



Psychosocial risk factors of technological addictions in a sample of Spanish University students: The influence of Emotional (Dys)Regulation, personality traits and Fear of Missing Out on internet addiction

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ABSTRACT

Perception of the need to be online can lead to the compulsive use of the Internet.

The aim of this study is to investigate the relationships between Internet Addiction and Social Media Addiction and some psychological variables that could influence the onset of these disorders (FoMO, Emotional Dysregulation, Personality traits).

The sample was composed by 598 Spanish university students aged from 18 to 35 (471 women and 118 men; average age = 21.56; standard deviation = 2.73). Participants responded to an online questionnaire regarding the use of Internet (IAT), the use of social media (BSMAS), Fear of Missing Out (FoMO), Emotional (Dys)regulation (DERS) and personality traits (BFI-15). Correlation analysis showed a positive relationship between FoMO, Social Media Addiction, Internet Addiction, Emotional (Dys)regulation and Neuroticism dimension of Big five. Also, we observed a negative relationship between Internet Addiction and Social Media Addiction, Conscientiousness dimension of Big Five, and gender. The tested mediation model highlighted that the total effect of the DERS on the IAT score was significant as well as its indirect effect via the BSMAS and FoMO scores was positive and significant. In conclusion, we proposed a new integrated model for understanding the characteristics, predictors, and risk factors of IA.

1. Introduction

Internet and social media are now an integral part of our daily lives and have changed the way of communicating and approaching the social and physical environment (Musetti and Corsaro, 2018).

On the one hand, these digital tools allow us to research, share, and publish online contents (Kuss and Griffiths, 2017).

The internet has been successful in facilitating communication, education, and information, supporting research and work activities, as well as representing tools for leisure and entertainment. On the other hand, in recent years, a growing number of studies have pointed out that excessive, problematic, and uncontrolled use of digital technology and online applications can lead to physical, psychological, social, and work-related problems and negative consequences (Kuhu and SarojVerma, 2017; Shirinkam et al., 2016; Yeap et al., 2015; Santos et al., 2017).

Internet addiction term has been recently used to describe impulse control problems (Liu and Potenza, 2007) related to an extreme overuse of the internet and new social and virtual technologies (Kuss and Griffiths, 2011; Andreassen, 2015). The Internet use becomes a primary daily activity, becoming harmful in different areas of the human existence. People affected by this disorder may manifest symptoms commonly associated with the substance and behavioral addictions, such as salience, mood modification, withdrawal, tolerance, and conflict (Griffiths 1995; Kuss et al., 2014) and consequently lead to physical, psychological, and social problems (Lebni et al., 2020).

In the last few years, research focused on understanding the problematic usage of the internet (PUI, Mental Health in a digital World, 2022). Using this term reference is made to all maladaptive and excessive behavior related to the World Wide Web. Different online activities are included in the PUI. We can consider two main categories of PUI: 1)

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impulsive behaviors (e.g., online games, online gambling, compulsive shopping online, use of pornographic sites, excessive use of social media). 2) Compulsive behaviors (i.e., cyberchondria, cyberstalking, digital hoarding). However, the two categories may contain elements of impulsiveness and compulsivity simultaneously (Fineberg et al., 2022).

Most of the literature has focused on Internet Gaming Disorder (IGD) or online Gambling Disorder (GD; Ioannidis et al., 2018); however, other types of online activity such as problematic use of social media and smartphones are also worth exploring.

In the last two years, the use of social media has significantly increased during the lockdown due to Covid-19 pandemic emergency. Many people used social media to relieve their sense of loneliness and to regulate emotional experiences (Cauberghe et al., 2021; Fernandes et al., 2020; O'Day and Heimberg, 2021).

Nonetheless, an excessive preference for virtual relationships can affect face-to-face communication and interaction (Mcdaniel et al., 2018). The main issue of an excessive online communication is that the absence of non-verbal language, facial expressions, gestures, etc. could impact on the development of some regulatory competencies.

The excessive use of such platforms can also affect sentimental and sexual sphere. If abused, online sexual practices, such as sexting, visiting to pornographic sites, using dating apps etc... can result in maladaptive and potentially harmful practices, lead to social retirement (Porcelli et al., 2019), to discomfort and distress experiences in real interactions (Cotter et al., 2018).

In this perspective, it's important to consider that other psychological and sociodemographic factors may have a relationship with the development of these behaviours (Kuss et al., 2014). There is a large literature that highlights the influence of gender, social relationship status, emotional regulation skills, personality traits and new forms of social anxiety on the new disorder of the digital era.

