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Social network sites addiction, internet addiction and individual differences: The role of Big-Five personality traits, behavioral inhibition/activation systems and loneliness

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ABSTRACT. Il presente studio approfondisce, nel contesto italiano, la relazione tra i tratti di personalità Big Five, i sistemi di inibizione (BIS) e attivazione comportamentale (BAS) in associazione con la dipendenza dai Social Network Sites (SNSs). Inoltre, è stato analizzato il ruolo della dipendenza dai SNSs come mediatore dell'associazione tra la solitudine percepita e la dipendenza da internet. Il campione di studio era composto da 580 utilizzatori di SNSs che hanno compilato un questionario self-report on-line. Il risultato della analisi di regressione ha evidenziato che la coscienziosità era negativamente associato con la dipendenza dai SNSs, mentre il BIS e una dimensione del BAS (*fun seeking*) erano positivamente associate alla dipendenza dai SNSs. L'analisi di mediazione ha mostrato che la solitudine era indirettamente associata alla dipendenza da internet attraverso la dipendenza dai SNSs. Le persone altamente coscienziose, organizzate e proattive, tendono ad evitare l'abuso dei SNSs che possono interferire con i loro obiettivi di vita.

SUMMARY. The present study focuses on a new specific form of addiction related to social network sites (SNSs). SNSs addicted people spent a considerable part of their day-life to SNSs, with a serious impact on their health. The present study deepens the association between Big-Five personality traits and behavioral inhibitions and activation systems with SNSs addiction. Furthermore, it was studied the role of SNSs addiction in mediating the association between perceived loneliness and internet addiction. The study sample consisted of 580 Italian SNSs users who filled an on-line self-report questionnaire. Regression analysis revealed that conscientiousness was negatively associated with SNSs addiction, while the behavioral inhibition system and the sensitivity to fun-seeking rewards were positively associated with SNSs addiction. Mediational analysis revealed that loneliness was indirectly associated with internet addiction via SNSs addiction. High consciousness people are organized and proactive tending to avoid the abuse of SNSs that could interfere with their goals.

Keywords: *Social network, Addiction, Individual differences*

INTRODUCTION

The internet has broadened the opportunities for people to connect and interact (Ellison, Vitak, Gray & Lampe, 2014). The use of social network sites (SNSs; e.g., Facebook, Twitter, Instagram) has increased in the last ten years. Over one billion people in the world use SNSs daily (Guedes, Nardi, Guimarães, Machado & King, 2016). SNSs have become a central concern in the field of communication and media research, and are regarded as a sort of "proxy variable" for fostering social interactions (Zhang & Leung, 2015). According to Grieve, Indian, Witteveen, Tolan & Marrington (2013), through the massive use of SNSs, people develop and maintain relationships and social connectedness in online environments, experiencing positive psychological outcomes such as a greater satisfaction with life. Sosik & Bazarova (2014) found that use of SNSs is a predictor of relational escalation through different types of mediated communication opportunities such as private messages, photo tags, wall posts and comments.

Besides this common use of SNSs, recent literature has increasingly focused on the pathological form of SNSs use, i.e. SNSs addiction (Andreassen, 2015; Guedes et al., 2016). While SNSs addiction was considered as a part of the internet addiction disorder, recent studies (Kuss & Billieux, 2016; Wegmann, Snagowski & Brand, 2016) posited that internet addiction can be distinguished by SNSs addiction because SNSs addiction can be viewed as a sort of specific form of addiction inside the umbrella of the several on-line mediated activities. SNSs addiction, as well as internet addiction, have not been considered specific nosological disorders (Pies, 2009), but an increasing number of studies start to assess the specificity of these phenomena (Andreassen et al., 2016; Starcevic & Billieux, 2017).

A key distinction between over-engagement in social networking and SNSs addiction is needed. According to Griffith (2010), "overtly engaged" SNSs users can stay controlled, appreciating other activities and leading multidimensional lives, while SNSs addicts use social networks in uncontrolled and compulsive ways, which are more likely to have unfavorable consequences. Andreassen & Pallesen (2014, p. 4054) define SNSs addiction as "being overly concerned about SNSs, to be driven by a strong motivation to log on to or use SNSs, and to devote so much time and effort to SNSs that it impairs other social activities, studies/job, interpersonal relationships, and/or psychological health and well-being".

