuroticism and conscientiousness with opposite signs: a mean positive correlation of $r = .22$, 95% CI [.17, .22], $k = 12$, $Z = 8.98$, $p < .001$ for neuroticism, and a mean negative correlation of $r = -.21$, 95% CI [-.25, -.15], $k = 11$, $Z = -7.52$, $p < .001$ for conscientiousness. The other three traits were negatively, but only mildly associated with PFU (for detailed results see Table 2.2). Moderator analyses showed that the percentage of females

in the sample significantly moderated the link between PFU and conscientiousness ($\beta = -.007$, $p < .05$), indicating that this effect was larger for males.

Regarding self-esteem, as expected, the effect was negative, $r = -.23$, 95% CI [-.31, -.15], $k = 6$, $Z = -5.26$, $p < .001$. Significant heterogeneity emerged also for this variable ($Q_{(5)} = 15.23$, $p < .05$) but none of the moderators were significant.

2.6.4. Associations between Problematic Facebook Use and Motives

Furthermore, we tested the associations between PFU 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, communication, etc.). Both types of motives were positively associated with PFU ($r = .40$, 95% CI [.30, .49] for internal sources; $r = .29$, 95% CI [.24, .34] for external sources), but the effect was comparatively larger for motives related to internal sources (difference = .11, 95% CI [-.002, .21]).

Similarly, regarding the second type of categorization, both motives with negative valence ($r = .40$, 95% CI [.31, .49]) and motives with positive valence ($r = .32$, 95% CI [.26, .37]) were positively associated with PFU. The effect related to motives with negative valence was slightly larger (difference = .08, 95% CI [-.02, .19]).

Significant heterogeneity emerged for all these effects. Age did moderate the link between motives with internal source and PFU ($\beta = .026$, $p < .05$); that is, internal sources were more associated with PFU in older samples. The other tested moderators did not significantly explained the heterogeneity.

2.6.5. Associations between Problematic Facebook Use and Psychological Distress

Meta-analytic results of the random-effects model for the association between PFU and

psychological distress was $r = .29$, 95% CI [.24, .34], $k = 13$, $Z = 10.64$, $p < .001$.

Heterogeneity of effects across studies ($Q_{(12)} = 69.99$, $p < .001$, $I^2 = 80.7\%$) was explored through moderator analysis. Results of meta-regression showed that the correlation was larger in samples with higher mean age ($\beta = .018$, $p < .01$). Moreover, this effect tended to be larger in samples from Western countries than in samples from Asian countries ($\beta = -.168$, $p < .01$). However, only two samples from Asian countries were available for this analysis. Proportion of females in the sample and publication status did not significantly moderate this effect.

Two subsequent analyses were performed on depression and anxiety, separately. Mean correlation between PFU and depression was $r = .30$, 95% CI [.25, .35], $k = 8$, $Z = 10.93$, $p < .001$. The result for anxiety was $r = .29$, 95% CI [.26, .32], $k = 8$, $Z = 17.94$, $p < .001$. In this case, no heterogeneity was found ($Q_{(7)} = 9.52$, $p = .22$, $I^2 = 32.5\%$) and no moderation analysis were performed for this variable.

2.6.6. *Associations between Problematic Facebook Use and Well-Being*

The analysis performed on the association between PFU and indexes of well-being yielded a negative mean effect of $r = -.19$, 95% CI [-.28, -.10], $k = 8$, $Z = -4.204$, $p < .001$. Significant heterogeneity emerged ($Q_{(11)} = 44.90$, $p < .001$, $I^2 = 89.4\%$). However, no proposed moderator influenced this association. Finally, the analysis on life satisfaction alone showed a negative effect of $r = -.15$, 95% CI [-.26, -.04], $k = 5$, $Z = -2.727$, $p < .001$. We were not able to test the effect of national setting and publication status because all available studies included samples from Western countries and published papers.

2.6.7. *Publication Bias*

Potential publication bias was evaluated in different ways (see Table 2.4). 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 one case (i.e. openness), the estimated effect was 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 study on the right side of the funnel plot. In other cases (i.e. other two personality traits) the trim and fill method suggested the imputation of four studies for agreeableness and one study for conscientiousness. As regard motives, three studies are suggested to be imputed for external source and one for positive valence.

Table 2.2. Summary of Meta-Analytic Results.

	<i>k</i>	<i>N</i>	<i>ES</i>	95% CI	Z	<i>Q</i> _(df=k-1)	<i>I</i> ²
Time spent online	26	13379	.32	.27, .36	12.80**	170.03**	87.8
Time spent on Facebook	22	9654	.33	.28, .38	12.15**	132.64**	86.7
Internet addiction	10	5410	.62	.54, .69	12.02**	161.18**	94.6
Gender (females vs. males)	36	16883	.14	.05, .23	3.04*	266.79**	86.6
<i>Personality traits</i>							
Neuroticism	12	4913	.22	.17, .26	8.98**	31.76**	63.7
Extraversion	12	4913	-.03	-.07, .01	-1.30	20.25**	45.9
Openness	10	4368	-.09	-.14, -.04	-3.65**	23.85*	60.9
Agreeableness	11	4672	-.07	-.14, .009	-1.73	75.38**	84.8
Conscientiousness	11	4672	-.21	-.25, -.15	-7.52**	34.80**	70.1
Self-esteem	6	2113	-.23	-.31, -.15	-5.26**	15.23*	72.0
<i>Motives for Facebook</i>							
Internal source	7	3292	.40	.30, .49	7.09**	70.39**	91.0
External source	11	4996	.29	.24, .34	11.44**	31.62**	69.4
Negative valence	7	3244	.40	.31, .49	7.70**	69.12**	89.4
Positive valence	15	5141	.32	.26, .37	10.16**	56.39**	80.4
Psychological distress	13	7123	.29	.24, .34	10.64**	69.99**	80.7
Depression	8	6041	.30	.25, .35	10.93**	25.90**	76.1
Anxiety	8	5950	.29	.26, .32	17.94**	9.52	32.5
General well-being	8	5278	-.19	-.28, -.10	-4.204**	44.90**	89.4
Life satisfaction	5	2646	-.15	-.26, -.04	-2.727*	23.263**	86.6

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

Table 2.3. Moderator Analyses.

	Mean age	% Females	Geographical location ^a	Publication status ^a
Time spent online	.005	.005**	.058	/
Time spent on Facebook	.014	.005**	.085	/
Internet addiction	-.019	.011	/	.141
Gender ^b	-.009	/	.162	-.166
<i>Personality traits</i>				
Neuroticism	.011	.001	-.061	/
Extraversion	-.010	-.002	-.058	/
Openness	.020	.0001	-.115	/
Agreeableness	.022	-.002	-.016	/
Conscientiousness	-.008	-.007*	-.085	/
Self-esteem	-.100	-.005	-.118	-.040
<i>Motives for Facebook use</i>				
Internal source	.026*	.001	.076	/
External source	-.007	.001	-.002	/
Negative valence	-.003	.001	.164	/
Positive valence	-.006	.0001	-.029	/
Psychological distress	.018**	.0003	-.168**	.0002
Depression	.007	.002	-.084	.042
General well-being	.007	.017	-.072	-.029
Life satisfaction	-.005	.018	/	/

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 2.4. Summary of Analyses Evaluating Publication Bias.

	Kendall's rank correlation		Egger's test		N of studies to be imputed ^a
	Tau	<i>p</i>	<i>Z</i>	<i>p</i>	
Time spent online	.019	.894	-.529	.597	0
Time spent on Facebook	-.087	.573	-1.140	.254	0
Internet addiction	.111	.728	1.04	.300	0
Gender	-.006,	.969	1.278	.201	0
<i>Personality traits</i>					
Neuroticism	-.424	.063	-2.360	.018	0
Extraversion	-.152	.545	-.770	.441	0
Openness	-.151	.051	-2.62	.009	3
Agreeableness	-.055	.879	-1.050	.294	4
Conscientiousness	-.382	.121	-1.943	.052	1
Self-esteem	-.333	.469	-1.103	.270	0
<i>Motives for Facebook use</i>					
Internal source	-.048	1.00	-.422	.673	0
External source	-.200	.445	-.216	.829	3
Negative valence	-.143	.773	-.169	.866	0
Positive valence	-.394	.086	-1.669	.095	1
Psychological distress	-.205	.367	-.073	.942	0
Depression	-.214	.548	-.781	.435	0
Anxiety	-.500	.109	-2.572	.010	0
General well-being	-.429	.179	-1.010	.313	0
Life satisfaction	0.200	.817	-.061	.951	0

Note: ^a according to trim and fill method.

2.7. 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, PFU 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. Finally, PFU was positively correlated with signs of psychological distress, including anxiety and depression, whereas, a comparatively smaller negative correlation between PFU and well-being (including life satisfaction and other indices of subjective well-being) emerged. 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 criteria¹. 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).

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).

A complementary approach is to put one effect into a meaningful context, comparing it to other effects that have been reported within the same literature and are commonly considered important (for the same approach in meta-analysis see, for example, Gini, Pozzoli, & Hymel, 2014). To our knowledge there are no other published meta-analyses on the correlates of PFU; however systematic reviews and meta-analyses about close topics can be used as literature of reference. The effects observed in our study appear stronger than other effects reported in the published literature, such as the correlation between problematic Internet use and social anxiety (Prizant-Passal, Shechner, & Aderka, 2016), general Internet use and well-being (Çikrikci, 2016; Huang, 2011), total time spent online and social anxiety (Prizant-Passa et al., 2016). Moreover, a comparison of our findings with available meta-analyses indicates that, for example, the link between PFU and psychological distress which has been found in the current meta-analysis is comparable to the association between problematic smartphone use and internalizing problems (Elhai, Dvorak, Levine, & Hall, 2017), and to the associations between Internet addiction and anxiety, depression, and alcohol abuse (Ho et al., 2014). In sum, the present meta-analytic review evidenced the links between PFU and specific characteristics of this phenomenon, certain individual characteristics of Facebook users as well as psychological distress and well-being that are statistically significant and practically meaningful.

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 can be considered a component of PFU—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 (Indian & Grieve, 2014; 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 et al., 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 as very weak risk factor for PFU, despite the large literature

suggesting otherwise (e.g. Turel et al., 2014; Przepiorka & Blachnio, 2016). 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. A possible explanation for this result has been provided by Andreassen and colleagues (2012) who argued that conscious people may be more occupied with other duties and deadlines, thus giving less importance to unnecessary activities like Facebook (Wilson, Fornasier, & White, 2010). Moreover, 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 have effect almost null indicating that extant studies found opposite signs for these associations. In fact, results suggested that extraversion may be not that important as outlined in previous studies in predicting PFU (e.g., Blachnio et al., 2017; Andreassen et al., 2012) 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 direct predictors for PFU. Research efforts, therefore, should be better devoted to the identification of other, more meaningful psychological mechanisms underlying PFU.

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.

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 seems potentially interesting also in order to contribute to 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). For this reason, future studies should ascertain the real nature of PFU.

Finally, small-to-medium associations were found between psychological distress and PFU showing that PFU is linked to individuals' well-being. The cross-sectional nature of all studies included in this meta-analysis did not allow to establish the direction of such associations. Although PFU is likely to influence psychological mental health of social networking sites users over time, it may also be the case that feelings of depression and anxiety, among others, also lead some people to problematic use of Facebook to fulfill

emotional and relational needs (Blachnio et al., 2015). Similarly, whereas it has been argued that PFU may have a negative impact on well-being (Denti et al., 2012), it could also be the case that having poor levels in some indicators of well-being, such as life satisfaction, peer support and happiness, may make users more prone to problematically use Facebook as a means of compensation (Satici & Uysal, 2015).

2.7.1. Moderators

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

Regarding the age of sample, results of the meta-regression showed that the associations of internal motives and psychological distress with PFU were larger in older samples (that is, samples with higher mean age). A possible explanation of the age-related difference in the association between internal motives and PFU could be based on the different meaning the use of Facebook (perhaps even more than other Internet applications) has for adults compared to adolescents in everyday life. Indeed, given the different developmental tasks adults and adolescents have to deal with (Sugarman, 2004), it could be supposed that Facebook users might tend to differ in the motivations underlying their engagement in this social network: for example, 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); conversely, 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. Brechwald & Prinstein, 2011; Bee, 1994).

As regard psychological distress, the finding of the current meta-analysis is consistent with another recent meta-analysis (Prizant-Passal et al., 2016) where problematic Internet use was more strongly associated with social anxiety as participants' age increased. These findings may support the application of the general chronic-stress model to Facebook use research. Briefly, this model posits that more longstanding negative experiences are associated with more adverse psychological symptoms (Dohrenwend & Dohrenwend, 1981). As far as Facebook use is concerned, it is plausible that young adults have a longer cumulative exposure to electronic media and their risks, including PFU, which might account for this association increasing with age. The chronic-stress model applied to this topic would predict that people who have experienced PFU for longer time would have worse outcomes than those who have experienced more limited maladaptive use. Further, this explanation is consistent with the possibility that symptoms of maladjustment, such as higher psychological distress, might be reported only after problematic use has persisted for some time (for similar reasoning in the context of prolonged negative experiences see, for example, Rueger, Malecki, & Demaray, 2011). Unfortunately, further understanding of this finding is limited by the lack of additional information about the developmental trajectories that may describe the progress of the link between PFU and psychological distress over time; moreover studies failed to report important information about when participants created their Facebook profile or when they started using Facebook in a problematic way, which may be useful to support our interpretation. Moreover, for adolescents, spending the majority of their free time on social networks may be regarded as "normative" (Zhou, 2011) and therefore adaptive, and it may thus be less related to psychological distress than for adults. These possibilities are speculative, however, and would need to be further investigated in future studies.

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, whereas the association between conscientiousness

and PFU tend to be stronger in samples with lower percentages of 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 of Facebook. Moreover, it seems that the negative relationship between conscientiousness and PFU is stronger in sample with lower percentages of females, indicating that it could plausible that being organized and precise is a stronger protective factor for males than females. Previous findings related to other problematic behaviours appeared inconsistent suggesting that the role of gender in such association should be clarified in order to understand the meaning of this effect. For example, whereas it has been found that conscientiousness was more associated with less alcohol and smoking for women compared to men (Kashdan, Vetter, & Collins, 2005), other studies showed non-significant moderation effect of gender in the association between conscientiousness and smoking (Harakeh, Scholte, de Vries, & Engels, 2006).

Finally, with regard to the geographical location of the studies included in the current meta-analysis, meta-regression showed that only the association between psychological distress 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 two 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 negative psychological correlates of PFU 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, both psychological well-being/distress and motives in people who use Facebook problematically are warranted. Moreover, such studies should analyze the role of other individual and contextual characteristics that may moderate these links.

2.7.2. Limitations and Future Directions

Although this meta-analysis makes important contributions to understanding the phenomenon of PFU and the relations between PFU and individual characteristics and (mal)adjustment, 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, this limitation necessitates caution in interpreting the findings. Unfortunately, this domain of research is still dominated by cross-sectional studies that hamper the possibility to establish, for example, the direction of the association between PFU and psychological distress and well-being. As an example, an important question for future longitudinal research is whether PFU serves primarily as an antecedent and/or consequence of psychological distress and other adjustment indices and whether these temporal relations are similar or different across age groups (e.g., adolescents vs. young adults). Particularly useful for this kind of test would be long-term cascade models, which are able to test cross-lag paths across multiple time points. Moreover, experimental studies (e.g., randomized controlled intervention studies) designed to investigate whether—and under what circumstances—changing how people use Facebook toward a less problematic use can, in turn, change their psychological adjustment and well-being could help to clarify the issue of directionality.

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, 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 PFU 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 PFU interacts with other individual risk factors, such as lack of emotional self-regulation 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. Overall, the individual and contextual factors that may buffer or exacerbate the relation of PFU with personality traits or motives, and psychological problems remains 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. Specifically, from a theoretical point of view, results of the current meta-analysis contribute to the debate of whether problematic Internet use can stand on its own diagnosis or whether it is a negative consequence of other existing disorders (Pies, 2009). In other words, the relatively medium correlations found with

psychological distress and general well-being seem to indicate that PFU might have the potential to be recognized as an outstanding disorder in future studies.