2. Gender, marital status, and cohabitation in PUI

Several studies investigated the influence of gender on the onset of PUI (Hassan et al., 2020; Mari et al., 2023; Pan et al., 2020; Xin et al., 2018). In general, it has often been seen that males have often shown higher tendency in abusing pornography, cybersex, and online gaming (Hassan et al., 2020; Tsumura et al., 2017). Furthermore, males seem to show higher scores in online gaming addiction (Spilkova et al., 2017; van den Eijnden et al., 2018). Instead, females seem to use social media more frequently than males (Chae et al., 2018), showing more symptoms of addiction (Varchetta et al., 2020; Martínez-Ferrer et al., 2018). However, there are contrasting results that emphasize higher levels of males in SMA (Araujo Robles, 2016; Cam and Isbulan, 2012).

There is not a large literature about the effect of Marital status and cohabitation on the PUI. However, some authors have pointed out that emotional and social states related to loneliness, that occur in different moments of life (Leigh-Hunt et al., 2017) seem to be significantly related to IA. For example, Orsolini et al. (2023) observed that participants with higher levels of PUI shown higher levels of boredom and loneliness. These results have been confirmed in different countries (Liu et al., 2020; Jiang et al., 2018), for young adults and adolescents (Bian and Leung, 2014, 2015; Mahapatra, 2019) and during the lockdown due to the pandemic Covid-19 (Alheneidi et al., 2021). However, other studies are not consistent with these results. For example, Aktürk et al. (2018) did not find a significant effect of the loneliness on smartphone addiction.

In summary, a deep more analysis is necessary to better understand the relationship between social and emotional status and the PUI.

2.1. Emotional dysregulation and PUI

Emotional regulation refers the abilities to modulate emotional excitement, be aware, understand and accept one's own and others' emotions, as well as the ability to act in the world without being

influenced by one's own emotional state (Gratz and Roemer, 2004).

As in substance addictions, difficulties in emotional regulation appear to strongly correlate with the severity of behavioral addictions (Rogier and Velotti, 2018). Several studies have shown that people with emotional (Dys)regulation and alexitimia experience difficulties in developing healthy relationships as a result of maladaptive coping strategies that encourage people to consider the Internet as a place to achieve greater process of self-control and communications (Scimeca et al., 2014). In fact, many studies have shown that higher levels of emotional (Dys)regulation were associated to problematic use of the Internet (Casale et al., 2016; Estevez, Jauregui, Sanchez-Marcos, Lopez-Gonzalez and Griffiths, 2017; Spada and Marino, 2017; Yu et al., 2013), video game addiction (Estevez et al., 2017) or excessive use of social media (Hormes et al., 2014). Internet gaming addicts also have a brain structure that resembles deficits in emotional and social skills (Dieter et al., 2017) and impaired prefrontal cognitive control over emotional interference (Lee et al., 2015). Moreover, the preference for online communication, characterized by the absence of non-verbal language, facial expressions, gestures, etc. could increase the risk, especially for young people, of not reaching full emotional maturity and presenting problems of emotional illiteracy, among the indicators probably responsible for some typical problems such as bullying, drug addiction and alcoholism (Goleman, 1995).

2.2. Personality traits and PUI

Several studies showed a strong relation between personality traits and behavioural addictions, internet abuse included (Weibel et al., 2010; Grant et al., 2010; Andreassen et al., 2013; Kayış et al., 2016). The personality traits of the "Big Five" (i.e., extroversion, agreeableness, conscientiousness, neuroticism, and openness to new experiences, Costa and McCrae, 1992) could have an important role in influencing the behaviors of Internet users. Studies about the relationship between "Big Five" and different behaviors of technological addictions have yielded interesting results (Armstrong et al., 2000; Cole and Hooley 2013; Randler et al., 2014). Agreeableness and Openness to experience have been negatively correlated with problematic use of the Internet (Wilson et al., 2010; Ko et al., 2012; Dong et al., 2013; Kuss et al., 2013; Müller et al., 2013) and with Social Media Addiction (SMA) (Blachnio and Przepiorka 2016; Tang et al., 2016). Conscientiousness also seems to be negatively related to Internet addiction and social media addiction, while neuroticism is positively correlated to a maladaptive use of the Internet and social media (Quagliari et al., 2022).