In order to measure SNSs addiction, Andreassen et al. (2016) developed the Bergen Social Media Addiction Scale (*BSMAS*). The original scale is composed of six items which mirror the six dimensions of SNSs addiction (Andreassen, Torsheim, Brunborg & Pallesen, 2012): a) *salience*, SNSs activity dominates thinking and behavior; b) *mood modification*, the use of SNSs impacts on and alters mood; c) *tolerance*, the need to spend more time on SNSs in order to guarantee the same pleasant sensation experienced before; d) *withdrawal*, symptoms of abstinence or negative feelings (e.g., irritation, anxiety, depression, sleep deprivation) when access to SNSs is not possible; e) *conflict*, the use of SNSs interferes with social, family, work or other domains; f) *relapse*, unsuccessful attempts to stop or control behavior (Andreassen et al., 2016; Kuss, Griffiths, Karila & Billieux, 2014).

A series of epidemiological reports have highlighted that SNSs addiction has prevalence rates that vary from 1.6% to 34% depending on the socio-cultural contexts (Andreassen, 2015). Concerning socio-demographic characteristics, some studies have highlighted that females are more addicted to SNSs than males (Andreassen, 2015; Andreassen et al., 2016), whereas others have shown that younger *vs* older people are more addicted (Andreassen et al., 2012; 2016). Conversely other studies have not found any differences among age groups (Koc & Gulyagci, 2013; Wu, Cheung, Ku & Hung, 2013). Andreassen et al. (2016) showed that educational status was negatively associated with SNSs addiction, though other studies (Kuss & Griffiths, 2012) have not confirmed this result, thus highlighting the need to explore these findings further (Andreassen et al., 2016).

A recent study found that problematic Facebook users can be clustered in different paths of social engagement. These authors find that some users, higher in social engagement, tend to use Facebook for maintaining existing relationship, while others had a low social engagement but tend to use Facebook for sharing contents and for gaming purpose (Ryan, Reece, Chester & Xenos, 2016). Nevertheless, for SNSs addicted nothing inhibits their unceasing use of social networks, even though this behavior leads to a generalized lower quality of life and specific relational problems (Andreassen, 2015). In this vein, the consequences of SNSs addiction include health, behavioral and emotional impairments. Overall SNSs addiction affects people's well-being (Andreassen, 2015). Some studies have highlighted that SNSs addiction is related to depression and anxiety (Hong, Huang, Lin, Chiu, 2014; Koc & Gulyagci, 2013). SNSs addicted

people use social networking to cope with negative feelings, also they experience high levels of anxiety when detaching themselves from social networks. Social consequences include impairment, neglect and isolation from different social environments (family, work or school domains) due to an exceeding devotion to social networking (Griffiths, Kuss & Demetrovics, 2014; Koc & Gulyagci, 2013).

A series of studies highlighted that SNSs addiction and internet addiction are related phenomena (Starcevic & Billieux, 2017; see also Müller, Beutel & Wolfling, 2014; Müller et al., 2016). According to Young, internet addiction is defined as any online-related compulsive behavior which critically interferes with normal life, creating severe stress in personal life and in close relationships (Young, 1996, 1998). SNSs addiction could be a specific and distinguished component of a broader internet addiction, and these two types of addiction can have different antecedents (Kuss & Billieux, 2016; Wegmann, Snagowski & Brand, 2016).

A series of studies examined individual differences associated with the development of internet addiction but relatively few studies have extended these findings on SNSs addiction. Scholars found that internet addiction was associated with Big-Five personality traits, that is positively linked to Neuroticism, Extraversion, Agreeableness, Openness to experience and negatively linked to Consciousness (Dong, Wang, Yang & Zhou, 2013; Kuss, Van Rooij, Shorter, Griffiths & van de Mheen, 2013). Yen, Ko, Yen, Chen & Chen (2009) found that people addicted to internet were sensitive to condition punishment and reward. Internet addiction was also positively associated with perceived loneliness (Kim, La Rose & Peng, 2009). Studies highlighted that SNSs use was positively associated with Neuroticism, Extraversion and negatively with Consciousness (Andreassen et al., 2012, 2013; Hong et al., 2014; Wilson, Fornasier & White, 2010) and also positively associated with loneliness (Bozoglan, Demirer & Sahin, 2013). Contrary than internet addiction, Andreassen et al., (2012) did not found association between sensitivity to condition punishment and SNSs addiction, while they found a negative unexpected association between sensitivity to condition reward and SNSs' addiction. These results are sometimes contradictory (Andreassen et al., 2012) and need to be deepened in various contexts and within different target populations.

Deepening the research on antecedents and consequences of SNSs addiction considering the specificity of the socio-cultural contexts and socio-demographic characteristics represent a challenge for the scholars in order to systematically assess and prevent the phenomenon. In this vein, few systematic studies have been done for assessing the phenomenon of SNSs addiction, especially in the Italian context (Monacis, De Palo, Griffiths & Sinatra, 2017a, 2017b).