The next chapters (Chapter 3, 4, and 5) report three studies that contribute to clarify some “open” results emerged in this meta-analysis: Study 2 (Chapter 3) aims to examine more in depth the specific role of the *external* motives leading to PFU among adolescents while taking into account personality traits; in Study 3 (Chapter 4) two types of psychological mechanisms (psychological motives for Facebook use and metacognitions) are proposed as mediators in the still unclear association between personality traits and PFU; and Study 4 (Chapter 5) tackle the issue of high engagement in Facebook use, by analyzing how problematic Facebook users differ from non-problematic ones with respect to the *real* frequency of certain Facebook activities.

CHAPTER 3

Study 2. Social Influence Processes and Problematic Facebook Use among Adolescents: the Contribution of Social Identity, Social Norms, and Personality

3.1. Literature Review

Recent research has highlighted the possible contribution of personality and social influence processes to PFU (Kuss & Griffiths, 2011a; Lee et al., 2012). However, to date, no study has investigated the relative contribution of these constructs in predicting PFU among adolescents. In this study, we focused on adolescence because it has been recently argued that Facebook is heavily used by adolescents to shape their relationships with peers and to outline personal characteristics, such as personality and identity, which develop in this particular period of life (Doornwaard et al., 2014).

3.1.1. Personality as a Predictor of Facebook Use

Personality has been linked to mental health and human behaviour for centuries, since the time of the ancient Greeks (Kotov, Gamez, Schmidt, & Watson, 2010) who suggested that personality types contribute to the vulnerability to psychological problems and, at the same time, also help understanding the etiology and mechanisms of mental illness (e.g., Clark & Watson, 1999). The interest in the link between personality and mental health has been expanded until present days, and it has gradually lead psychologists toward a consensus about the conceptualization of personality traits. Much of the 20th century was, indeed, characterized by efforts to classify personality, resulting in a broad definition of personality as a hierarchical structure made of several traits, that is, basic dimensions “in which individuals

differ in their enduring emotional, interpersonal, experiential, attitudinal, and motivational styles” (McCrae & John, 1992, p. 175).

Among the variety of models proposed to understand the organization of personality traits, the Big Five model (also named the Five-Factor Model - FFM) has gradually emerged as a shared framework and it has been supported by growing evidence of its validity (Kotov et al., 2010). As outlined in chapter 2, the FFM (Caprara et al., 1993; Caprara et al., 1994) traces individual personality differences based on five main dimensions: Extraversion (which refers to expansiveness and energy), Agreeableness (which refers to concern and politeness), Conscientiousness (which refers to orderliness and precision), Emotional Stability (which refers to the capacity to cope with anxiety and emotionality), and Openness (which refers to openness to novelty and interest toward different people and cultures). Despite researchers are still debating about the best model of personality, the FFM has been recognized as valuable for capturing the essential traits. Indeed, it was found to be robust across age (i.e., the same structure has been proven to be valid for both children and adults; Digman, 1997), and cultures (McCrae & Costa, 1997). Moreover, it has been showed that personality traits tend to be quite stable over time and largely involved in many relevant life outcomes, such as life satisfaction and well-being (e.g., Heller, Watson, & Ilies, 2004; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007).

In the last decade, a growing body of research has also been focused on the link between personality traits and Internet use (e.g., Hughes et al., 2012). Literature reviewed in the meta-analysis (chapter 2) shows that personality characteristics are thought to be linked to online experiences by influencing, for example, the frequency of Internet use and interpersonal communication (e.g., Butt & Phillips, 2008; Ross, Orr, Sisc, Arseneault, Simmering, & Orr, 2009). Nonetheless, findings on this association remain unclear. Research has shown that introverts can cope with their off-line social difficulties using online communications (Amichai-Hamburger et al., 2002), and that extraversion is a significant

predictor of frequent Internet use to engage in social activities. In addition, neuroticism has been observed to play a role in affecting the sharing of information in social networks (Ross et al., 2009). Moreover, openness to experience has been associated with a greater tendency to be sociable on Facebook, and agreeableness and conscientiousness appear to be linked to the number of friends on SNSs (Ross et al., 2009).

3.1.2. Application of the Social Influence Theory to Facebook Use

Social Influence Theory proposes that individual emotion, cognition and behavior can be affected by three social processes: compliance (normative influence of others' expectations), internalization (congruence of one's goals with those of other group members), and identification (i.e. conception of one's self in terms of the group's defining features) (Kelman, 1974). These processes may be operationalized as subjective norms, group norms, and social identity (see Aim section).

Kelman (1958) defined social influence as the *change* in behaviour or attitudes that one person, or a group or the society, (intentionally or unintentionally) causes on another one, as a result of the way the "influenced" person perceives him/herself in relation to the source of influence. This theory is based on the assumption that such *change* can occur at different levels, corresponding to the underpinning processes engaged by the "influenced" to adopt the induced behaviour (or, in other words, to conform). The three processes proposed by Kelman are compliance, identification, and internalization (Table 3.1 reports the original definitions proposed by Kelman in 1958), which are indeed the three different ways to "accept" influence. These are characterized by specific antecedents (such as, feelings and thoughts) and consequences, and are function of three determinants: (a) the relative importance of the expected result of engaging in a certain behaviour; (b) the relative "power" the influencer has on the individual; and (c) the predominance of the induced response (Kelman, 1958).

Because SNSs are social in nature, Social Influence theory has been recently adopted by several researchers (e.g., Dholakia, Bagozzi, & Pearo, 2004; Zhou, 2011) to examine the role of social influence processes in predicting participation intention and, in turn, actual behavior in virtual communities. It has indeed been found that intention to participate in social network activities predicted actual online behaviors and higher levels of virtual community engagement (Zhou, 2011). For example, participation intention may be particularly influenced by subjective norms (i.e., compliance), in that, one should be more prone to participate in online activities if such activities are valued and expected by other in-group members. Similarly, a process of internalization of group norms (e.g., what significant others think about online activities or how they behave online) may influence an individual intention to participate in the same online activities and subsequent consistent behavior. Therefore, because social influence processes tend to be particularly strong during adolescence (Brechwald & Prinstein, 2011; Prinstein & Dodge, 2008), adolescents' behaviors in online communities can be especially influenced by their peers' attitudes and beliefs about online activities and their actual behavior online; that is adolescents' decision to do something in online contexts can be regulated after significant references' pressure, expectations and behaviors (Doornwaard et al., 2014).

Table 3.1. Social Influence Theory (Kelman, 1958).

Social Influence processes as described by Kelman (1958, p. 53)	Operational definition
<p>«<i>Compliance</i> can be said to occur when an individual accepts influence because he hopes to achieve a favorable reaction from other person or group. He adopts the induced behavior not because he expects to gain specific rewards or approval and avoid specific punishments or disapproval by conforming. Thus the satisfaction derived from compliance is due to the <i>social effect</i> of accepting influence».</p>	<p><i>Subjective Norms</i></p>
<p>«<i>Internalization</i> can be said to occur when an individual accepts influence because the content of the induced behavior – the ideas and actions of which it is composed – is intrinsically rewarding. He adopts the induced behavior because it is congruent with his value system. He may consider it useful for the solution of a problem or find it congenial to his needs. Behavior adopted in this fashion tends to be integrated with the individual's existing values. Thus the satisfaction derived from internalization is due to the <i>content</i> of the new behavior».</p>	<p><i>Group Norms</i></p>
<p>«<i>Identification</i> can be said to occur when an individual accepts influence because he wants to establish or maintain a satisfying self-defining relationship to another person or a group. This relationship may take the form of classical identification, in which the individual takes over the role of the other, or it may take the form of a reciprocal role relationship. The individual actually believes in the responses which he adopts through identification, but their specific content is more or less irrelevant. He adopts the induced behavior because it is associated with the desired relationship. Thus the satisfaction derived from identification is due to the <i>act</i> of conforming as much».</p>	<p><i>Social Identity</i></p>

3.1.3. Aim of the Current Study

This study reports the derivation of a model designed to assess the contribution of personality, social identity and social norms to frequency of Facebook use as perceived by youngsters (perceived frequency of Facebook use: henceforth PFFU) and PFU among adolescents. The model is presented on Figure 3.1 and the following are hypotheses derived from the literature sustaining the module structure.

H1: PFFU and PFU will be positively associated with openness and agreeableness and negatively associated with emotional stability, extraversion, and conscientiousness.

Despite the number of published studies aimed at exploring the relationships between personality traits and Facebook behaviours, conclusions about such relationships are still

unclear (see chapter 2). For this reason, in this study we want to test the contribution of the Big 5 to PFFU and PFU.

H2: PFFU and PFU will be positively associated with the endorsement of subjective norms around such usage.

Subjective norms refer to what particular behavior is considered appropriate and, to some extent, prescribed within a group (“what ought to be”; e.g., Cialdini, Kallgren, & Reno, 1991). In other terms, they refer to the group “pressure” an individual feels about what he/she should do and his/her beliefs about what others expect him/her to do. Studies have shown that the norms such groups hold can influence both positive and negative attitudes and behavior, including during adolescence (e.g., Borsari & Carey, 2003; Pozzoli & Gini, 2013). In this context subjective norms refer to the influence of important others’ mindsets on the need for Facebook use. Adolescents who endorse subjective norms that favour Facebook use, that is, who perceive that significant people think that they should use Facebook, will be more likely to (problematically) engage with it.

H3. PFFU and PFU will be positively associated with the endorsement of group norms around such usage.

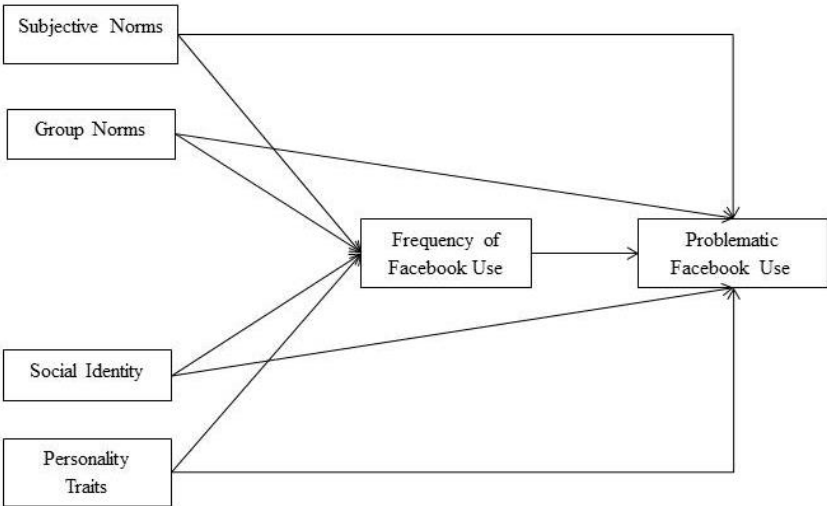
While subjective norms refer to what group members expect other individuals in the group to do, group norms in general refer to the congruence of group’s goal to one’s goal (Zhou, 2011). In particular, in SNSs context they reflect, for example, the agreement among group members about the importance (for themselves) of using Facebook. Therefore, adolescents who endorse group norms favorable to the use of Facebook and share positive values about Facebook with their group (i.e., the process of internalizing group norms; Kelman, 1974) will be more likely to (problematically) engage with it.

H4. PFFU and PFU will be positively associated with the strength of social identity.

Social identity reflects one’s definition of self in relation to his/her group. It includes three dimensions: cognitive social identity (the overlapping of self-image with the identity of

friends’ group), affective social identity (the feeling of belongingness toward friends’ group), and evaluative social identity (the perceived value as a member of the friends’ group). Social identity has been found a key factor in on-going perceptions and behaviours in general (Tajfel, 2010), in addictive behaviours (e.g. Buckingham, Frings, & Albery, 2013; Frings & Albery, 2015; Dingle, Cruwys & Frings, 2015), and in the whole Social Cure School (e.g. Jetten, Haslam, & Alexander, 2012). Therefore, we propose that social identity should lead adolescents to (problematically) use Facebook.

Figure 3.1. Proposed theoretical model predicting Problematic Facebook Use in a sample of adolescents.



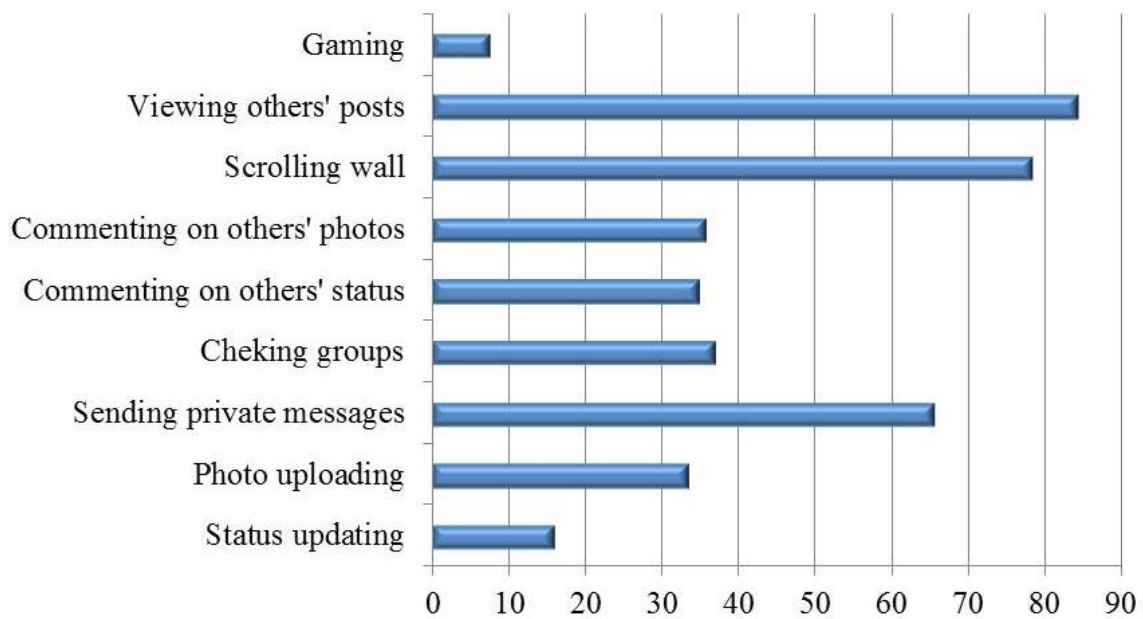
3.2. Methods

3.2.1. Participants and Procedure

A convenience sample of 1179 adolescent students from two secondary schools in Italy voluntarily participated in the study. Permission was sought from the Head of School and signed consent was obtained from students’ parents. The parental consent letters described the goals of the study and privacy of schools and children was guaranteed. Students of age provided their own written consent. Further, before data collection, students also gave their

personal assent for participation and anonymity was assured. All students agreed to participate. Formal approval for this research was given by the Ethics Committee of Psychological Research at the University of Padova, Italy. All responses to the self-report instruments (outlined below) were collected during a regular school-day in classrooms and in the presence of the class teacher. Then, the paper and pencil surveys were entered into the database. Data entry was completed by two research assistants. Data were randomly checked to ensure accuracy and only few inaccuracies were identified and corrected. 151 participants declared that they had not a Facebook account and were excluded from analyses. Moreover, 60 participants with a Facebook account did not answer enough questions among those of interest and were excluded from analysis (see analysis section). Therefore, the analyses were run on data from a final sample of 968 students aged between 14 and 19 years (mean age = 17.19, $SD = 1.48$; 37.7% females). Of them, only 11 students declared that they did not own a personal computer and 13 reported that they did not own a smartphone. The mean number of Facebook friends in this sample was 852 friends (ranging from 3 to 6753). Moreover, 63% of the adolescents reported having created their Facebook account before 14 years of age. With regards to the perceived frequency of Facebook use, 79% of the participants declared to be online on Facebook from “quite” to “very” often during a standard weekday. Figure 3.2 shows the percentages of participants reporting to engage in each activity at least once a week.

Figure 3.2. Activities on Facebook (“More than once a week” %).



3.2.2. Measurement of Key Variables

Personality Traits. Personality traits were assessed using the Italian version of the Big Five Questionnaire (Caprara et al., 1993; Caprara et al., 1994) which covers five personality traits: agreeableness, conscientiousness, emotional stability (i.e. neuroticism reversed), extraversion, and openness. The questionnaire contains 20 items rated on a 5-point scale (from (1) “absolutely false for me” to (5) “absolutely true for me”), so that higher scores indicate higher levels of on each trait. The Cronbach's alpha for the scale in the present study was .76 (95% CI .74–.78).