2.3. Fear of missing out and PUI

Fear of Missing Out (FoMO) is a new social phenomenon widely studied in the last decade. This term refers to the often-intense sense of discomfort caused by the concern that friends or others may witness rewarding experiences from which one is absent (Przybylski et al., 2013). It's the fear of being left out, the constant thought that others are doing something more interesting and rewarding than us and that we're missing something. It is characterized by the desire to remain socially connected and could manifest as a form of social anxiety (Przybylski et al., 2013). It has been suggested that people with higher levels of FoMO can enter a cycle of behaviors that seek to reaffirm their identity and self-esteem by spending more and more time online (Przybylski et al., 2013). FoMO is in fact a variable involved in emotional problems (Przybylski et al., 2013), in various problems related to problematic use of social networks (Li et al., 2020), and could be considered a significant predictor of social media addiction (Varchetta et al., 2020).

2.4. Study Aim and hypothesis

Most of the literature has focused on IGD or online GD (Ioannidis et al., 2018); however, other types of online activity such as problematic

use of social media and smartphones are also worth exploring. Nowadays, about 4.74 billions of people in the world have a social media account, a number projected to increase to almost six billion in 2027 (Dixon, 2022). That means that almost 59.3 % of the world population uses at least a platform of social media. Given the widespread of the phenomenon, we decided to study and understand the risk factors and mechanisms that expose individuals to higher risks of developing disorders related to the use of technological tools. In particular, the aim of this research is to investigate the relationships between the so-called addictions of the digital age such as Internet Addiction (IA) and Social Media Addiction (SMA), and some sociodemographic (e.g., gender, marital status and cohabitation) and psychological variables that could influence the onset of these disorders (e.g., FoMO, difficulties in emotional regulation, personality traits). Specifically, the study developed by Quaglieri et al. 2002 showed a partial mediation model in which an indirect and direct effect of emotional (dys)regulation on internet addiction are presented in Italian sample. Therefore, we made some hypothesis:

Hypothesis 1 (H1). Correlations between variables

- Positive correlation between IA and variables related to problematic social media use (SMA and FoMO);
- Positive correlation between IA and emotional (dys)regulation;
- Positive correlation between SMA and emotional (dys)regulation;
- Correlation between IA and SMA and personality traits; in particular, a positive correlation with Neuroticism dimension and negative correlation with Conscientiousness dimension.

Hypothesis 2 (H2): There would be a total positive effect of emotional dysregulation (independent variable) on IA (the dependent variable).

Hypothesis 3 (H3): There would be an effect of the independent variable on the proposed mediator (FoMO and social media addiction) and an effect of the proposed mediator on the dependent variable (IAT); and an effective mediation model could be established including neuroticism, conscientiousness, gender, marital status, and cohabitation as covariates.

3. Methodology

3.1. Participants

A total of 763 participants were involved in the study. The questionnaire was administered by using the online “Qualtrics” platform. A non-probabilistic and convenience sampling technique was used. Inclusion criteria were being of legal age (18 years), speaking Spanish, and being Spanish university students. The questionnaire has been collected throughout social networks, instant messaging, and official university channels. Participants voluntarily and anonymously responded to the survey in their preferred environment (e.g., at home, university, work). They expressed their informed consent before starting the survey and have been free to stop or close the survey at any time without providing explanations. Expedited ethics approval was obtained from the Institutional Board of the *Comité de Ética* of University of Valencia (IRB 15,910/2021), in accordance with the principles embodied in the Declaration of Helsinki. Of the total 763 participants, 3 of them did not provide their consent and 171 did not complete the entire questionnaire. Therefore, the final sample was composed of 589 Spanish University students (118 male, 471 female) aged from 18 to 35 years ($M = 21.56$; $SD = 2.73$). This study adopted the Monte Carlo Power Analysis for Indirect Effects to determine the adequate sample size for the serial mediation which the simulation web app calculated (Schoemann et al., 2017) as 207 responses ($\beta = 0.80$). All the socio-demographic characteristics of the participants are shown in Table 1.

Table 1
Demographic characteristics of the sample.