In order to address this gap, the present study aimed at examining individual differences as possible antecedents of SNSs addiction controlling for the effect of the main socio-demographic characteristics (age, sex, educational status).

The present study examined the role of Big-Five personality traits (McCrae & Costa, 1999), and the behavioral inhibition/behavioral activation system (Carver & White, 1994), in association with the problematic use of SNSs.

Moreover, it further deepened the association between perceived loneliness and addiction to SNSs and to internet (Bozoglan et al., 2013; Ostovar et al., 2016; Yao & Zhong, 2014). It was hypothesized that SNSs addiction mediates the relationship between loneliness and internet addiction as a way for fulfilling people's need of social interactions (Zhang & Leung, 2015). In this vein, the present study contributes to the recent scientific debates on the nature of internet addiction as a generalized "umbrella construct" (Kuss & Billieux, 2016) which encloses several activities mediated by web, e.g., SNSs use (Griffiths, Kuss, Billieux & Pontes, 2016; Kuss et al., 2014; Montag et al., 2015; Müller et al., 2016; Wegmann et al., 2016) instead of being a specific form of addiction as some studies posited (Aboudjaoude, Koran, Gamel, Large & Serpe, 2006; Byun et al., 2009).

SNSs addiction, Big-Five personality traits and behavioral inhibition and activations systems

Studies (Andreassen et al., 2012; 2013; Hong et al., 2014) have analyzed the association between SNSs addiction and the personality traits of the Big-Five personality model: Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness. In particular, Neuroticism and Extraversion were positively associated with SNSs addiction, while Conscientiousness was negatively associated with SNSs addiction. Highly neurotic people tend to be shy, anxious or depressed and tend to use social networks to obtain social support. Extraverted people, on the other hand, use social networks as a way to express

themselves. For example, Krämer & Winter (2008) found that extraversion was correlated to a less constrained on-line self-presentation. High extroverted people showed less conservative pictures of themselves. Finally, people with a high score in conscientiousness tend to avoid the use of SNSs in order to reach more easily their primary objectives and tasks (Andreassen et al., 2012, 2013; Wilson et al., 2010).

According to Kuss & Griffiths (2012) the brain's reward system is involved in SNSs addiction. The use of SNSs is easily fostered by positive reinforcement and the avoidance of negative consequences (Guedes et al., 2016). Yen et al. (2009) found that addiction to internet was positively associated with a specific behavioral reward mechanism (Carver & White, 1994). The Behavioral Inhibition System (BIS), also called "anxiety sensitivity", describes the sensitivity to avoiding punishing and unpleasant stimuli, and the Behavioral Activation System (BAS) describes the sensitivity to rewarding stimuli. Yen et al. (2009) showed that college students with problematic internet use had higher score on the BIS and on a specific subscale of BAS system named Behavioral-Approach Fun-Seeking (BAS-FS). The association between BIS and SNSs addiction could be explained because face-to-face social interactions are more punitive in terms of social reputation, while on-line interactions are perceived as less dangerous (anonymity, lack of direct interaction) and people can easily escape, logging out, from SNSs. People with high sensitivity to condition punishment (BIS) could be more addicted to SNSs sites as a less anxious and thus punitive way to fulfill their need of social contacts compared to face-to-face interaction. Moreover, some kinds of SNSs rewards such as "likes" evaluations, comments, feedback and re-posting are pleasurable and seductive and satisfy the basic needs of love, belonging, self-esteem and self-actualization in the virtual world (Yen et al., 2009). For this reason, the BAS-FS could be associated also with SNSs addiction. To the best of author's knowledge, was found only one study that examined the association between SNSs addiction and the BIS/BAS model (Andreassen et al., 2012). Andreassen et al. (2012) found that the BIS was negatively correlated to Facebook addiction and BAS-FS was negatively related to Facebook addiction. These authors claimed that participants who score highly in BAS-FS, could be viewed as people who regard Facebook as "old news" and thus lacking in fun and novelty. However, as the authors claimed, these results are preliminary and need to be further tested (Andreassen et al., 2012).

Hypothesis 1: In the present study, it was hypothesized that SNSs addiction would be positively associated with Neuroticism and Extraversion, and negatively associated with Conscientiousness. It was also hypothesized that SNSs addiction would be positively associated with the sensitivity to condition punishment (BIS) and with the behavioral-approach fun-seeking (BAS-FS).