Social Influence Processes. Three social influence processes were measured with items adapted to the Facebook context from a study of general online communities (Dholakia et al., 2004). Subjective norms were measured with two items (e.g., “Most people that are important to me think that I should use Facebook”) rated on a 7-point scale ((1) “definitely disagree” to (7) “definitely agree”). The Cronbach's alpha for the scale in the present study was .85 (95% CI .83–.86). Group norms were measured with two items (e.g., “How important is using

Facebook for your friends?") rated on a 7-point scale ((1) "definitely disagree" to (7) "definitely agree"). The Cronbach's alpha for the scale in the present study was .75 (95% CI .71–.79). Social identity was assessed by two items for each dimension: cognitive social identity (e.g., "My image overlaps with the identity of my friends' group"), affective social identity (e.g., "How attached are you to your friends' group?"), and evaluative social identity (e.g., "I am a valuable member of my friends' group"). Items were rated on a 7-point scale ((1) "not at all" to (7) "very much"). The Cronbach's alpha for the scale in the present study was .85 (95% CI .83–.86).

Perceived Frequency of Facebook Use. PFFU was measured using a 5-point scale ((0) "never" to (4) "very often"), with participants rating how often they are online on Facebook in a day.

Problematic Facebook Use. PFU was measured with the Problematic Facebook Use Scale (PFUS). It consists of fifteen items adapted from the scale developed and validated by Caplan (2010). A preliminary study aimed at examining the factorial validity of the PFUS in a sample of Italian adolescents and young adults (Marino et al., 2017), showed good psychometric properties (for more details, see Appendix D).

Participants were asked to rate the extent to which they agreed with each of the fifteen items on a 8-point scale (from (1) "definitely disagree" to (8) "definitely agree"). The scale included five subscales: preference for online interaction (e.g., "I prefer online social interaction over face-to-face communication"); mood regulation (e.g., "I have used Facebook to make myself feel better when I was down"); cognitive preoccupation (e.g., "I would feel lost if I was unable to access Facebook"); compulsive use (e.g., "I have difficulty controlling the amount of time I spend on Facebook"); and negative outcomes (e.g., "My Facebook use has created problems for me in my life"). Taken together, these factors give an overall index score for the construct of PFU. Higher scores on the scale indicate higher levels of PFU. The Cronbach's alpha for the scale in the present study was .84 (95% CI .83–.86).

3.2.3. Statistical Analyses

The pattern of relationships specified by our theoretical model (presented in Figure 3.1) was examined through structural equation modeling (SEM) and a DWLS method was used to test the model, using the Lavaan package (Rosseel, 2012) of the software R (R Core Team, 2013). In the tested model, PFU was the dependent variable, personality traits and social influence processes were the independent variables, and PFFU was the mediator. The Sobel test (also known as the product of coefficients approach; Baron & Kenny, 1986; Hayes, 2009) was used to test for mediation. Given the multivariate nature of the statistical analyses, only cases with less than 10% of missing data on each of the variables included in the theoretical model were selected. Therefore SEM analysis was run on a sample of 968 students. Before testing the model, two separate confirmatory factor analyses (CFA) were performed to examine the validity of the measure for the social identity and the validity of the measure for PFU. All other latent variables included in the model were predicted by the manifest items used to measure that construct.

3.3. Results

3.3.1. Correlations

Table 3.2 shows the Pearson bivariate correlations among the variables of interest included in the model. PFU and PFFU were found to be positively correlated, in line with previous evidence (Kuss & Griffiths, 2011a). As expected, all social influence processes positively correlated with PFFU and with PFU. Specifically, group norms correlated significantly with both PFFU and PFU, and subjective norms correlated significantly with PFU. All personality traits, except for conscientiousness, were significantly and negatively correlated with PFU such that decreased scores on emotional stability, extraversion, openness, and agreeableness, were associated with increased PFU.

Table 3.2. Correlation Matrix for the Study Variables.

	1	2	3	4	5	6	7	8	9	10
1. Perceived Frequency of Facebook Use (PFFU)	1									
2. Problematic Facebook Use (PFU)	.41**	1								
3. Subjective Norms (SN)	.22**	.41**	1							
4. Group Norms (GN)	.61**	.63**	.58**	1						
5. Social Identity (SI)	.11**	-.09*	-.02*	.002	1					
6. Emotional Stability (ES)	-.08*	-.31**	-.08*	-.07	.24**	1				
7. Extraversion (E)	.07*	-.29**	-.03	.05	.40**	.43**	1			
8. Conscientiousness (C)	.05	.01	-.05	.08*	.01	.20**	.32**	1		
9. Agreeableness (A)	.08*	-.14**	-.12**	-.02	.24**	.21**	.69**	.32**	1	
10. Openness (O)	-.05	-.18**	-.03	-.07	-.002	.11*	.44**	.22**	.62**	1
11. Gender (G)	.29**	.05	-.07*	.10*	.001	-.27**	.10*	.05	.27**	.21**

Notes: * $p < .05$, ** $p < .001$; $N = 968$.

Moreover, weak correlations between three personality traits (emotional stability, extraversion, and agreeableness) and PFFU were found. Finally, gender positively correlated with PFFU but not with PFU.

3.3.2. *The CFA and SEM Analyses*

To evaluate the fit of a model, the following criteria are commonly considered: Comparative-Fit Index (CFI; good fit: > .95); Non-Normed Fit Index (NNFI; good fit: > .95); and Root Mean Square Error of Approximation (RMSEA; good fit: < .05) (e.g., Browne & Cudeck, 1993; Hu & Bentler, 1999).

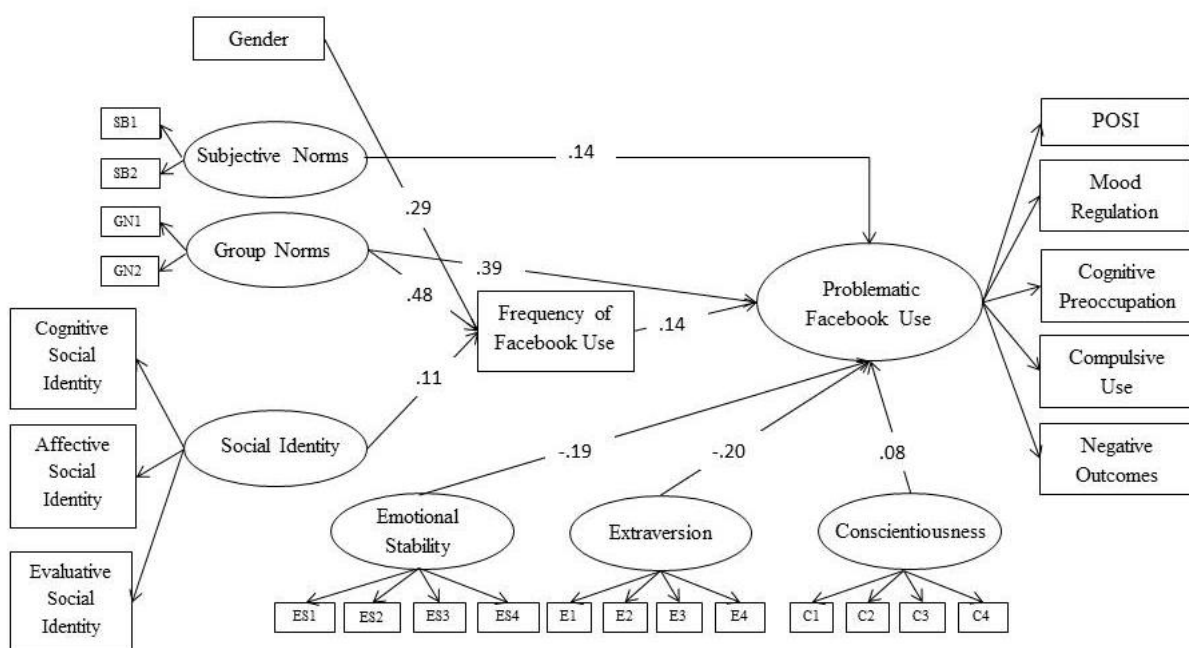
Results of the CFA showed a more than adequate fit to the data for both the social identity model ($\chi^2_{(6)} = 3.772$, $p = .707$, CFI = 1, NNFI = 1, RMSEA < 0.001 [90% CI: .000, .031]) and the PFUS model ($\chi^2_{(80)} = 191.771$, $p < 0.001$, CFI = .99, NNFI = .99, RMSEA = .038 [90% CI: .031, .045]).

A first version of the model was tested including in the SEM all the variables of interest: latent independents made of observed scores for subjective norms, group norms, and personality traits. PFU and social identity also were latent variables identified by factor scores of the respective dimensions. Gender (dummy coded: M = 1, F = 2) was also included as a predictor in the model to control for the effect of gender on the associations among the measures. Results of the SEM for the whole model showed that it did not fit the data very well: $\chi^2_{(482)} = 2102.195$, $p < .001$; CFI = .937, NNFI = .927, RMSEA = 0.061 [90% CI: .058, .063], and ten standardized coefficients did not reach the statistical significance at 5% level: the effects of gender, social identity, openness, and agreeableness on PFU; the effects of subjective norms and five personality traits on the PFFU.

Therefore, we evaluated a second version of the model (Figure 3.3), removing non-significant links (Lenzi et al., 2015; Pozzoli & Gini, 2013). The modified model fitted the data well, $\chi^2_{(277)} = 1054.605$, $p < .001$; CFI = .960, NNFI = .953, RMSEA = 0.055 [90% CI:

.052, .059]. The variables in the model accounted for 40% of the variance in participants' PFU and for 32% of the variance in participants' PFFU. In this second model all estimated coefficients were statistically significant at the 5% level, with a satisfactory effect-size. Gender seemed to have an effect only on PFFU, showing that females tended to use the social network more frequently than males, but they were not more likely to problematically use Facebook than males. Moreover, a relatively modest link has been found between PFFU and PFU. Regarding our main hypotheses on personality traits and Facebook use, partly consistent with H1, emotional stability ($\beta_{\text{STANDARDIZED}} = -.19$) and extraversion ($\beta_{\text{STANDARDIZED}} = -.20$) had only direct negative effects on PFU and a positive, though weak, direct effect was found between conscientiousness ($\beta_{\text{STANDARDIZED}} = .08$) and PFU. Moreover, H2 was partially supported by the data because of the positive direct effect found between subjective norms and PFU ($\beta_{\text{STANDARDIZED}} = .14$). H3 was fully supported by results: there was a positive direct link between group norms and PFU ($\beta_{\text{STANDARDIZED}} = .39$), and an indirect effect of group norms on PFU (.078) via PFFU. An indirect effect between social identity and PFU (.015) via FFU, was also observed partly supporting H4.

Figure 3.3. Tested Model of the Inter-relationships between the Study Variables.



Note: All coefficients are significant at and below the .05 level.

3.4. Discussion

The goal of the present study was to examine the effect of both individual and social characteristics on PFFU and PFU among Italian adolescents. Overall, results indicate that personality traits and social influence processes are significantly involved in PFFU and/or PFU among adolescents.

With regard to the individual aspects, consistent with previous studies (Amichai-Hamburger et al., 2002; Amichai-Hamburger & Vinitzky, 2010; Kuss & Griffiths, 2011a; Ryan & Xenos, 2011), three personality traits, extraversion, emotional stability (neuroticism), and conscientiousness, appear to have a significant (though relatively weak) role in influencing PFU among adolescents. Specifically, low rates of extraversion are associated to PFU. This result is supported by the social compensation explanation (Ong et al., 2011): the less extraverted adolescents may be more likely to use Facebook in order to compensate for their lack of interpersonal and social skills. They may tend to be worried about their self-presentation skills and to prefer online interactions, finding the social network a safer place to interact with others without the proximity and intimacy needed in real-life settings (Kuss & Griffiths, 2011a). Moreover, the illusory benefit for introverts and shy people tending to feel more comfortable maintaining social relationships in online settings than in face-to-face situations (Ebeling-Witte, Frank, & Lester, 2007) may entail an higher amount of time spent online and engaging in PFU, in terms of negative consequences such as difficulties in their interpersonal life and missing social engagements (Caplan, 2010).

Furthermore, results show that those found to be low in emotional stability are more likely to use Facebook in a problematic way. It is possible that less emotionally stable adolescents tend to use Facebook to regulate their mood. Indeed, Amiel and Sargent (2004) found that people high in neuroticism (that is, low emotional stability) report using social networks to control information, to know what other users do, and to experience a sense of belonging to a group in order to satisfy their need for self-assurance (Amichai-Hamburger &

Vinitzky, 2010). Finally, in line with previous research (Ross et al., 2009), conscientiousness does not appear to affect PFFU. A somewhat unexpected, though very weak, result from the SEM reveals that the degree of conscientiousness is related to PFU. A possible account for this result has been provided by Bachrach and colleagues (Bachrach, Kosinski, Graepel, Kohli, & Stillwell, 2012) who argue that the precision and organization of highly conscientious people may predispose them to focus on ordering pictures or events using the tools Facebook offers. Moreover, Amichai-Hamburger and colleagues (2010) explain that, specifically in the context of Facebook, highly conscientious people may strive for an ever-increasing number of friends. This tension may increase the need to have what is happening on Facebook under control and, so, to PFU. Given the inconsistency with results from Study 1, understanding whether these mechanisms are actually in place in such circumstances may be a valid venue for future research.

As regard to social influence processes, results predominantly showed that they may have different effects on the way adolescents use Facebook. Firstly, subjective norms seem to affect the problematic (or not) nature of Facebook use rather than the perceived frequency of use. It can be argued that the more adolescents feel that people important to them think they have to use Facebook, the more they are likely to use it in a problematic way. In other words, PFU among adolescents is influenced by people who are important to them (de Oliveira, Zuniga Huertas, & Lin, 2016) and that pressure to use the social networks may be considered a risk factor for PFU regardless for the perceived frequency of use. In fact, despite the positive relation between FFU and PFU, the amount of time spent on the Internet does not necessarily indicate problematic use (Pontes et al., 2015).

Our findings suggest that adolescents who share values with their group about the importance of using Facebook (group norms) are more likely to both frequently use, and problematically engage, with Facebook. As suggested by de Oliveira (2016), in a social network site like Facebook, users share thoughts and experiences with their friends. When

they perceive that this group shares similar objectives, they may tend to frequently use Facebook in order to achieve the shared goal. Moreover, if adolescents share the belief that Facebook is equally important to them and to their group, they may use it problematically (Chan, Cheung, Lee, & Neben, 2015).

Finally, social identity seems to affect the PFFU but not PFU. Sharing ways of thinking, attachment to peer groups, and sense of belonging to peers in offline life do not directly determine PFU, but they may influence PFFU. Indeed, Lin, Fan, and Chau (2014) have recently reported that the sense of belonging to the group appears to positively influence the intention to continue using Facebook, for example to stay in touch with friends at any time. Since previous studies found opposing effects of the impact of social identity on Facebook use, future research are needed in order to understand this mechanism (Cheung, Chiu, & Lee, 2011; Hsu & Lin, 2008; Shen, Cheung, & Lee, 2013). In general, the model we tested demonstrated that the three social processes seem to play different roles in predicting the perceived frequency and quality of Facebook use.

In conclusion, since overuse and misuse of social networking sites may significantly affect young people's lives and well-being (Satici et al., 2014; Bevan et al., 2014), the results of this study may have some practical implications for educational programmes targeting adolescents. Prevention and intervention training may be delivered to young people in order to modify the way they perceive their social context, for example in terms of their peer groups, while also taking into account their individual characteristics.

The findings of this study must be considered with regard to some key limitations. First, a cross-sectional design was adopted and this may only be suggestive of a causal inference. Future research should thus seek to better understand the nature of the patterns observed through longitudinal studies. Second, all questionnaire-based studies are subject to recall bias and answer inaccuracy. Future studies could thus focus on gathering data, especially with respect to Facebook use, that are objectively linked to behavior. Third, the present model did

not take into account the distinction between the different uses of Facebook (e.g., messaging friends, playing games like Farmville, gambling, video-games, friends monitoring, etc). According to Griffiths' argument (2012), future studies should deepen the investigation of the different risk factors for PFU by testing whether such factors differentially contribute to the different activities. Despite its limitations, this preliminary study establishes important links between key individual and social variables in predicting the perceived frequency and maladaptation of Facebook use in adolescents.