Age	Mean	21.56
	Std. Deviation	2.73
	Range	18–35
	N (%)	
Gender	Male	118 (20.0)
	Female	471 (80.0)
Educational Level	Primary/middle School	3 (0.5)
	High School	474 (80.5)
	Bachelor's degree	87 (14.8)
	Master's degree	24 (4.1)
	Postgraduate degree	1 (0.2)
University studies	Psychology	435 (73.9)
	Other faculties	58 (26.1)
Marital Status	Single	305 (51.8)
	Non-cohabiting partner	247 (41.9)
	Cohabiting partner	35 (5.9)
	Married	2 (0.3)
Cohabitation	Alone	20 (3.4)
	Partner	36 (6.1)
	Partner with children	2 (0.3)
	Relatives	353 (59.9)
	Flatmates	178 (30.2)

4. Measures

4.1. Internet addiction test

The IAT was developed by Young (1998), based on the criteria of the DSM-IV (American Psychiatric Association, 1995) for pathological gambling, and has been the most used in the world to study the use of the Internet. It consists of 20 items (e.g., “Do you fear that life without the Internet would be boring, empty or joyless?”, “Do you try to cut down the amount of time you spend online?”) that are scored on a 5-point Likert scale ranging from 1 (very rarely) to 5 (very frequently). The test identifies two main groups of users according to the score obtained: 1) Normal users or users without problems (<40 points), and 2) problematic internet users (≥ 40 points) (Jelenchick et al., 2012). The present study applied the Spanish version of the IAT, developed by Fernández-Villa et al. (2015). Cronbach's alpha was 0.85.

4.2. Bergen social media addiction scale

The Bergen Social Media Addiction Scale (BSMAS, Andreassen, 2015) is a self-report questionnaire based on the six dimensions proposed by Griffiths (2005) (i.e., salience, mood, modification, tolerance, withdrawal conflict, relapse) and consists of six items (e.g., “How often during the last year have you used social media so much that it has had a negative impact on your job/studies?” “How often during the last year have you felt an urge to use social media more and more?”) that are rated on a 5-point Likert scale ranging from 1 (very rarely) to 5 (very often). The score of 24 is considered as a cut-off for a possible clinical diagnosis of Social Media Addiction. Higher scores indicate higher levels of addiction symptoms. (Luo et al., 2021). The present study applied the Spanish version of the test, developed by Vallejos-Flores et al. (2018). Cronbach's alpha was 0.77.

4.3. Fear of missing out scale

The Fear of Missing Out Scale (FoMOs, Przybylski et al., 2013) is a 10-item self-report questionnaire that measures respondents' experiences of a pervasive apprehension that “others” are engaged in rewarding activities and positive relationships in their absence (e.g., “I get worried when I find out my friends are having fun without me”). The scale has a 5-step Likert scale ranging from 1 (not true of me) to 5 (extremely true of me). On an average score from 1 to 5, higher scores indicating higher levels of FoMO. The present study used the Italian version of the scale, developed by Gil et al. (2015). Cronbach's alpha

was 0.82.

4.4. Difficulties in emotion regulation scale

The original version of The Difficulties in Emotion Regulation Scale (DERS, Gratz and Roemer, 2004) is a 36-item self-report questionnaire (e.g., “I pay attention to how I feel”, “When I’m upset, I become irritated at myself for feeling that way”). The scale measures six facets of difficulty regulating emotions (i.e., non-acceptance, goal-directed behavior, impulse control, limited access to effective emotional regulation strategies, lack of emotional awareness, lack of emotional clarity). The present study applied the Chilean short version of the scale, proposed by Guzmán Gonzalez et al. (2014) consisting of 25 elements and allows you to get a global score, calculating the average of the scores of all the items, and a score for each scale by calculating the average of the scores of the items that make up each dimension (*Rechazo emocional, Interferencia emocional, Desatención emocional, Descontrol emocional y Confusión emocional*). The responses range from a score from 1 to 5. Higher scores indicate greater difficulties in emotional regulation. Cronbach’s alpha was 0.89 for the total scale, 0.92 for *Rechazo emocional*, 0.89 for *Interferencia emocional*, 0.86 for *Desatención emocional*, 0.91 for *Descontrol emocional* y 0.85 for *Confusión emocional*.

4.5. Big five inventory-15

The Big Five Inventory-15 (Gerlitz and Schupp, 2005) is a self-report questionnaire that evaluates five personality dimensions (i.e., Extroversion, Agreeableness, Conscientiousness, Neuroticism, Openness to Experience). Items (e.g., “I see myself as a person that is reserved”, “I see myself as a person that tends to find fault with others”) are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The present study applied the adaptation on Peruvian university students of the scale, developed by Domínguez-Lara and Merino-Soto (2018) We used the Cronbach’s alpha for testing the reliability of each personality dimension: 0.67 for Extroversion, 0.68 for Agreeableness, 0.64 for Conscientiousness, 0.63 for Neuroticism, and 0.59 for Openness to Experience. The total Cronbach’s alpha was 0.58.