The link between loneliness, SNSs addiction and internet addiction

Loneliness is a result of the perceived absence of social interactions and social network (Russell, Peplau, & Cutrona, 1980). Kim et al. (2009) pointed out that a greater perception of loneliness is associated with internet addiction in college students. Other studies confirmed that internet and SNSs addiction were associated with a higher perception of loneliness (Bozoglan et al., 2013; Ostovar et al., 2016; Yao & Zhong, 2014). Those who lack social contacts and feel lonely are more exposed to a problematical use of internet because they perceive themselves unskilled in face-to-face social interactions. For this reason, lonely people can feel more comfortable and skilled in the on-line interactions that are considered less threatening because of anonymity and the lack of face-to-face interactions (Caplan, 2003). Internet, and especially the use of SNSs (e.g., post Facebook status; Deters & Mehl, 2013), can contribute in reducing the perception of loneliness fulfilling people's need of social interactions.

Scholars are debating regarding the association between SNSs addiction and internet addiction (Wegmann et al., 2016). Indeed, according to Young (1996, 1998) internet addiction is defined as *any* online-related compulsive behavior which seriously interferes with everyday life, creating severe stress for family, friends, close relationships, and impacting on the work environment (see also, Kraut et al., 1998; Kuss et al., 2014; Treuer, Fabian & Furedi, 2001). Young (2009) posits that there was an association between internet addiction and different aspects of on-line use such as compulsive gaming, sex dating, and e-mailing/texting or others forms of communication mediated by the web such as SNSs.

In this vein, studies confirmed that social networking was associated with internet addiction (Starcevic & Billieux, 2017; see also Müller et al., 2014, 2016) because SNSs can be used systematically and problematically for specific multiple on-line activities (Griffiths et al., 2016; Kuss et al., 2014;

Müller et al., 2016; Wegmann et al., 2016). Montag et al., (2015) argued that SNSs addiction could be conceptualized as a sort of small world within the large world wide web, in which people can perform generalized internet activities (e.g., messaging, chatting, gaming, surfing on web). Internet addiction can be viewed as a sort of "umbrella construct" which includes a series of differentiated on-line activities (Kuss & Billieux, 2016) that can be reached and performed also using SNSs.

However, few studies have been conducted on the relationship between SNSs addiction and internet addiction (Monacis et al., 2017b; Müller et al., 2016) and further investigation is needed. In the present paper, it was studied a model where the feeling of loneliness is directly associated with SNSs addiction for fulfilling people's need of social contacts. In turn, SNSs addiction was expected to be associated with a more likelihood to show a generalized internet addiction developed through the massive use of available specific on-line activities (e.g., messaging, surfing on web, streaming content) than can be accessed via SNSs.

Hypothesis 2: It was hypothesized an indirect effect between loneliness and internet addiction mediated by SNSs specific addiction.

METHOD

Participants and procedure

A convenience sample was recruited. Data were collected through a web-based on-line survey, and participants were approached via social networks (e.g., Facebook, Twitter and Instragram). The link to the questionnaire was disseminated in SNSs through specific pages, links, posts and discussion groups. There were two main reasons for this: a) the need to reach a large sample of people who used social networks; b) completing the questionnaire was easy for the respondents, they only had to click on a link and follow the instructions.

Five-hundred and eighty participants completed the on-line survey, of which 362 were female, (62.40%). All the participants used SNSs and were Italian. The mean age was 32 (*SD* = 12.41). Educational attainment was distributed as follows: completed primary school (n = 33, 5.70%), completed high school (n = 306, 52.80%), university degree (n = 109, 18.80%), second degree (n = 94, 16.20%), and post-graduate (n = 38, 6.60%). Participants were distributed throughout Italy. In particular, 56 (9.70%) came from the north, 457 (78.80%) came from the central region and 67 (11.60%) came from the south. Finally, 11 (1.90%) participants claimed that they had used SNSs for less than 1 year, 36 (6.20%) from 1 to 3 years, 180 (31.00%) from 3 to 6 years, 314 (54.10%) from 6 to 10 years, and 39 (6.70%) over 11 years.