CHAPTER 4

Study 3. Individual Characteristics and Problematic Facebook Use among Young Adults: the Role of Personality, Motives and Metacognitions

4.1. Literature Review

As outlined in chapter 2, recent reviews focused on Facebook (Kuss & Griffiths, 2011a; Ryan et al., 2014) and have revealed that there is an increasing number of scientific outputs highlighting possible predictors of PFU (e.g., personality traits, levels of social anxiety, motivations for Facebook use). However, to date, there is still a lack of theory-driven empirical research on psychological mechanisms that may lead to PFU (Lee et al., 2012). Therefore, one of the major challenges, in this context, is the development of a more detailed understanding of how Facebook use may become problematic, and what could facilitate the early detection of individuals at risk of developing PFU. In this view (and given the open findings highlighted in chapter 2 with regard to the direct link between personality and PFU), in the present study, we propose two different types of psychological mechanisms (psychological motives and metacognitions) that may help to explain the relationship between personality traits and PFU. The current study is the first to test the unique role of personality traits, motives for addictive behaviours and metacognitions in explaining PFU among young adults.

4.1.1. Personality Traits and Facebook Use

In accordance with the preceding study, the widely-used Five-Factor Model (Caprara et al., 1993; Caprara et al., 1994) has been also used in this study. As outlined in chapter 3, in previous studies that have applied this model to Facebook use, people low in extraversion and in emotional stability were found to be more likely to engage in Facebook use (Amichai-Hamburger et al., 2002). Moreover, people high in agreeableness have been found to use

Facebook to enhance their interpersonal successes by posting and connecting with others (Marshall et al., 2015), while people high in openness to experience have been observed to frequently find and share information (Hughes et al., 2012). 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). Beyond the link of specific uses of Facebook and personality, in chapter 2 it has been highlighted that only low levels of emotional stability and high levels of conscientiousness were respectively positively and negatively associated with the problematic use of the social network. Findings from chapter 3 partly confirmed these results in adolescence and also suggested a link between extraversion and PFU.

4.1.2. Motives Underlying PFU

As already stressed in chapter 2, many studies have outlined the motives underlying Facebook use, trying to understand the specific needs people expect to satisfy using Facebook (Sheldon, 2008b; for a review, see Ryan et al., 2014). Some of these works, using the Use and Gratification paradigm (Papacharissi & Mendelson, 2011), 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, 2008b), developing new friendship relationships, and escapism (Floros & Siomos, 2013). Kuss and Griffiths (2011a) argued that the main motivation to use Facebook might be that of establishing and/or maintaining both online and offline relationships.

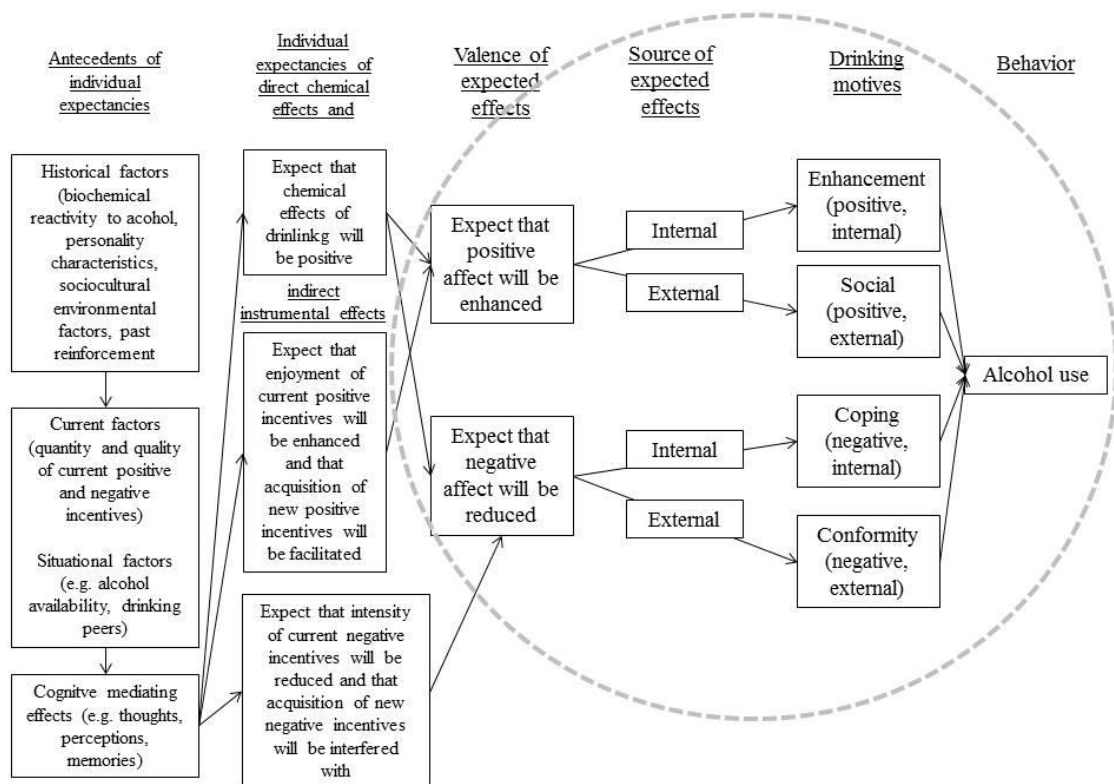
As recently pointed out by Bischof-Kastner and colleagues (Bischof-Kastner et al., 2014), despite the importance of these motivations in predicting Internet and Facebook use, many studies have failed to concomitantly consider the important role of affectivity in understanding problematic Internet use (PIU), and PFU in particular. One promising approach

which considers affectivity, and allows a classification of the different motives behind Internet use, was proposed by Bischof-Kastner and colleagues (2014) on the basis of the traditional motivational model for addictions (Figure 4.1; Cox & Klinger, 1988). As already explained in the meta-analysis (see chapter 2), according to the motivational model of addictive behaviours, people (with different individual characteristics like history, personality, and thoughts) behave in certain ways to achieve expected or desired effects. Four motives result from crossing two orthogonal dimensions: (1) positive or negative valence (i.e. increasing or decreasing positive or negative feelings); and (2) internal or external source (in respect to one's own sensations or to significant others, respectively). The resulting four motives are: (i) enhancement (positive valence and internal source; that is, to expect to enhance positive affect by using Facebook); (ii) coping (negative valence and internal source; that is, to expect to diminishing bad feelings by using Facebook); (iii) conformity (negative valence and external source; to use Facebook because of the peer pressure to use it); and (iv) social (positive valence and external source; that is, to expect to improve contact and relationships with friends).

Based on this model, in this study, the Internet Motives Questionnaire (Bischof-Kastner et al., 2014) was adapted to specifically measure Facebook motives after the successful adaptation to several behaviours beyond alcohol use (Mazzardis et al., 2010), including gambling (Canale et al., 2015), sexual risk-taking behaviour (Cooper, Shapiro, & Powers, 1998), and listening to music (Kuntsche, Le Mével, & Berson, 2014).

Figure 4.1. The Original Motivational Model of Alcohol Use (adapted from

Kuntsche, Knibbe, Gmel, & Engels, 2005; Cooper, 1994; Cox & Kinger, 1988).



4.1.3. Metacognitions and PFU

The Self-Regulatory Executive Function (S-REF) model of psychopathology (Wells & Matthews, 1994; 1996) emphasizes the role of processes and metacognitive beliefs implicated in problem maintenance. This model, specifically, proposes that psychological problems are exacerbated and maintained by maladaptive styles of coping with thoughts and emotions, rather than focusing only on the content of thoughts and stressful experiences. Such coping styles involve perseverative thinking (e.g., worry and rumination), threat monitoring, avoidance, and thought suppression. Worry refers to a chain of negative thoughts, often in the form of “what if” questions, that are future-oriented, directed at anticipating danger and planning ways to avoid it, and involve catastrophizing. Rumination refers to the attempt to answer questions about the meaning of negative events (i.e., “why” questions). It is aimed at

understanding the reasons for negative emotions and finding out ways of dealing with distressing feelings. Both worry and rumination are voluntary, but often experienced as difficult to control. This style of coping is termed the Cognitive Attentional Syndrome (CAS) and it becomes problematic, once activated, because it causes negative thoughts and emotions to persist and become perseverative (Wells, 2000, 2009).

According to the S-REF model the CAS is derived from underlying metacognitions, which have been defined as “the information individuals hold about their own cognition and internal states, and about coping strategies that impact both” (Wells, 2000). This form of knowledge provides plans for guiding processing, the rules of which may be more (explicit) or less (implicit) amenable to conscious awareness and verbal expression. Metacognitions take two forms: positive and negative. Positive metacognitions motivate the use of the CAS. They include beliefs such as: “Worry will help me be prepared” or “If I ruminate I will be able to understand”. Negative metacognitions concern the significance, uncontrollability and danger of thoughts. Examples of these include: “I need to control my thoughts at all times” or “My thoughts may make me lose my mind”.

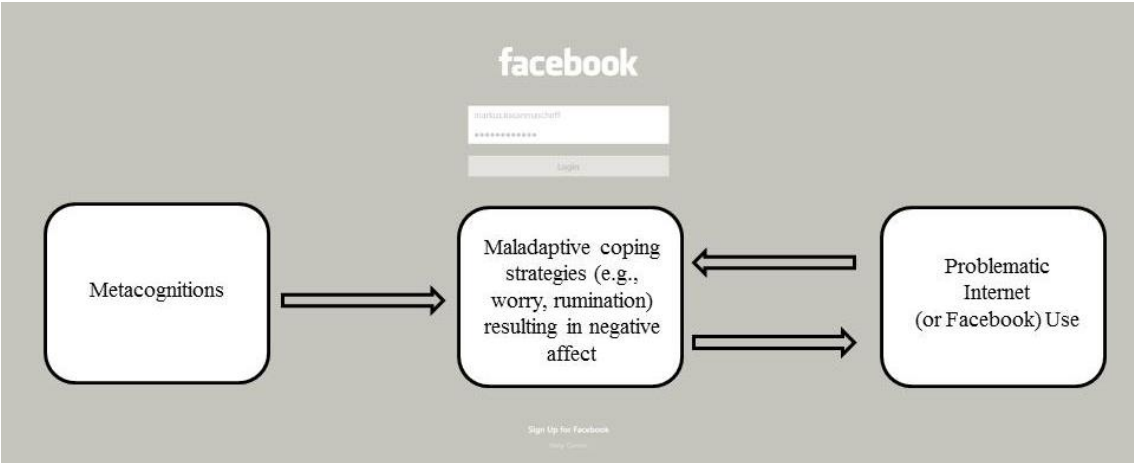
In the last two decades, the S-REF model has been widely applied with both adolescents and adults and has led to the development of disorder-specific formulations and treatments for addictive behaviours (Spada, Caselli, & Wells, 2013; Spada, Caselli, Nikčević, & Wells, 2015), depression (Wells, 2009), generalized anxiety disorder (Wells, 1995), obsessive-compulsive disorder (Wells, 2000; Wells & Matthews, 1994), post-traumatic stress disorder (Wells, 2000; Wells & Sembi, 2004), and social anxiety disorder (Clark & Wells, 1995).

Cartwright-Hatton and Wells (1997; Wells & Cartwright-Hatton, 2004) assessed metacognitions through five factors: (i) positive beliefs about worry (measuring beliefs that perseverative thinking is useful); (ii) negative beliefs about thoughts (measuring beliefs that perseverative thinking is dangerous); (iii) cognitive confidence (in one’s own attention and

memory); (iv) beliefs about the need to control thoughts; and (v) cognitive self-consciousness (assessing the tendency to self-focus attention and to monitor thoughts).

Spada and colleagues (Spada, Langston, Nikčević, & Moneta, 2008) have identified the role of metacognitions in PIU. They found that metacognitions, as measured by the Metacognitions Questionnaire-30 (Wells & Cartwright-Hatton, 2004), were correlated with PIU. They also tested a mediation model in which negative emotions predicted metacognitions which in turn predicted PIU, observing that the relationship between negative emotions and PIU was entirely mediated by metacognitions. They thus postulated that metacognitions predict PIU because they lead to an escalation in negative emotions (through the activation of maladaptive coping strategies such as rumination and worry), which in turn increases the likelihood of utilizing the Internet as a means of cognitive-affective self-regulation (Figure 4.2). In other words, using the Internet (for example by seeking information to reduce preoccupations and psychological discomfort) becomes a strategy to control emotional states (Spada et al., 2008). It is plausible to assume that metacognitions may play a similar role in PFU as the latter has been found to be employed as means for regulating emotions and cognitive preoccupations (Caplan, 2010).

Figure 4.2. Metacognitions Predicting PIU through the Activation of Maladaptive Coping Strategies.



4.1.4. Aim of the Current Study

The present study aims to test a model designed to assess the unique contribution of personality traits, motives for using Facebook and metacognitions on PFU among young adults. The conceptual model is presented in Figure 4.3 and the following hypotheses directly derive from the literature and sustain the model structure. First, as reviewed above, a number of personality traits have been found to be associated with different patterns of Facebook use and with PFU (e.g., Amichai-Hamburger et al., 2002; Kuss & Griffiths, 2011a; Marshall et al., 2015). Young adults high in personality traits like openness, conscientiousness and agreeableness are expected to report higher levels of PFU for several reasons, such as enhancing their interpersonal successes by connecting with others or finding and sharing information. Conversely, high emotional stability and extraversion should be associated with lower PFU. Nonetheless, results from the meta-analysis (see chapter 2) revealed that the link between personality and PFU is still not clear. Therefore, we tested whether personality traits are directly linked to PFU:

Hypothesis 1: PFU will be positively associated with openness and agreeableness and negatively associated with emotional stability, extraversion, and conscientiousness.

Second, a number of scholars have tried to understand why people use social networking sites (Joinson, 2008a; Papacharissi & Mendelsohn, 2011). However, no attempt has been made to investigate the possible link between PFU and motives for doing so, which have often been found to be significant predictors of other problematic behaviours (Bischof-Kastner et al., 2014). Specifically, enhancement and coping motives have been found to predict PIU, whereas conformity and social motives appear to be linked only to the frequency of Internet use (Bischof-Kastner et al., 2014). Therefore, we tested whether such theory-driven motives are directly linked to PFU:

Hypothesis 2: PFU will be positively associated with coping, conformity, enhancement, and social motives.

Third, assuming that PFU is a form of deficient self-regulatory strategy (Caplan, 2010), metacognitions could influence such maladaptive behaviour, by predisposing people to develop maladaptive coping strategies to thoughts and internal events, which may lead to Facebook use as a means of self-regulation. Therefore, we tested whether metacognitions are directly linked to PFU:

Hypothesis 3: PFU will be positively associated with positive beliefs about worry, negative beliefs about thoughts, cognitive confidence, need to control thoughts, and cognitive self-consciousness.

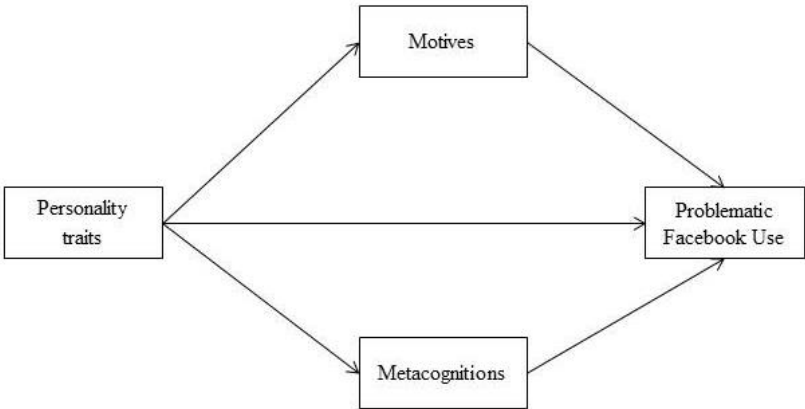
Fourth, it is possible that the sole link between personality and PFU is not sufficient to understand the psychological mechanism that may lead people to problematically use Facebook. Therefore, based on theories of personality (e.g., Caprara et al., 1993), it is likely that most associations of personality traits with PFU are indirect and mediated, at least partially, by individual motives and metacognitions. Caprara and Cervone (2000) have indeed defined personality traits as a set of internal systems that arise and act during the life span facilitating personal adaptation. This set of self-regulatory systems guide motivational and cognitive processes. Literature on different risky behaviours suggests that personality traits indirectly influence risky behaviours by activating certain needs and thoughts, which, in turn, may be encountered by engaging in the target behaviour (e.g., Cooper, Agocha, & Sheldon, 2000). Specifically, personality traits represent salient ways in which individuals differ in their motivational styles (McCrae & John, 1992) and metacognition appears to be influenced by different personality traits (Chiaburu, Cho, & Gardner, 2015). Therefore, it is important to include motives and metacognitions when investigating the link between personality traits and health or behavioural outcomes. Moreover, in the motivational model (Cox & Klinger, 1988), motives to engage in a behaviour result from a variety of expectancies linked to personality, memories, and perceptions (see Figure 4.1). Such individual characteristics may influence also the information individuals hold about their cognition and internal states (Spada et al.,

2008). Therefore, we tested the potential mediation role of motives and metacognitions in the relationship between personality and PFU.