Measures

– *SNSs addiction*. This was measured using the Italian adaptation (Monacis et al., 2017a) of the BSMAS scale (Andreassen at al., 2016). The scale is composed of 6 items with a 6-point Likert response scale (from 1 = very rarely to 5 = very often; e.g., "How often during the last year have you spent a lot of time thinking about social media or planned use of social media?"). Cronbach's alpha score was $\alpha = .70$.
– *Internet addiction*. This was measured using the Addiction subscale included in the *Use, Abuse and Dependence on the Internet* (*UADI*) inventory (Del Miglio, Gamba & Cantelmi, 2001). The scale was composed of 15 items with a 5-point Likert response scale (from 1 = absolutely false to 5 = absolutely true; e.g., "It is difficult for me to disconnect from the internet"). Cronbach's alpha score was $\alpha = .80$.
– *Loneliness*. This was assessed using a revised Italian adaptation (Cavallero, Ferrari & Bertocci, 2006) of the R-UCLA Loneliness Scale (Russel et al., 1980). The scale was composed of 20 items with a 4-point Likert response scale (from 1 = never to 4 = often; e.g., "I am no longer close to anyone"). Cronbach's alpha was $\alpha =. 82$.
- *Big-Five personality traits*. These traits (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness) were assessed using the Italian adaptation (Guido, Peluso, Capestro & Miglietta, 2015) of the abbreviated form of the *Big-Five Inventory* (Rammstedt & John, 2007). The scale was composed of 10 items with a 5-point Likert response scale (from 1 = disagree strongly to 5 = agree strongly; e.g., agreeableness, "I see myself as someone who… is outgoing, sociable"). In the original study (Rammstedt & John, 2007) and in the Italian adaptation (Guido et al., 2015), the scale presented good psychometric proprieties and the questionnaire was indicated as a reliable and valid measure for assessing personality.

– *Behavioral inhibition / Behavioral activation-fun seeking*. The sensitivity to conditioned punishment (BIS mechanism; 7 item with a 5-point Likert scale; e.g., "If I think something unpleasant is going to happen I usually get pretty worked up"; in this study, α = .81) and the behavioral approach to new rewarding situations (Fun Seeking, BAS-FS; 4 item with a 4-point Likert scale; e.g., "I will often do things for no other reason than that they might be fun"; in this study, α = .78) were measured using the specific scales of the Italian adaptation (Leone, Pierro & Mannetti, 2002) of the original BIS/BAS scale (Carver & White, 1994).

Data analyses

To evaluate the factorial structure of the BSMAS was carried out a confirmatory factor analysis using IBM SPSS Amos v.21. The goodness of fit of the models was checked using relative chi-squared index (χ^2/df), the Tucker-Lewis index (TLI), the Comparative Fit Index (CFI), the Root Square Mean Error of Approximations (RMSEA), and the Standardized Root Mean Square Residual (SRMR). A good model fit is indicated by relative chi-square index between 0 and 3 (Kline, 1998), TLI and CFI values greater than .90 and .95 reflect an acceptable and excellent fit to the data respectively, and values smaller than .08 or .06 for RMSEA and SRMR reflect an acceptable and good model fit, respectively (Hancock & Mueller, 2013; Hu & Bentler, 1999).

SPSS v.22 was used for statistical analyses. Descriptive statistics (mean, standard deviation and Pearson's *r* correlations) were carried out for preliminarily examining study's variables. An independent sample *t*-test was performed in order to evaluate differences in SNSs addiction considering sex (male, female), age (above or below median age in years) and educational level (people with a high school diploma or below vs graduates or above).

Multiple regression analysis was performed to test the associations between Big-Five personality traits and BIS/BAS system with SNSs addiction (was also included sex, age and educational level as controlling variables). Finally, PROCESS' SPSS Macro (Hayes, 2012) was used for testing the mediation of SNSs addiction between loneliness (predictor) and internet addiction (outcome) through a series of multiple regression analyses (including sex, age and educational level as controlling variables). According to MacKinnon (2008) for checking a mediation effect one's need at least to find, a) "path a": a direct path between predictor (loneliness) and mediator (SNSs addiction) and, b) "path b" a significant relationship between mediator (SNSs addiction) and outcome (internet addiction) in the presence of the predictor (loneliness). A significant direct effect between predictor (loneliness) and outcome (internet addiction) is not required ("path c"). The bootstrap method was used to test the significance of the indirect effect of internet addiction on loneliness via SNSs addiction, generating a 95% bootstrap percentile confidence interval of the indirect effect based on 1,000 bootstrap samples (Preacher & Hayes, 2004).