Hypothesis 4: The relationship between personality and PFU will be mediated by motives to use Facebook and by metacognitions.

While a few studies have analyzed some of the current associations, to date, no attempt has been made to investigate the possible links between personality traits, motives, metacognitions and PFU altogether in a single model. Moreover, as highlighted above, the sometimes inconsistent findings on the relationships between personality traits and PFU may suggest that there could possibly be different underlying mechanisms able to explain such a link. The present study sought to test a single model, in which the contribution of each component to PFU is considered above and beyond that of the other components.

Figure 4.3. The Theoretical Model of Problematic Facebook Use Developed for testing in the study.



4.2. Methods

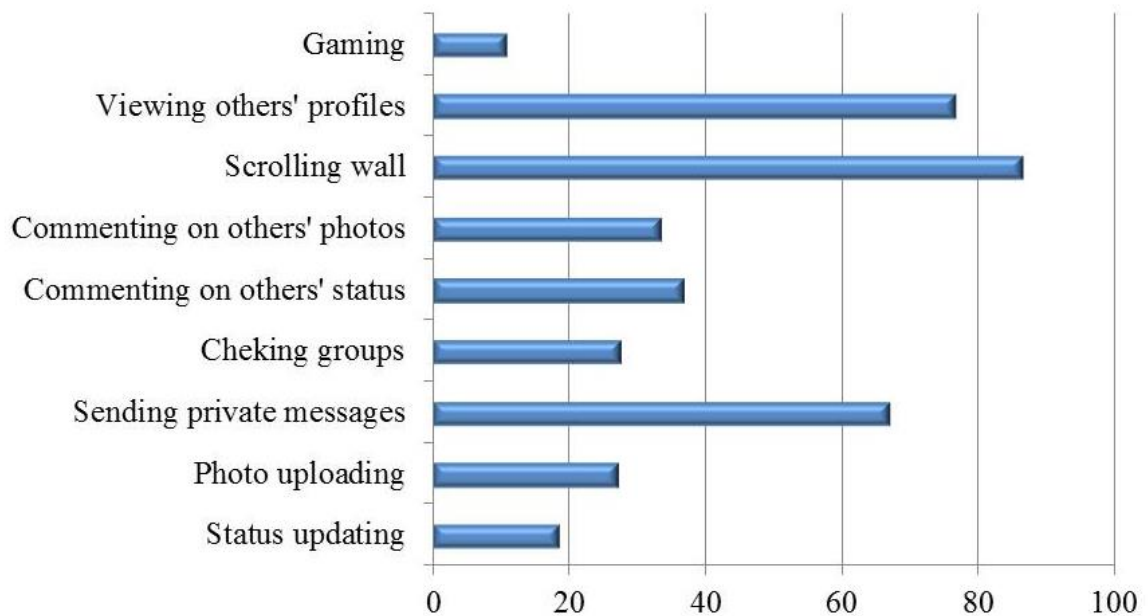
4.2.1. Participants and Procedure

822 respondents answered an on-line questionnaire during the academic year 2015/2016. Participants were Italian university students aged between 18 and 35 years (mean age = 21.17, $SD = 2.15$; 77.1% females) and were from different faculties (31% liberal arts; 36% psychology; 12% science; 22% other faculties). The survey was accessible online from October 15th 2015 to January 20th 2016. It was promoted by means of a section created in the university institutional website at the Department of Developmental and Social Psychology of the University of Padova (Italy), and an account on Facebook. At the beginning of the survey, participants were asked to provide information about their Facebook affiliation (that is, if they have or not a Facebook account), while their demographic information was only requested at the very end of the questionnaire (e.g., age, gender).

Seven participants declared not to have a Facebook account and were excluded from analyses. Therefore, the analyses were run on a final sample of 815 students (mean age = 21.17, $SD = 2.16$; 77.2% females). Of them, only 15 students declared that they did not own a personal computer whereas the 98% of them reported that they own a smartphone. The mean number of Facebook friends in this sample was 666 friends (ranging from 1 to 7654). Moreover, 34% of the sample reported having created their Facebook account before 14 years of age. With regards to the perceived frequency of Facebook use, 72% of the participants declared to be online on Facebook from “quite” to “very” often during a standard weekday. Figure 4.4 shows the percentages of participants reporting to engage in each activity at least once a week. The mean score of PFU was 28.7 ($SD = 14.1$; range: 15 – 118). Moreover, in line with findings from the meta-analysis (see chapter 2), a preliminary *t*-test showed that the mean score of PFU did not significantly differ between males and females ($F_{(813)} = .618$, $p = .432$; the Cohen’s *d* was also computed and it showed a negligible ($d = .06$) standardized

difference between the two means (males' mean score = 28.02, *SD* = 15.99; females' mean score = 28.95, *SD* = 13.53).

Figure 4.4. Activities on Facebook (More than once a week %).



4.2.2. Measurement of Key Variables

For each measure a confirmatory factor analysis (CFA) was performed with DWLS estimator (Jöreskog & Sörbom, 1993) to test for the construct validity of each measure. To evaluate the fit of a model, the following criteria are commonly considered: Comparative-Fit Index (CFI; adequate fit: >.90; good fit: > 0.95); Non-Normed Fit Index (NNFI; adequate fit: >.90; good fit: > 0.95); and Root Mean Square Error of Approximation (RMSEA; adequate fit: <.08; good fit: < 0.05) (e.g., Browne & Cudeck, 1993; Hu & Bentler, 1999).

Problematic Facebook Use. PFU was measured with the Problematic Facebook Use Scale (PFUS; see the methods section of chapter 3; Appendix D). The items were summed to obtain a continuous variable for PFU. Higher scores on the scale indicate higher levels of PFU. The Cronbach's alpha for the scale was .89 (95% CI .88-.90). The CFA confirmed an adequate fit between the model and the data: $\chi^2_{(90)} = 234.75, p < .001$; CFI = .97; NNFI = .96; RMSEA = .044, 90% CI [.038, .051].

Personality Traits. Personality traits were assessed using a short form of the Italian version of the Big Five Questionnaire (Caprara et al., 1993; Caprara et al., 1994) as for Study 2. It covers five personality traits: agreeableness, conscientiousness, emotional stability, extraversion, and openness. The questionnaire contains 20 items rated on a 5-point scale (from (1) “absolutely false for me” to (5) “absolutely true for me”), so that higher scores indicate higher levels on each trait. The Cronbach’s alpha for the scale was .78 (95% CI .75-.80). The CFA for this sample confirmed the factorial structure of the original validated scale: $\chi^2_{(160)} = 448.34, p < .001$; CFI = .95; NNFI = .94; RMSEA = .047, 90% CI [.042, .052].

Motives. Motives for using Facebook were measured with an adapted version of the Internet Motives Questionnaire (Bischof-Kastner et al. 2014) to Facebook context. Items were translated from English to Italian and back-translated in English by a bilingual psychologist. Simply replacing the word “Internet” with the word “Facebook” made adaptation from Internet to Facebook context. Participants were asked how often they logged on Facebook for different motives, thinking of all the times they have been on Facebook during the last 12 months. The scale includes four motives: coping (e.g. “To forget your worries?”), conformity (e.g. “To be liked by others?”), enhancement (e.g. “Because it is exciting?”), and social motive (e.g. “To come into contact with others?”). The questionnaire contains 16 items rated on a 5-point scale (from (1) “never or almost never” to (5) “always or almost always”), so that higher scores indicate higher levels on each motive. The Cronbach’s alpha for the scale was .86 (95% CI .84-.87). The CFA confirmed an adequate fit between the model and the data: $\chi^2_{(90)} = 224.40, p < .001$; CFI = .98; NNFI = .97; RMSEA = .040, 90% CI [.033, .047]. All the standardized loadings were significant at the $p < .001$ level (mean loading for coping factor = .79; mean loading for conformity factor = .61; mean loading for enhancement factor = .59; mean loading for social factor = .70) thus showing item convergent validity (Anderson & Gerbin, 1988). For more details see Appendix E.

Metacognitions. Metacognitions were assessed using the Italian version of the MCQ-30 (Quattropiani, Lenzo, Mucciardi, & Toffle, 2014). It consists of five factors assessed by six items each: positive beliefs about worry (e.g. “Worrying helps me cope”); negative beliefs about thoughts (e.g. “When I start worrying I cannot stop”); lack of cognitive confidence (e.g. “My memory can mislead me at times”); beliefs about the need to control thoughts (e.g. “Not being able to control my thoughts is a sign of weakness”); and cognitive self-consciousness (e.g. “I pay close attention to the way my mind works”). The questionnaire contains 30 items rated on a 4-point scale (from (1) “definitely disagree” to (2) “definitely agree”). Higher scores indicate higher levels of maladaptive metacognitions. The Cronbach’s alpha for the scale was .88 (95% CI .86-.89). The CFA for this sample confirmed the factorial structure of the original validated scale: $\chi^2_{(395)} = 2068.12, p < .001$; CFI = .92; NNFI = .91; RMSEA = .072, 90% CI [.069, .075].

4.2.3. Statistical Analyses

Correlation analyses were conducted in order to test the associations between the variables of interest. The pattern of relationships specified by our theoretical model (Figure 4.3) was examined through path analysis, using the package Lavaan (Rosseel, 2012) of the software R (R Development Core Team, 2012) and utilizing a single observed score for each construct included in the model. In particular, the covariance matrix of the observed variable was analyzed with Maximum Likelihood method estimator and a bootstrap approach (1000 bootstrap samples) was used to calculate bootstrapped confidence intervals to test for mediation. To evaluate the goodness of fit of the model we considered the R^2 of each endogenous variable and the total coefficient of determination (TCD; Bollen, 1989; Jöreskog & Sörbom, 1996). The TCD represents the overall effect of the predictor variables on dependent variables: in other words, the higher the TCD, the larger the explained variance. The TCD is computed as following: $1 - (psi/cov)$ (where psi represents the determinant of the

covariance matrix among the errors and *cov* represents the determinant of the fitted covariance matrix among endogenous variables).

In the tested model, PFU was the dependent variable, personality traits were the independent variables, and motives and metacognitions were the mediators between personality traits and PFU (Figure 4.3).

4.3. Results

4.3.1. Correlations

Table 4.1 shows the means, standard deviations and bivariate correlations between the variables included in the study. As expected, most of the study variables were correlated with each other. In particular, a strong positive correlation was found between PFU and motives, and a medium correlation between PFU and metacognitions, with the exception of cognitive self-consciousness. Moreover, PFU correlated with three personality traits (namely, extraversion, emotional stability, and openness).

4.3.2. Path Analysis

A first version of the theoretical model was tested including all the variables of interest. Several path coefficients did not reach the statistical significance and were characterized by a small effect size: the link between four personality traits (emotional stability, openness, agreeableness, and conscientiousness) and PFU, the association between social motive and PFU, the relationship between three metacognitions factors (positive beliefs about worry, need to control thoughts, and cognitive self-consciousness) with PFU; the associations between openness and three motives (coping, conformity, and social motive) and three metacognitions (positive beliefs about worry, cognitive confidence, and need to control thoughts); the relationship between extraversion and all motives and three metacognitions (positive beliefs about worry, need to control thoughts, and cognitive self-consciousness); the

link between emotional stability with enhancement and social motives, and with cognitive self-consciousness; the associations between agreeableness and three metacognitions (positive beliefs about worry, cognitive confidence, and cognitive self-consciousness) and three motives (coping, conformity, and enhancement); the relationships between conscientiousness and negative beliefs about thoughts, and three motives (coping, conformity, and enhancement). Therefore, these non-significant links were removed and a second version of the model was evaluated. In this model, all path coefficients were significant at least at the $p < .05$ level. As shown in the Figure (4.5), the only personality trait directly and negatively predicting PFU was extraversion. Positive, strong and direct associations were found between three motives (coping, conformity, and social) and PFU, and between two metacognitions (negative beliefs about thoughts and cognitive confidence) and PFU. Personality traits are differentially linked to motives to use Facebook (e.g. openness is associated with positive motives; that is enhancement, while extraversion is not associated with motives, and emotional stability seems to have an effect on negative motives, that is coping and conformity).

Table 4.1. Correlation matrix for the study variables.

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Problematic Facebook Use	28.74	14.12	1													
2. Emotional stability ^a	11.92	3.46	-.22**	1												
3. Extraversion ^a	15.29	2.78	-.18**	.24*	1											
4. Conscientiousness ^a	13.82	3.50	.01	.05	.27**	1										
5. Agreeableness ^a	16.33	2.48	-.06	.09**	.37**	.18**	1									
6. Openness ^a	15.37	2.72	-.07*	.11**	.25**	.06	.23**	1								
7. Coping ^b	6.11	2.86	.63**	-.21**	-.10**	.02	-.02	-.09*	1							
8. Conformity ^b	5.58	2.19	.56**	-.17**	-.12**	-.02	-.07	-.07	.49**	1						
9. Enhancement ^b	6.88	2.44	.50**	-.08*	-.06	-.05	-.06	-.10**	.53**	.45**	1					
10. Social ^b	9.91	3.68	.29**	-.05	.06	-.05	.11**	.08*	.25**	.36**	.44**	1				
11. Positive beliefs ^c	12.40	4.21	.21**	-.13**	.06	.14**	.07	.02	.15**	.18**	.16**	.12**	1			
12. Negative beliefs ^c	12.84	4.65	.34**	-.57**	-.16**	-.01	.02	.01	.26**	.30**	.12**	.11**	.26**	1		
13. Cognitive confidence ^c	11.51	4.32	.27**	-.21**	-.22**	-.16**	-.05	-.06	.19**	.22**	.11**	.07	.22**	.33**	1	
14. Need control thoughts ^c	12.17	3.38	.26**	-.25**	-.09*	.07*	-.02	-.02	.20**	.25**	.14**	.09*	.32**	.54**	-.31**	1
15. Cognitive self-consciousness ^c	16.65	3.45	.04	.03	.15**	.14**	.16**	.24**	.03	.04	.01	.11**	-.24**	.18**	-.01	.33**

Notes: * $p < 0.05$, ** $p < 0.01$; $N = 815$. ^a = Personality Traits; ^b = Motives; ^c = Metacognitions.

Along with the direct paths, as shown in Table 4.2, four indirect relationships were found significant at 5% level. Specifically, the indirect link between emotional stability and PFU via two motives for using Facebook (coping (-.31) and conformity (-.17)), and via two metacognitions (negative beliefs about thoughts (-.25) and cognitive confidence (-.05)).

Table 4.2. Standardized Bootstrapped Estimates of the Indirect Effects (with 95% Confidence Intervals) of Independents (Personality Traits) on the Dependent (PFU) through the Proposed Mediators (Motives for using Facebook and Metacognitions) linked to the Dependent.

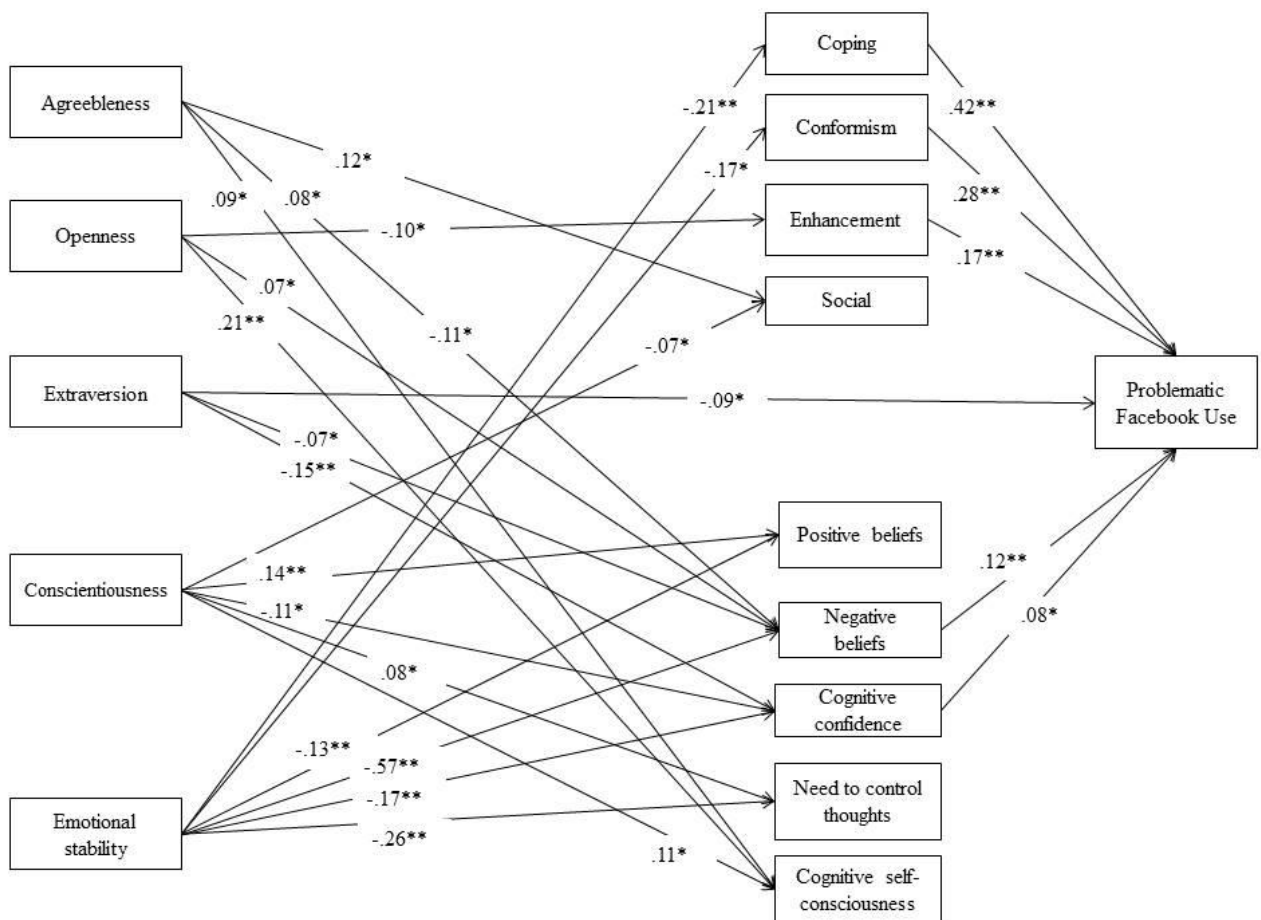
Independent Variables	Mediators	Dependent (PFU)	Confidence Intervals	
			Lower Bound	Upper Bound
Emotional stability ^a	<i>Coping</i> ^b	-.31	-.45	-.17
	<i>Conformity</i> ^b	-.17	-.27	-.06
	<i>Negative beliefs</i> ^c	-.25	-.37	-.12
	<i>Cognitive confidence</i> ^c	-.05	-.09	-.00
Extraversion ^a	<i>Negative beliefs</i> ^c	-.04	-.08	.00
	<i>Cognitive confidence</i> ^c	-.05	-.10	.00
Openness ^a	<i>Enhancement</i> ^b	-.08	-.16	-.00
	<i>Negative beliefs</i> ^c	-.04	-.00	.08
Agreeableness ^a	<i>Negative beliefs</i> ^c	.05	-.00	.10
Conscientiousness ^a	<i>Cognitive confidence</i> ^c	-.03	-.07	.00

Note: ^a = Personality traits; ^b = Motives; ^c = Metacognitions.

The squared multiple correlations for the endogenous variables indicate that the model accounts for 36% of the variance for the outcome variable (PFU), and 34% of the variance for one mediator (negative beliefs about thoughts) variable. Lower variance was observed for other mediators (e.g. 8% for cognitive confidence and 4% for coping motive). Finally, the total amount variance explained by the model (Total Coefficient of Determination, TCD = .52) indicated a good fit to the observed data. In terms of effect size, TCD = .52 corresponds

to a correlation of $r = .72$. According to the Cohen's (1988) traditional criteria, this is a very large effect size.

Figure 4.5. The Final Model of Problematic Facebook Use, Showing the Interrelationships between the Variables.



Notes: * $p < 0.05$, ** $p < 0.01$; $N = 815$.

4.4. Discussion

The goal of the present study was to examine the contribution of personality traits, motives and metacognitions to university students' problematic Facebook use (PFU), that is the use of Facebook that may lead to psychological, social, school/or work problems in person's life. Path analysis revealed that three of the four motives for using Facebook (coping, conformity, and enhancement) and two of the five metacognitions (negative beliefs about thoughts and cognitive confidence) predicted PFU. Moreover, only one personality trait (extraversion) appears to be directly, though weakly, linked to PFU, whereas emotional stability indirectly influenced PFU via motives (coping and conformity) and metacognitions (negative beliefs about thoughts and cognitive confidence). These results are (at least in part) consistent with our hypotheses that the relationship between PFU and personality traits would be mediated by motives and metacognitions.

These findings, taken together, suggest that Facebook motives and metacognitions can constitute, to a degree, direct antecedents of PFU, and that personality traits are not directly linked to PFU with the exception for extraversion. The negative link between PFU and extraversion is supported by the social compensation explanation, proposed by Ong and colleagues (Ong et al., 2011), and confirmed by previous empirical studies (Kuss & Griffiths, 2011a): the less extraverted individuals are, the more likely they are to use Facebook problematically in order to compensate for their perceived lack of interpersonal and social skills.

With regard to motives for using Facebook, our findings showed that problematic Facebook users seem to use Facebook mainly to cope with low mood, to not feel excluded under the peer pressure to use it, to enhance pleasant feelings, and not to meet social needs or maintain contacts. It can be supposed that using Facebook, for both internal (coping and enhancement) and external (conformity) emotion-regulation motives, is more dysfunctional than social Facebook use, which appears predominantly recreational. The robustness of these

findings is highlighted by the consistency with results from studies on Internet, alcohol and gambling (Bischof-Kastner et al., 2014). Indeed, as in the case with PIU, alcohol abuse or gambling, Facebook appears a method for regulating emotions, and when such motivation comes into play, Facebook use may escalate into PFU.

With regards to metacognitions, bivariate correlations seem to indicate an association between metacognitions and PFU, whereas results from multivariate analysis showed that negative beliefs about thoughts and low cognitive confidence might have an impact on PFU. Why would this be the case? It could be argued that if an individual believes their thinking and emotional states are dangerous and overwhelming (negative beliefs about thoughts) they may be more likely to engage in PFU as a means of cognitive-affective self-regulation. Moreover, it is also possible to argue that low cognitive confidence may lead to perseverative Facebook use in order to control for the presumed accuracy of information remembered helping to reduce temporarily metacognitive dissonance (Spada et al., 2008). Furthermore, it could be speculated that PFU itself is a means to ‘actively’ worry and ruminate about events and interactions on Facebook (e.g. what friends are doing on Facebook, how they perceive others’ profiles, if somebody has ‘poked’ someone else, etc.).

In addition, motives for using Facebook and metacognitions were found to mediate the relationship between PFU and personality traits. In recent years, the direct role of personality traits in predicting PFU has been widely investigated in Facebook context (Ross et al., 2009; Amichai-Hamburger & Vinitzky, 2010), showing that low levels of extraversion and emotional stability, in particular, were likely to be linked to PFU. The present results add to previous findings by suggesting that these constructs only weakly directly influence this maladaptive behaviour and also through motives and metacognitions. Specifically, in this study, emotional stability appeared to be the trait that significantly influences both motives and metacognitions, and, in turn, PFU. In particular, low levels of emotional stability influenced the two motives with negative valence (coping and conformity) which in turn

affected PFU: that is, people low on emotional stability may tend to use Facebook to cope with negative mood or to forget problems. Moreover, low levels of emotional stability had an effect on negative beliefs about thoughts concerning uncontrollability and danger and cognitive confidence which, in turn, affected PFU: that is, less emotionally stable people may endorse more readily beliefs (in the form of metacognitions) which lead to the employment of maladaptive strategies to control thinking increasing the likelihood of utilizing Facebook to regulate emotional states. Therefore, the data support the potential contribution of metacognitions to PFU, both directly influencing such problematic behaviour and mediating the relationship between personality traits and PFU. These results are also partly supported by previous findings on the mediating role of metacognitions in the relationship between difficulties in emotion regulation and PIU (Casale, Caplan, & Fioravanti, 2016). Specifically, Casale and colleagues (2016) showed that having difficulties in regulating emotions (like in the case of people with low levels of emotional stability) was associated with positive beliefs that using the Internet may serve as a means of escaping from unwanted affective states, which, in turn, increased the likelihood to engage in PIU. In this view, it could be observed that the coping motive as conceptualized in the present study (i.e., for example, using Facebook to forget about problems) can be compared to the positive beliefs (i.e., escapism) influencing PIU as proposed by Casale and colleagues (2016). In other words, the coping motive might be considered similar to a specific positive metacognition to the extent to which it focuses on beliefs about the usefulness of using Facebook as a self-regulation tool, that is, to overcome negative feelings and control thoughts (Casale et al., 2016; Panova & Lleras, 2016; Spada, Moneta, & Wells, 2007). Therefore, taken together, these findings seem to support the conceptualization of PIU (and therefore PFU) as a maladaptive cognitive-emotional-behavioural regulation strategy (Kardefelt-Winther et al., 2017; Spada et al., 2008; see chapter 2).

The present results are preliminary and some limitations must be highlighted. First, the sample was not randomly selected and the use of data from a self-report questionnaire may be influenced by recall bias and answer accuracy. Second, the cross-sectional design does not allow definitive statements about causality and future studies should employ longitudinal designs. Moreover, as suggested by Casale and colleagues (2016), future studies should examine the specific positive and negative metacognitive beliefs about Facebook, rather than using generic metacognitions, in order to further clarify the role of metacognitive beliefs in the development and maintenance of PFU.

Despite these limitations, results of this study have potentially important implications for developing prevention and intervention programmes for young adults. First, since personality traits tend to be quite stable, especially among adults, recent studies have shown the efficacy of evidence-based interventions tailored to other specific individual factors, such as motives and beliefs, to prevent alcohol abuse and to reduce problematic gambling amongst adolescents and young adults (Canale, Vieno, Griffiths, Marino, Chieco, Disperati, Andriolo, & Santinello, 2016; Disperati, Canale, Vieno, Marino, Chieco, Andriolo, & Santinello, 2015). Second, there is a large literature demonstrating the effectiveness of metacognitive therapy in treating psychological distress (see Wells, 2013) and growing evidence of its application to addictive behaviours (see Spada et al., 2015). Therefore, developing interventions taking into account of the specific motives and maladaptive metacognitions that lead to PFU might be of value.

In conclusion, the results from the current study provide an important addition to the literature on PFU, suggesting that both Cox and Klinger's motivational model (1988) and Wells' metacognitive model (2000) might be used to develop a theory-driven conceptualization of PFU. Such approaches may help further our understanding of motivational and metacognitive factors involved in cause and maintain PFU.

CHAPTER 5

Study 4. Objective Facebook Engagement

in Problematic and Non-Problematic Facebook Users

5.1. Literature Review

As highlighted in the meta-analysis (see chapter 2), the time spent online or specifically on Facebook could be considered as a part of the problematic use but it appears to be insufficient to completely explain PFU. Importantly, 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 preoccupation, 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.

5.1.1. 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 et al., 2007; Valenzuela et al., 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, Chamarro, & Carbonell, 2016; Rosen et al., 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 and colleagues (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= 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.

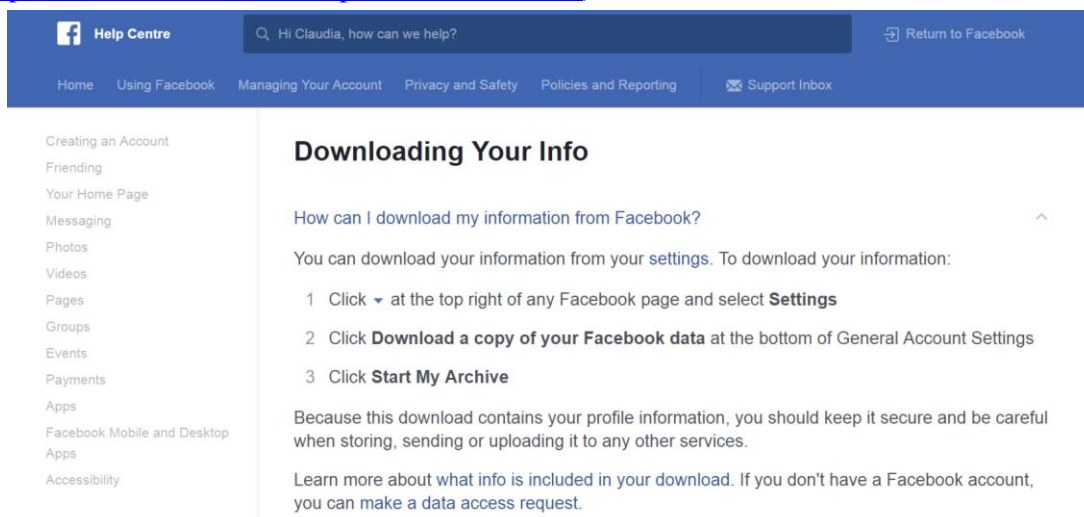
To our knowledge, no attempt has been made to assess the frequency or amount of “objective” Facebook behaviour and to link this to PFU. Therefore, the aim of this study was to test whether, and how much, specific objective Facebook behaviour is more frequent in problematic than non-problematic Facebook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

5.2. Methods

5.2.1. 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 5.1), 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 (“CODE.ZIP”) (full instructions for downloading data from Facebook accounts are presented in the following official Facebook link: <https://www.facebook.com/help/131112897028467/> ; see Figure 5.1). 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 Padova, Italy, gave formal approval for this research.

Figure 5.1. Screenshot of the “Downloading Your Info” page on Facebook (<https://www.facebook.com/help/131112897028467/>).



5.2.2. Measurement of Key Variables

Problematic Facebook Use. PFU was measured with the Problematic Facebook Use Scale (PFUS; see the method section of chapter 3 and 4; Appendix D). Items were averaged to obtain a PFU score. Higher scores indicate higher levels of PFU. The Cronbach's alpha was .88 (95% CI .85-.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 5.1. A specific R library (named MyFbr) was developed to extract information from the html pages downloaded by each participant in collaboration with statisticians from the department. The entire library MyFbr is available at <https://github.com/livioivil/myFBr> (Figure 5.2).

Figure 5.2. Screenshot from the Site <https://github.com/livioivil/myFBr>



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. As an example, figure 5.3 shows the commented code to extract data about “friends” (see also Table 5.1).

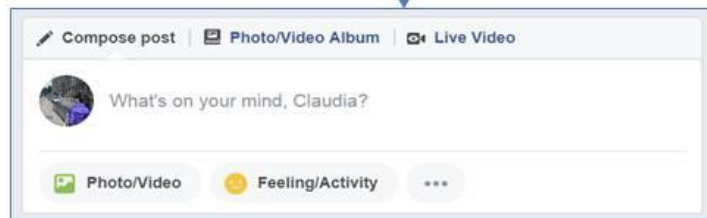
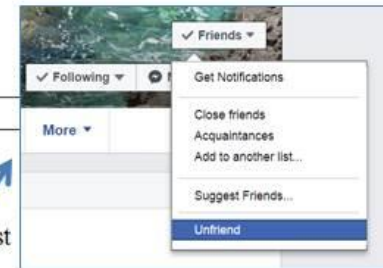
Figure 5.3. R Code to Extract Data about “Friends”

(<https://github.com/livioivil/myFBr/blob/master/R/getFriends.R>).

```
1 |
2 |
3 | getFriends <- function(percorso){
4 |   percorso=.fixPercorso(percorso)
5 |   perA=paste(percorso,"/html/friends.htm", sep="")
6 |   pg=htmlParse(perA) #reading file
7 |
8 |   #Number of new friendships established
9 |   accet=length(getNodeSet(pg,"//div[@class='contents']/div/u1[1]/li/text()"))
10 |
11 |   #Number of friendship requests sent
12 |   richi=length(getNodeSet(pg,"//div[@class='contents']/div/u1[2]/li/text()"))
13 |
14 |   #Number of friendship requests received
15 |   ricev=length(getNodeSet(pg,"//div[@class='contents']/div/u1[3]/li/text()"))
16 |
17 |   #Number of friends removed from the friends list
18 |   rimos=length(getNodeSet(pg,"//div[@class='contents']/div/u1[4]/li/text()"))
19 |
20 |   #creating the dataset
21 |   "amici" <- structure(.Data = list(accet,richi,ricev,rimos),
22 |                       names = c("accettati", "richEff", "richRic","rimossi"),
23 |                       row.names = c(1:1),
24 |                       class = "data.frame")
25 |   return(amici)
26 | }
27 |
28 |
```

Table 5.1. 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.