RESULTS

Preliminary analyses

A CFA was run in order to verify the original structure of the BSMAS scale (Andreassen et al., 2016). This one factor model (M1) did not fit the data very well (χ^2 = 133.15, p<.001, df = 9; χ^2/df = 14.80; TLI = .64; CFI = .79; RMSEA = .15; RMSR = .08). However, after a recognition of the modification indices in M1, M2 was created by adding correlations between the residual terms of items 1 and 2, and between items 3 and 6. The correlations between these residual terms were easy to explain because they were added among observed variables (item) of the same latent dimension (Andreassen et al., 2012, 2016). M2 (χ^2 = 13.73, p>.05, df = 7; χ^2/df = 1.96; TLI = .98; CFI = .99; RMSEA = .04; RMSR = .03) showed a significantly improved fit compared to M1 (M1 – M2: $\Delta\chi^2$ = 119.42, Δdf = 2, p<.001). Factor loadings of the model were satisfactory ranging from .45 to .67 further evidencing the goodness of the Italian adaptation of the BSMAS (see also, Monacis et al., 2017a).

Table 1 reports the means, standard deviations and correlations among variables. The independent sample *t*-test showed a difference in BSMAS score for sex, t(578) = −2.50, p<.05 (men: M = 2.10, SD = .66; women: M = 2.24, SD = .70) and educational level, t(578) = 2.89, p<.01 (up to high school diploma: M = 2.26, SD = .70; with a degree or above: M = 2.10, SD = .66); no differences were found for age, t(578) = 1.35, p>.05 (young: M = 2.22, SD = .71; adults: M = 2.15, SD = .67).

Table1 – Means, standard deviations and correlations among variables (N = 580)

Variable	Mean (SD)	1	2	3	4	5	6	7	8	9
1. SNSs addiction	2.19 (.69)									
2. Extraversion	3.18 (.97)	–.03								
3. Agreableness	3.84 (.66)	–.11**	–.09*							
4. Conscientiousness	3.48 (.80)	–.14**	.16**	.19**						
5. Neuroticism	3.20 (.95)	.15**	–.06*	–.22**	–.18**					
6. Openess	3.66 (.92)	–.01	.04	.11**	.10*	–.04				
7. BIS	3.43 (.78)	.20**	–.22**	–.11**	–.11**	.49**	.03			
8. BAS–FS	2.95 (.93)	.11**	.25**	–.25**	–.09*	.15**	.07	.02		
9. Loneliness	1.83 (.40)	.19**	–.44**	–.13**	–.09*	.12**	–.08*	.22**	–13**	
10. Internet addiction	2.73 (.64)	.54**	–.02	–.21**	–13**	.17**	–.04	.28**	.29**	.19**

Note. *p<.05;**p<.01.

H1: Individual differences and SNSs addiction

Regression analysis is reported in Table 2. The BSMAS total score was positively associated with sex (β = .11, p<.05) and negatively associated with educational level (β = –.09, p<.05). The hypotheses were partially confirmed. Of the Big-Five personality dimensions, Conscientiousness was negatively associated with BSMAS (β = –.10, p<.05), whereas Neuroticism (β = .02, p>.05) and Extraversion (β = –.02, p>.05) were not associated with the BSMAS dimension. Finally, as expected, the BIS (β = .14, p<.01) and BAS-FS (β = .09, p<.05) mechanisms were positively associated with the BSMAS total score.

H2: Relationship between Loneliness, SNSs addiction and Internet addiction

Table 3 shows the results of regression analyses for testing the mediation hypothesis. All analyses were performed controlling for age, gender and educational level. The association between Loneliness and SNSs addiction (path a, B = .32, p<.001) was significant as well as the association between SNSs addiction and Internet addiction in the presence of Loneliness (path b, B = .50, p<.001). Thus, the requirements for configuring a mediation model were met. The direct effect of Loneliness on Internet addiction was significant (path c, B = .13, p<.05) in the presence of SNSs addiction. The bootstrap method highlighted that the indirect effect of Loneliness on Internet addictions was significantly mediated by SNSs addiction within a 95% CI (B = .16; CI: .02, .24). Results of mediation analysis are summarized in Figure 1.

DISCUSSION

The aim of the present study was to deepen individual differences as possible antecedents of SNSs addiction phenomenon in the Italian context, further studying the association between SNSs addiction and internet addiction.

Table 2 – Regression analyses of BSMAS total score on several predictor variables

Predictors	β	*t*	**95% CI**
Sex	.11*	2.51	.03; .28
Age	−.03	−.59	−.01; .01
Educational level	−.09*	−2.16	−.12; −.01
Extraversion	−.02	−.36	−.07; .05
Agreeableness	−.05	−1.20	−.15; .04
Conscientiousness	−.10*	−2.28	−.16; −.01
Neuroticism	.02	.36	−.06; .08
Openness	.01	.30	−.05; .07
BIS	.14**	2.89	.04; .21
BAS-FS	.09*	2.03	.02; .14