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. Then, objective Facebook behaviour (dataFB) was matched with the questionnaire (dataScale) answers to create a single dataset, using the function: `data = merge(dataFB, dataScale, by = “CODE.ZIP”)`.

5.2.3. *Statistical 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 ($N = 187$, $M = -.59$) and was thus named “non-problematic users”; a second group showed moderate z-scores of PFU ($N = 87$, $M = .59$) 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 ($X_{(1)} = .12$, $p = .74$). Moreover, the two groups did not differ in participants' age ($t_{(295)} = -1.63$, $p = .10$).

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:

H_0 : Non-problematic and problematic users will not differ in objective Facebook behaviour scores.

H_1 : 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).

5.3. Results

Table 5.2 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 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).

Table 5.2. 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 ₁₀	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 H ₁
Received requests	45.46	99.63	44.16	91.41	0.11	0.544	0.01	0.12	Strong evidence for H ₀
Unfriend	59.31	125.71	83.96	179.59	-1.39	0.083	-0.17	0.60	Anecdotal evidence for H ₀
Sent requests	10.31	10.62	15.99	27.77	-2.51	0.006	-0.30	5.12	Substantial evidence for H ₁
<i>Events</i>									
Going	15.29	23.87	27.41	42.94	-3.13	<.001	-0.38	26.09	Strong evidence for H ₁
Interested	2.11	4.88	3.53	12.94	-1.34	0.090	-0.16	0.56	Anecdotal evidence for H ₀
Rejected	8.38	20.66	14.92	56.96	-1.42	0.078	-0.17	0.63	Anecdotal evidence for H ₀
Not answered	135.77	161.66	165.94	187.37	-1.46	0.072	-0.18	0.67	Anecdotal evidence for H ₀
<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 H ₁
Likes	66.62	96.45	114.22	159.83	-3.20	<.001	-0.39	32.74	Very strong evidence for H ₁
Share	6.36	18.54	21.49	78.28	-2.53	0.006	-0.30	5.37	Substantial evidence for H ₁
Photos	43.35	108.39	91.95	181.54	-2.89	0.002	-0.35	13.49	Strong evidence for H ₁
Private Messages	4161.09	13548.99	9742.56	23971.01	-2.56	0.005	-0.31	5.80	Substantial evidence for H ₁

Notes: Degrees of freedom= 295; for all tests, the alternative hypothesis specifies that problematic group's score is higher than non-problematic group; BF₁₀ = Bayes' factor; Interpretation (according to Sirota, Juanchich, Kostopoulou, & Hanak, 2014)= evidence to support H₁ (anecdotal evidence: 1-3, substantial evidence: 3-10, strong evidence: 10-30, very strong evidence: 30-100); evidence to support H₀ (anecdotal evidence: 1/3 – 1, substantial evidence: 1/10 – 1/3, strong evidence: 1/30 – 1/10, very strong evidence: 1/100 – 1/30).

5.4. 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, 2008a). 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 study 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 et al., 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, Papacharassi 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 (Papacharassi & 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 PFU and specific objective online behaviours. 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 users’ 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 et al., 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).

CHAPTER 6

General Discussion

6.1. New Findings about Problematic Facebook Use

The present thesis has analyzed the role of several individual correlates that may be involved in problematic Facebook use (PFU) as well as the objective behaviour of problematic Facebook users. The research project was grounded on the conceptual framework derived both from Caplan's (2010) model of problematic Internet use and current research on Facebook use and behavioural addictions, that helped to describe the psychological factors involved in PFU and its detrimental effects for well-being. In this view, we conceptualized PFU as the maladaptive use of Facebook characterized by cognitive and behavioural factors which negatively impact users' well-being, thus including either addictive-like symptoms and/or scarce self-regulation related to Facebook use reflecting in social and personal problems.

The first aim of the project was to systematically summarize the findings from the literature on PFU in order to offer a clearer picture of this debated phenomenon. Briefly, results from the meta-analysis reported in Study 1 (chapter 2) showed that females are slightly more problematic than males, and that PFU was positively associated with time spent online and Internet addiction. With regard to individual characteristics, problematic Facebook users seem to have low self-esteem. Moreover, among the Big Five personality traits, neuroticism and conscientiousness were the traits most clearly associated with PFU; the associations indicated that problematic Facebook users may be characterized by low levels of emotional stability (that is, high levels of neuroticism) and conscientiousness. Furthermore, all investigated motives for using Facebook were significantly associated with PFU, with the strongest associations observed between PFU and motives driven by one's own sensations (i.e., internal source) and motives related to reducing negative affect (i.e., negative valence).

Finally, PFU was positively correlated with signs of psychological distress, including anxiety and depression, whereas a comparatively smaller negative correlation between PFU and well-being (including life satisfaction and other indices of subjective well-being) emerged.

Overall, Study 1 provided important results that may contribute to a better conceptualization of PFU: (i) Internet addiction and PFU are not fully overlapping phenomena, but they can be empirically distinguished and are likely to have distinctive features; and (ii) the amount of time spent online can be considered a component of PFU - with more time spent online indicative of potential problematic use - but it is not exhaustive of this phenomenon. Moreover, with regard to the understanding of the psychological characteristics of problematic Facebook users, results indicated that, among others, the *emotion-regulation dimension* is as a potentially key factor in PFU, in terms of personality (i.e., problematic users have high levels of neuroticism), motives (i.e., using Facebook to manage low mood, especially for adults), and psychological distress (i.e., depressive and anxious symptoms). Taken together, results suggested that PFU may have to do with difficulties in self-regulation and that users may tend to engage in PFU to satisfy specific needs. Given the main results of Study 1 and the core conceptual framework of risk behaviours (social influence processes and motives), the research work presented in this thesis has been conducted for an in-depth investigation of PFU among adolescents and young adults (Study 2, 3 and 4).

In Study 2 (presented in chapter 3), social influence processes were explored in order to understand the role played by social norms and social identity in adolescent Facebook engagement and problematic use. Results from this study may constitute an empirical base for recent common arguments (Griffiths & Kuss, 2017) about the nowadays social meaning of SNSs use: social media are becoming a “way of being” for adolescents, rather than a simple activity to engage in among others; so that, teenagers born between the late 1990s and the early 2000s have grown up in a technological world in which being always online is the

normative way to live and interact with others (Griffiths & Kuss, 2017). In this view, social influence processes are particularly important to understand the “technology loving culture” (Griffiths & Kuss, 2017): perceiving the importance of using Facebook from significant others and sharing with peers the value of Facebook seem to help in explaining why and how adolescents are that involved in social media use and, sometimes, in problematic use (Study 2). Indeed, as pointed out in the discussion section of Study 1, being “always online” is “normative”, it is perceived as a *status quo*, and therefore it is not “addictive” *per se*. Thus, Facebook use is also an habitual behaviour that can become problematic for a minority of people with certain characteristics (for example, users with low levels of emotional stability and strong beliefs about group norms supporting the use of Facebook; Study 2). This is one of the reasons why it is important not to overpathologize everyday life behaviours like Facebook use, but to provide support for theoretically-based understanding of PFU (Billieux, Schimmenti, Khazaal, Maurage, & Heeren, 2015).

Following this line of reasoning, Study 3 (presented in chapter 4) provided evidence for the need to understand more in-depth the psychological mechanisms underlying PFU among young adults. Results suggested that psychological motives for Facebook use and metacognitions can constitute, to some extent, both direct and indirect antecedents of PFU. Indeed, when included in a single, complex model, only one personality trait (namely, extraversion) appeared to be directly, though weakly, linked to PFU, whereas emotional stability indirectly influenced PFU via motives (i.e., coping and conformity) and metacognitions (i.e., negative beliefs about thoughts and cognitive confidence). These results support the idea that it is worthy to explore the complex psychological mechanisms that may lead to PFU. Moreover, the tendency for less extroverted users to problematically use Facebook and the mechanisms leading users high in neuroticism to PFU, may further contribute to differentiate the psychological profiles of heavy SNSs users from those of gamers or generally Internet addicted individuals who showed low levels of openness (Wang,

Ho, Chan, & Tse, 2015); in that, whereas individuals engaged in SNS may tend to satisfy their communication and affective needs (e.g., Ross et al., 2009), this might be not the case, for example, for gamers. Consistent with Griffiths and Kuss (2017), these results further sustain the conceptual separation between PFU and the broader problem of PIU.

In sum, Study 2 and Study 3 highlighted the role of specific individual characteristics of users who get involved in PFU (namely, personality traits, beliefs about social norms, thinking styles and motives), thus contributing to better understanding the psychological profiles of problematic Facebook users. However, more studies are needed in order to clarify the still unclear way on which SNSs shape personality traits and identity (Gentile, Twenge, Freeman, and Campbell, 2012). For example, an experimental study (Gentile et al., 2012) examined the effect of SNS use on positive self-views, showing that interacting on Facebook was positively associated with increasing self-esteem but, interestingly, not with narcissism. Moreover, in a further experimental work, Gonzales and Hancock (2011) suggested that Facebook use could also have an impact on self-esteem (positive rather than negative) when users become self-aware by viewing their own Facebook profile. Taken together, results from the present thesis and from previous experimental studies suggest the presence of a mutual interaction between individual characteristics and problematic SNSs use. In line with the “reinforcing spirals framework” (Slater, 2007, p. 281), it is likely that the relationship between individual differences and PFU is reciprocal and may constitute, to a certain degree, mutually influencing processes.

Beyond the issue of the direction of the relationship between PFU and individual characteristics, an important question remained open: given their characteristics and motives for using Facebook, what do Facebook users really do on the SNS? In order to answer this question, Study 4 (presented in chapter 5) explored the links between objective Facebook behaviour and levels of problematic use, indicating that problematic Facebook users tend to engage in certain objective behaviours significantly more often than non-problematic users.

For example, problematic users were found to be more prone to add friends and send friend requests, to send a large number of private messages, to frequently engage in all wall activities (like status updating and photos), and to click “going” in event pages. As more thoroughly discussed in chapter 5, such activities may be viewed as different strategies problematic Facebook users adopt to satisfy their mood and cognitive regulation needs. In this view, the use of objective data directly downloaded from users’ Facebook profiles is a methodological novelty in this line of research that further contributes to the conceptualization of PFU. Indeed, despite the amount of time spent on Facebook is not considered problematic *per se* (Pontes et al., 2015), it could be that the *quantity of use* of certain Facebook applications might become problematic over certain thresholds, especially if multiple applications are used together. Indeed, while Study 4 yielded that both problematic and non-problematic users are highly engaged in Facebook use (by, for example, sending a large number of private messages), problematic users may tend to be “to much” engaged, in a way that may be out of their control and produce negative consequences.

6.2. Limitations

Although this thesis contributes to understanding the phenomenon of PFU and the relations between PFU and individual characteristics, there are limitations that need to be highlighted. First, the observational and cross-sectional design of study 2 and 3 hampers the possibility to ascertain the direction of the links between variables. Future studies should use experimental designs in order to better understand the nature of the patterns observed, (specifically focusing on PFU rather than on the frequency of use only). Nevertheless, it has been argued that the results from structural modeling may be suggestive of a “tentative” causal inference (e.g., Bullock, Harlow, & Mulaik, 1994). Moreover, personality traits (included in study 2 and 3) are usually considered predictive factors of problematic behaviours by definition (Andreassen et al., 2013; Buss, 1991). Nevertheless, as mentioned

above, the reverse could also be possible: indeed, some studies (Gonzales & Hancock, 2011; Gentile et al., 2012; Horton, Reid, Barber, Miracle, & Green, 2014) showed that using social networking site may also promote specific traits (including personality and self-esteem) and motives involved in PFU. Therefore, additional research on this topic is warranted.

A further limitation of the present work is the convenience sampling and, especially in study 2 and 3, the non-inclusion of the frequency of the specific Facebook activities participants engaged in and of objective measures (as in study 4). As mentioned earlier, indeed, it could be that specific traits and motives may be responsible for specific problematic Facebook activities.

6.3. Avenues for Further Studies

Although the present thesis may be regarded as an example of how individual characteristics (e.g., personality, motives, and social norms) and objective behaviour may be involved in PFU among adolescents and young adults, there are several open issues and questions that should be addressed in future research.

As regard the target population, at the time of this research project planning (about three years ago), adolescents and young adults were the most engaged populations in Facebook use. For this reason, according to the earlier research, the current thesis involved these specific populations. However, SNSs use is continuously changing with regard to both type of users and type of platforms endorsed. First, with regard to users, Facebook use among older adults (that is, those aged 60 years or above) has been heavily increasing in recent years, and some authors (e.g., Coelho & Duarte, 2016; Jung, Walden, Johnson, & Sundar, 2017) have begun to call for a better understanding of the specific patterns and correlates of Facebook use among senior users. For example, Jung and colleagues (2017) showed that Facebook may be particularly important for older adults to satisfy age-related needs, such as engaging in social interactions for retirees and being connected with family members. In light of the age

differences emerged in Study 1 with regard to the motives for using Facebook, it is likely that Facebook and other SNSs are perceived differently across generations (Griffiths & Kuss, 2017). For this reason, future research should compare the role and meaning of Facebook use throughout the lifespan, with particular focus on motives that might be involved in problematic use at different ages. Second, nowadays the number of SNS platforms beyond Facebook (such as Snapchat and Instagram) is growing, especially among adolescents. In this view, Griffiths and Kuss (2017) have recently argued that SNS could be “a way of being” for teenagers who appear to have embraced the social norms of constant online social networking use, disregarding the specific SNS. This is in line with findings from Study 2 about the importance of social identity and social norms in Facebook engagement, but future studies are warranted to identify common patterns of problematic use in different social media including but not limited to Facebook used by adolescents.

With regard to the somewhat unclear findings about the relationship between personality traits and PFU present in the literature, the present thesis suggests that the Big Five model might not be the most appropriate model to understand individual differences in the context of PFU. For this reason, it could be argued that other, more “disordered” personality traits (e.g., narcissism and impulsivity) might be more helpful to explain PFU. Among others, narcissistic personality has been considered as a promising trait to explain problematic SNS use (e.g., Andreassen, Pallesen, & Griffiths, 2017; Davenport, Bergman, Bergman, & Fearington, 2014). Authors have hypothesized that narcissists may tend to extensively engage in SNS use because these are optimal places where they can satisfy their need for admiration, attention, and exhibitionism (e.g., Carpenter, 2012; Liu & Baumeister, 2016). Whereas a few studies have empirically investigated the role of narcissism in problematic SNS use in general (e.g., Andreassen et al., 2017; Casale, Fioravanti, & Rugai, 2016), to our knowledge, only two published studies (Casale & Fioravanti, 2017; Malik & Khan 2015) have specifically focused on the relationship between narcissism and PFU. For

example, Casale and Fioravanti (2018) recently explored the role of two forms of narcissism (that is, grandiose and vulnerable narcissism) in predicting PFU, confirming the tendency of grandiose narcissists to engage in PFU because of their need for admiration and to belong. Regarding impulsivity, Orosz and colleagues (2016b) proposed the use of the UPPS model of impulsivity (Urgency, lack of Premeditation, Perseverance, and Sensation seeking; Whiteside, Lynam, Miller, & Reynolds, 2005) to understand problematic Facebook users' personality characteristics. Specifically, the authors argued that urgency (that is, the tendency to impulsively engage in a behaviour disregarding the long-term consequences) and lack of perseverance (that is, the difficulty to remain focused on a demanding task) are likely to be indirectly linked to PFU via obsessive passion (that is, an uncontrollable desire to engage in a behaviour). In other words, it could be that that impulsivity traits activate obsessive passion that, in turn, leads to problematic online behavior (Orosz et al., 2016b).