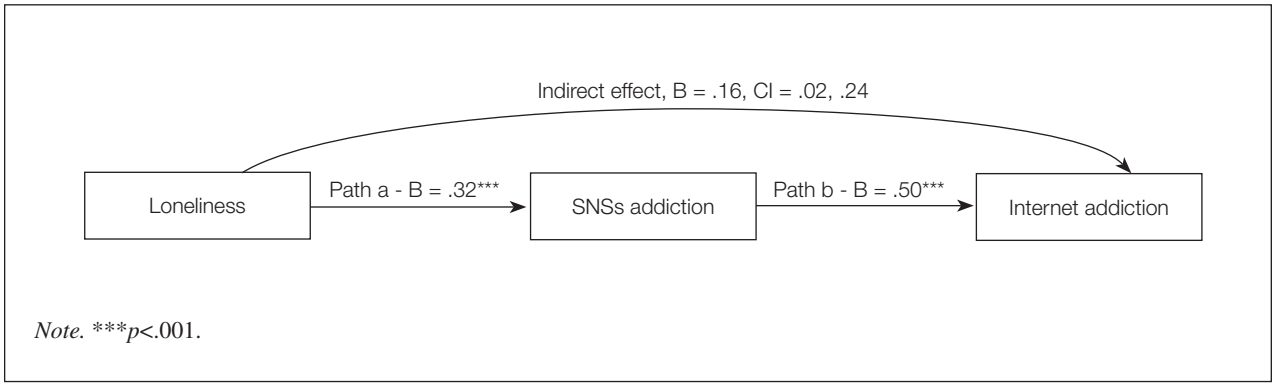
Note. *p<.05; **p<.01.

Table 3 – Multiple regression analyses for testing the mediation hypothesis

Predictor	**Outcome**			
	SNS addiction		**Internet addiction**	
	B	95% CI	B	95% CI
SNSs addiction	-	-	.50***[b]	.43, .56
Loneliness	.32***[a]	.18, .45	.13*[c]	.02, .24
Sex	.16**	.04, .27	−.17***	−.26, −.08
Age	−.01*	−.01, −.01	.00	−.01, .01
Educational level	−.06*	−.11, −.01	−.03	−.07, .01

Note. *p<.05; ** p<.01; *** p<.001; [a] = path a, [b] = path b, [c] = path c.

Figure 1 – Results of mediation analysis



Note. ***p<.001.

In particular, it was studied the association between Big-Five personality traits and BIS/BAS with SNSs addiction. Also, it was verified the mediational role of SNSs addiction in the relationship between Loneliness and Internet addiction.

The preliminary analyses revealed that the Italian adaptation of the BSMAS scale had a unidimensional factorial structure, which was coherent with the original model (Andreassen et al., 2012, 2016) and with the Italian validation (Monacis et al., 2017a). The scale is a valid and reliable measure of SNSs addiction by assessing information regarding the salience, mood modification, tolerance, withdrawal, conflict and relapse phenomena related to the exaggerated use of SNSs (Andreassen et al., 2016; Kuss et al., 2014) in the Italian context.

Concerning the socio-demographic differences, independent sample *t*-test analyses showed that women (*vs* men) and undergraduates (*vs* graduates) had a higher score in relation to SNSs addiction measured with the BSMAS, whereas no differences were found regarding age. These results are in line with previous studies (Andreassen, 2015; Andreassen et al., 2012) which highlighted a greater sensitivity of females to SNSs addiction due to their predisposition for social interaction. A greater educational status was also negatively associated with SNSs addiction as evidenced by some studies (Andreassen et al., 2016). However other studies have reported different findings (Kuss & Griffiths, 2012) highlighting a greater sensitivity of graduate students (*vs* undergraduates) to internet and SNSs addiction. On the basis of these results, Andreassen (2015) claimed that further investigations are necessary.

The results of multiple regression analyses (Table 2) partially confirmed the Hypothesis 1. As expected, the Conscientiousness trait of the Big-Five model of personality was negatively associated with SNSs addiction. People with a high level of Conscientiousness tend to be bright, organized and proactive and tend to avoid procrastination. Hence, those who present a high Conscientiousness score might avoid the use of SNSs that could interfere with their primary goals (Wilson et al., 2010). As outlined by Andreassen et al. (2012), people with a high Neuroticism score are anxious and shy and may use SNSs as a way to interact easily with other people. The results of the present study did not confirm the hypothesized positive association between Neuroticism and the SNSs addiction. People with a high Neuroticism score feel negative emotions and may also be inhibited in daily activities (e.g., anhedonia), thus including SNSs use. Studies posited that highly extroverted people use SNSs to overtly present themselves (Andreassen et al., 2012; Krämer & Winter, 2008). The present results did not confirm this finding. People with a high Extraversion score are sociable, enthusiastic, adventurous and outgoing. This type of persons tends to find more pleasure in face-to-face interactions rather than those mediated via social networks. In the present study, multiple regression analyses also showed that the BIS (sensitivity to conditioned punishment and tendency to avoid unpleasant and anxious stimuli) and BAS-FS mechanisms (sensitivity to rewarding through fun seeking) correlated positively with the SNSs addiction score. The present findings are in line with Yen et al. (2009). The BIS could promote the use of SNSs as the main, easy and least anxious proxy to fulfill the needs for