In sum, it could be noted that different types of personality traits have been often found as indirect predictors for PFU (as in case of Study 3) via a series of possible mediators, rather than as direct antecedents (as in the case of Study 2, which however also confirmed the weakness of the direct associations already found in our meta-analysis). In this view, further studies should investigate such relationships through longitudinal and experimental designs, which would allow to better understand the psychological mechanisms involved in the development and maintenance of PFU. Some examples of potential mechanisms may be loneliness (Olufadi, 2016), metacognitive and desire thinking styles (Spada, Caselli, Slaifer, Nikčević, & Sassaroli, 2014), parental and peer attachment styles (e.g., Assunção & Matos, 2017b; Moreau et al., 2015), or self-control indicators (like self-regulation skills, addictive tendencies or self-control; e.g., Błachnio & Przepiorka, 2016).

Finally, with regard to objective Facebook data, it should be noted that a number of other aspects could be taken into account beyond measuring the *quantity* of Facebook engagement. For example, the library specifically developed for the current research project

(MyFbr) allows to download other interesting information, including the texts of posts, comments, and messages, as well as profile and cover pictures, and album. The analysis of such objective variables may further help to explain not only the *quantity* of an activity, but also the *quality* of Facebook engagement. For example, one could analyze what kind of language problematic users use to express their emotional states in their Facebook messages, or whether these users tend to post more personal pictures than non-problematic users. Merging this real information with psychological variables, such as emotional skills, would be of value in order to understand more in-depth how Facebook use becomes problematic. This method will contribute to shed light on the mechanisms underlying PFU, thus adding knowledge about the nature of this debated phenomenon.

6.4. Implications for Theory, Intervention, and Prevention

Findings from the current thesis may have some important implications for (i) the theoretical conceptualization of PFU, (ii) clinical intervention for problematic Facebook users, and (iii) prevention programmes for young users.

First of all, despite the misuse of Internet has been recognized a public concern by the World Health Organization (WHO, 2014), there is still a controversial and ongoing debate regarding the conceptualization of behavioural addictions or problematic behaviours like Facebook use (Billieux et al., 2017). Therefore, most scholars in the field aim for an official recognition of technological disorders in order to provide a solid ground for prevention polices and treatment (Kuss & Billieux, 2017).

As outlined above, results of the four studies presented in this thesis may add to the scientific knowledge by evidencing a possible self-(dis)regulation mechanisms underlying PFU. Indeed, Caplan's model of problematic Internet use (adapted to the Facebook context in this thesis) includes the negative consequences for social life derived from Facebook use as a result of both mood and cognitive-behavioural regulation (Caplan, 2010; Marino et al., 2017).

Moreover, taken together, low levels of emotional stability (found in Study 1, 2 and 3), self-regulation motives (that is, the attempt to reduce unwanted feelings and to feel better, found in Study 1 and 3), anxious/depressive symptoms associated with PFU (found in Study 1), seem potentially interesting also in order to corroborate the conceptualization of PFU as a maladaptive coping strategy (Kardefelt-Winther et al., 2017). Nonetheless, the behavioural aspects of PFU, in terms of heavy objective Facebook engagement (found in Study 4), may also suggest a compulsive aspect of PFU resulting in unregulated Facebook use (Caplan, 2010). This approach is in line with a recent argument by Kuss and Billieux (2017) who consider “technological addictions” (including problematic SNSs use) as an heterogeneous involvement in digital technologies as a consequence of maladaptive/escapist motives or mechanisms used to cope with pre-existing psychopathology (e.g., Billieux et al., 2013; Schimmenti & Caretti, 2010). The authors (Kuss & Billieux, 2017) also suggested that nowadays the traditional symptom-centered “components model” used to explain substance-related addictions is limiting because it does not capture the complex nature of the digital behaviours (Griffiths, 2005; Kuss, Shorter, van Rooij, Griffiths, & Schoenmakers, 2014). Therefore, notable authors in the field have recently proposed to move away from “recycled substance addiction criteria so that we can fully embrace the unique psychological processes of potentially problematic and repeated behaviours” (Billieux et al., 2017, p. 1723) happening online. In this view, as discussed in Chapter 1 and in Study 1, although PFU has not been officially classified as a mental disorder yet, it might have the potential to be recognized as an outstanding disorder in future studies aimed at ascertaining the complex nature of PFU, beyond the restriction in the biomedical model of addictive disorders (Potenza, 2015).

As already mentioned in the discussion sections of the studies, the theoretically-based conceptualization of PFU may also result in useful information for both clinical and prevention work. Specifically, clinicians should tackle PFU while taking into account: (i) the specific individual characteristics of problematic Facebook users, (ii) the potential detrimental

effect of PFU on psychological well-being, and (iii) the emotional-cognitive-behavioural dimensions involved in PFU. As a matter of fact, the knowledge about the efficacy of treatments for Internet-related potential disorders is at a very early stage in development and currently lacks rigorous methodology as the definition of PIU itself, as a behavioural addiction or as the result of a coping strategy, is not conclusive (Billieux et al., 2017; Spada, 2014). Because Caplan's model (2010) adopted a cognitive-behavioural approach to explain PIU, it could be argued that the cognitive-behavioural therapy (CBT) might be implemented in treating these types of problematic behaviours. Nonetheless, there is only few preliminary evidence for the usefulness of CBT in this field (e.g., Young, 2007; Du, Jiang, & Vance, 2010). Future randomized control trials are warranted in order to provide evidence for the efficacy of different psychotherapeutic approaches such as, the metacognitive therapy (MCT; Wells, 2000), group and multi-modal counselling (Kim, 2008; Orzack, Voluse, Wolf, & Hennen, 2006; Shek, Tang, & Lo, 2009) as well as motivational interviewing (Spada, 2014).

Finally, results emerged from this research project should to be taken into account by researchers and practitioners to update their extant knowledge about the different types of risk factors involved in PFU and so to refine the prevention intervention programmes, especially for young people. As already mentioned in Study 2 and 3, prevention programmes should aim at reducing the risk for young people to engage in PFU, for example by modifying motives and social norms about Facebook use and improving adolescents' emotional skills. Moreover, with regard to (pre)adolescents, since classrooms and school settings are important in young people's lives and behaviours, another important aspect to consider in prevention is the student and school-level factors associated with PFU. For this reason, the class activities explicitly dedicated to the prevention of PFU should follow the social and emotional learning approach, which has been recognized as highly effective in improving emotional skills, attitudes, and behaviours among students (for a meta-analysis, see Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). In addition, teacher and parent education could

contribute to make adults aware of the meaning of social media for their children as well as of how to recognize problematic use of technology (Willard, 2011).

In conclusion, despite the limitations highlighted in the four studies, we believe that the complex patterns of results presented in this thesis reflect the complexity of PFU. These findings, in particular, evidenced the importance of ascertaining the nature of this phenomenon and of studying how individual and social variables influence PFU. We hope that this work would stimulate further research in this field to allow researchers, clinicians, and school operators developing and implementing effective interventions able to reduce the risk of problematic use and promote a positive use of social media among young and less young people.

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Appendices

APPENDIX A. The items in the Young's Diagnostic Questionnaire (YDQ) and the corresponding DSM-IV criteria for Pathological Gambling; (response format = Yes/No).

<i>Items</i>	<i>DSM-IV Criteria for Pathological Gambling^a</i>
1. Do you feel preoccupied with the Internet (think about previous online activity or anticipate next online session)?	“is preoccupied with gambling (e.g., preoccupied with reliving past gambling experiences, handicapping or planning the next venture, or thinking of ways to get money with which to gamble)” (<i>salience</i>)
2. Do you feel the need to use the Internet with increasing amounts of time in order to achieve satisfaction?	“needs to gamble with increasing amounts of money in order to achieve the desired excitement” (<i>tolerance</i>)
3. Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?	“has repeated unsuccessful efforts to control, cut back, or stop gambling” (<i>relapse</i>)
4. Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?	“is restless or irritable when attempting to cut down or stop gambling” (<i>withdrawal</i>)
5. Do you stay online longer than originally intended?	-
6. Have you jeopardised or risked the loss of significant relationship, job, educational or career opportunity because of the Internet?	“has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling” (<i>conflict</i>)
7. Have you lied to family members, therapist, or others to conceal the extent of involvement with the Internet?	“lies to family members, therapist, or others to conceal the extent of involvement with gambling”
8. Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)?	“gambles as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)” (<i>mood modification</i>)

Note: ^a= First, persistent and recurrent maladaptive gambling behavior as indicated by at least five of the criteria (listed in the table plus three criteria not included in the YDQ: 1) after losing money gambling, often returns another day in order to get even (“chasing” one’s losses); 2) has committed illegal acts, such as forgery, fraud, theft, or embezzlement, in order to finance gambling; 3) relies on others to provide money to relieve a desperate financial situation caused by gambling). Second, the gambling behavior is not better accounted for by a Manic Episode (APA, 1994. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. Washington, D.C.: Author). In the YDQ: with five or more “yes”, the respondent is classified as addicted Internet user (Dependent); with less than 5 criteria is classified as normal Internet user (Non Dependent).

APPENDIX B. The items in the Internet Addiction Test (IAT; Young, 1998b);

(response format = from (1) “not applicable” to (5) “always”;

<http://netaddiction.com/internet-addiction-test/>).

“How often do you find yourself....”

1. Staying online longer than intended
 2. Neglecting household chores to spend more time online
 3. Preferring the excitement of the Internet to intimacy with a partner
 4. Forming new relationships with fellow online users
 5. Hearing others complain about the amount of time the individual spends online
 6. Grades or school-work suffering because of time spent online
 7. Checking email before something else that needs to be done
 8. Job performance or productivity suffering because of the Internet
 9. Becoming defensive or secretive when asked about online activity
 10. Blocking out disturbing thoughts about their life with soothing thoughts of the Internet
 11. Finding themselves anticipating when they will go online again
 12. Fearing that life without the Internet would be boring, empty, and joyless
 13. Snapping, yelling, or acting annoyed if someone bothers them while they are online
 14. Losing sleep due to late night logins
 15. Feeling preoccupied with the Internet when offline, or fantasizing about being online
 16. Saying to themselves "just a few more minutes" when online
 17. Trying to cut down the amount of time spent online and failing
 18. Trying to hide how long they've been online
 19. Choosing to spend more time online over going out with others
 20. Feeling depressed, moody, or nervous when offline, and having this feeling go away once
back online
-

APPENDIX C. Bergen Facebook Addiction Scale (BFAS; Andreassen et al., 2012): criteria for Facebook Addiction borrowing from pathological gambling (wording based on scale measuring gaming addiction); (response format = from (1) “very rarely” to (5) “very often”).

<i>Criteria</i>	<i>How often during the past year have you:</i>
<i>Salience</i>	Spent a lot of time thinking about Facebook or planned use of Facebook?
<i>Tolerance</i>	Felt an urge to use Facebook more and more?
<i>Mood modification</i>	Use Facebook in order to forget about personal problems
<i>Relapse</i>	Tried to cut down on the use of Facebook without success?
<i>Withdrawal</i>	Became restless or troubled if you have been prohibited from using Facebook?
<i>Conflict</i>	Use Facebook so much that it has had a negative impact on your job/studies?

APPENDIX D. The Problematic Facebook Use Scale: a preliminary validation study

As outlined in chapter 1, recent research on problematic Facebook use has highlighted the need to develop a specific theory-driven measure to assess this phenomenon. In this APPENDIX a summary of a preliminary study aimed at examining the factorial validity of the Problematic Facebook Use Scale (PFUS) in a sample of Italian adolescents and young adults (Marino et al., 2017) is presented.

The Problematic Facebook Use Scale (PFUS) comprised fifteen items slightly adapted from the scale developed and validated by Caplan (2010), the GPIUS2. In our adaptation we replaced the word “Internet” with the word “Facebook” where necessary. Participants were asked to rate the extent to which they agreed with each of the fifteen items on a 8-point scale (from (1) “definitely disagree” to (8) “definitely agree”). The scale included five subscales, of three items each: (i) preference for online social interaction (POSI; e.g., “I prefer online social interaction over face-to-face communication”); (ii) mood regulation (three items, e.g., “I have used Facebook to make myself feel better when I was down”); (iii) cognitive preoccupation (three items, e.g., “I would feel lost if I was unable to access Facebook”); (iv) compulsive use (three items, e.g., “I have difficulty controlling the amount of time I spend on Facebook”); (v) and negative outcomes (three items, e.g., “My Facebook use has created problems for me in my life”). Caplan’s original model (Caplan, 2010) also included the higher-order factor “deficient self-regulation” comprising cognitive preoccupation and compulsive Internet use. Preliminary analysis using our sample did not support that structure, thus we decided to test for the five-factor structure of the scale. Taken together, these factors give an overall index score for the construct of PFU. Higher scores on the scale indicate higher levels of PFU. The full list of items (with respective factor loadings) is reported in the following table.

Standardized factor loadings for the Problematic Facebook Use Scale (response format = from (1) “definitely disagree” to (8) “definitely agree”); N=1460 (Marino et al., 2017).

Items	POSI	Mood regulation	Cognitive preoccupation	Compulsive use	Negative outcomes
1. I prefer online social interaction over face-to-face communication	.63				
2. Online social interaction is more comfortable for me than face-to-face interaction	.81				
3. I prefer communicating with people online rather than face-to-face	.78				
4. I have used Facebook to talk with others when I was feeling isolated		.51			
5. I have used Facebook to make myself feel better when I was down		.78			
6. I have used Facebook to make myself feel better when I've felt upset		.77			
7. When I haven't been on Facebook for some time, I become preoccupied with the thought of going on Facebook			.79		
8. I would feel lost if I was unable to go on Facebook			.69		
9. I think obsessively about going on Facebook when I am offline			.71		
10. I have difficulty controlling the amount of time I spend on Facebook				.77	
11. I find it difficult to control my Facebook use				.75	
12. When offline, I have a hard time trying to resist the urge to go on Facebook				.79	
13. My Facebook use has made it difficult for me to manage my life					.74
14. I have missed social engagements or activities because of my Facebook use					.58
15. My Facebook use has created problems for me in my life					.58
PFU	.46	.77	.92	.81	.74
Internal consistency (Cronbach's α)	.79	.70	.73	.81	.67

Briefly, in a total of 1460 Italian adolescents and young adults (718 boys, 742 girls, $M_{\text{age}} = 18.71$ years, $SD = 2.67$, range 14-29 years), confirmatory factor analyses (CFA) revealed that the factor structure of the PFUS provided a good fit to the data ($\chi^2_{(85)} = 170.50$, $p < .001$, CFI = .983, GFI = .997, RMSEA = .026 [.021-.032]). Furthermore, results of the multiple group analyses supported the invariance of the model across age and gender groups (more details have been published in Marino et al., 2017). Moreover, to test the convergent validity of PFUS scores, we also administered the Bergen Facebook Addiction Scale (BFAS). The associations between PFUS scores and the BFAS was investigated in the second sample of young adults ($N = 807$) and were substantially high (whereas a lower correlation was observed between BFAS and POSI).

In sum, these results provide evidence supporting the factorial validity of the PFUS. This new scale provides a theory-driven tool to assess problematic Facebook use among male and female, adolescents and young adults. For this reason, it has been used in all the three studies presented in the current thesis.

APPENDIX E. Standardized factor loadings for the Facebook Motives Questionnaire (response format = from (1) “never or almost never” to (5) “always or almost always”).

<i>Items (motive)</i>	<i>Loadings</i>	<i>SE</i>
<i>How often do you go on Facebook:</i>		
<i>(Coping)</i>		
To forget your worries?	.722	.028
Because it helps you when you feel depressed or irritated?	.817	.027
To cheer yourself up when you are in a bad mood?	.849	.030
To forget about your problems?	.764	.028
<i>(Conformity)</i>		
Because your friends pressurized you to do it?	.353	.019
Because you would like to belong to a certain circle of friends?	.691	.028
To be liked by others?	.721	.031
To not feel excluded?	.665	.032
<i>(Enhancement)</i>		
Because it gives you a pleasant feeling?	.801	.030
Because it is exciting?	.651	.021
To experience a feeling of exaltation?	.519	.017
Simply because it is fun?	.404	.025
<i>(Social)</i>		
To come into contact with others?	.488	.026
Because it is fun to be in contact with others?	.807	.031
To improve your contact with friends and acquaintances?	.799	.032
To share a special occasion with friends?	.712	.031