social contacts in order to avoid stressful face-to-face/social interactions. Indeed, social network mediated contacts are perceived as less dangerous (e.g., anonymity) and people can easily escape from SNSs. Social networks are also perceived as fun (e.g., people could be pleasured in shaping their own online identity) and intrinsically rewarding (Guedes et al., 2016; "likes", comments, feedback, re-posting). People with a high score on the BAS-FS may more easily develop SNSs addiction as they find surfing on SNSs to be particularly fun.

Coherently with the study hypothesis (Hypothesis 2), mediation analysis showed an indirect effect between Loneliness and Internet addiction mediated by SNSs addiction (Figure 1). Loneliness was associated with SNSs addiction. In turn, SNSs addiction was associated to Internet addiction. This result is coherent with other studies that showed an association between Loneliness and Problematic internet use (Bozoglan et al., 2013; Ostovar et al., 2016; Yao & Zhong, 2014). For instance, it was found that much compromised were face-to-face social interactions (e.g., perception of loneliness) much time end effort people tend to spend on SNSs in order to fulfill their basic need of social contacts (Deters & Mehl, 2013). Those who feel greater level of loneliness tend to perceive themselves unskilled in social interactions and more skilled in SNSs contacts considered as less threatening because the anonymity and the lack of face-to-face interactions (Caplan, 2003). Since SNSs can be used systematically for multiple on-line activities such as texting, gaming, sex dating and streaming multimedia contents, the SNSs addiction could contribute in the development of a more generalized addiction to internet (Griffiths et al., 2016; Kuss et al., 2014; Montag et al., 2015; Müller et al., 2016). This result sustains those studies that view Internet addiction as a sort of umbrella construct which includes a series of differentiated on-line activities (Kuss & Billieux, 2016) that can be reached and performed also using SNSs.

The study's limitations need to be addressed. The cross-sectional nature of the present study limits the conclusions regarding the causal relationship between the investigated variables. A longitudinal study design could address this limitation. Also, it was used a convenience sample. Participants were not recruited through a randomization procedure and thus the results may not be representative of the entire population. Further studies could broaden these findings in other countries and cultures. The association between socio-demographic characteristics (e.g., age, sex, education level, length of time as SNSs users), Big-Five personality traits and SNSs addiction need to be further tested (Andreassen, 2015; Andreassen et al., 2012) also using a cross-cultural approach. Moreover, the present study has been conducted following a social-psychological perspective and thus targeting a not-clinical sample. Further studies on SNSs addiction conducted with a clinic approach could also target a clinical sample. For instance, scholars can examine how SNSs users, of clinical and not-clinical samples, differs in specific individual traits. Since there is a controversy if internet addiction and SNSs addiction can be classified as specific nosological mental disorder (Pies, 2009), additional studies could contribute in deepening the characteristics, diversities and specificities of these conditions in order to enrich the scientific debate concerning the nosological classification of these phenomena.

These limitations notwithstanding, to the best of author's knowledge, the present study represents one of the first attempts to explore the phenomenon of SNSs addiction in the Italian context adding innovative contribution to existing literature. The present study confirms the good psychometric proprieties of the BSMAS measure (Monacis et al., 2017a); also it provides further evidences on the relationship between the Big-Five personality traits, the sensitivity to punishment and rewarding (BIS/BAS-FS system) and SNSs addiction, confirming and broadening previous results (Wilson et al., 2010; Yen et al., 2009) discussing new insights into associations among the studied variables. Moreover, since few studies have been conducted on the relationship between SNSs addiction and internet addiction (Müller et al., 2016), the relationships between Loneliness, SNSs addiction and Internet addiction was deepened (Müller et al., 2014). The present study emphasizes the mediational role of SNSs addictions to fulfill people's need of social contacts and as an antecedent of a generalized internet addiction that can be viewed as a sort of umbrella constructs (Kuss & Billieux, 2016; Montag et al., 2015) in which can be performed a series of on-line activities that can be reached via SNSs.

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