4.6. Analysis

We calculated the Pearson’s correlation coefficients (r) between scores of the IAT, BSMAS, FoMOs, DERS, and BFI-15 Neuroticism and Conscientiousness (sub)scales. The mediation model was run using PROCESS version 3.5, as developed by Preacher and Hayes for SPSS, version 26 (IBM, Armonk, NY). PROCESS estimates indirect effects (i.e., mediation) and conditional indirect effects (i.e., moderated mediation) using bootstrap confidence intervals. In the present study, the bias-corrected 95 % confidence interval (CI) was calculated using 5000 bootstrapping resamples. Effects were considered significant when the resulting confidence interval did not contain 0. A serial mediation model (Model 6) was tested using PROCESS Model Templates, in order to explore whether the association between difficulties in emotional regulation (i.e., DERS) and IA (i.e., IAT) were mediated by social media addiction (i.e., BSMAS) and FoMO (i.e., FoMOs), using BFI-15 Neuroticism and Conscientiousness subscale scores, gender, marital status and cohabitation as covariates.

5. Results

Table 2 presents the descriptive statistics (mean scores, standard deviation, and median scores) for the variables considered in the study.

Pearson’s correlation analysis (Table 3) showed that the IAT score was significantly and positively correlated with all variables considered (e.g., BSMAS, FoMOs, DERS, BFI-15 Neuroticism, and negatively correlated with BFI-10 Conscientiousness. Specifically, the IAT score showed a strong positive correlation with the BSMAS score; a moderate

Table 2

Descriptive statistics for the IAT, DERS, BFI-15 Neuroticism and Conscientiousness, FoMOs, and BSMAS measures.

	M (SD) n = 589	Median n = 589
IAT	35.65 (9.09)	34.00
DERS	69.68 (13.76)	69.00
DERS_RE	16.70 (6.72)	15.00
DERS_IN	13.29 (3.71)	13.00
DERS_DE	13.20 (5.35)	12.00
DERS_AT	19.42 (3.64)	20.00
DERS_CO	7.06 (2.57)	7.00
BFI-15 (N)	2.77 (0.95)	2.67
BFI-15 (C)	4.10 (0.73)	4.33
BFI-15 (O)	3.59 (0.85)	3.67
BFI-15 (E)	3.75 (0.90)	4.00
BFI-15 (A)	4.29 (0.65)	4.33
FoMOs	2.31 (0.68)	2.20
BSMAS	2.34 (0.75)	2.33

Note. IAT: Internet Addiction Test; DERS: Difficulties in Emotion Regulation Scale; DERS_RE = *Rechazo Emocional* dimension of Difficulties in Emotion Regulation Scale; DERS_IN = *Interferencia Emocional* dimension of Difficulties in Emotion Regulation Scale; DERS_DE = *Descontrol emocional* dimension of Difficulties in Emotion Regulation Scale; DERS_AT = *Desatención Emocional* dimension of Difficulties in Emotion Regulation Scale; DERS_CO = *Confusión Emocional* dimension of Difficulties in Emotion Regulation Scale; BFI-15 (N): Neuroticism dimension of Big Five Inventory-15; BFI-15 (C): Conscientiousness dimension of Big Five Inventory-15; BFI-15 (O): Openness to experience dimension of Big Five Inventory-15; BFI-15 (E): Extraversion dimension of Big Five Inventory-15; BFI-15 (A): Agreeableness dimension of Big Five Inventory-15; FoMOs: Fear of Missing Out Scale; BSMAS: Bergen Social Media Addiction Scale.

Table 3

Correlation coefficients (Pearson’s r) between the IAT, DERS, BFI-15 Neuroticism and Conscientiousness, FoMOs, and BSMAS (n = 589) scores.

	IAT	DERS	BFI-15 (N)	BFI-15 (C)	FoMOs	BSMAS
IAT	–	0.387 **	0.275 **	-0.164 **	0.451 **	0.719 **
DERS	0.387 **	–	0.573 **	-0.133 **	0.432 **	0.417 **
BFI-15 (N)	0.275 **	0.573 **	–	-0.141 **	0.244 **	0.225 **
BFI-15 (C)	-0.164 **	-0.133 **	-0.141 **	–	-0.041 **	-0.111 **
FoMOs	0.451 **	0.432 **	0.244 **	-0.041 **	–	0.475 **
BSMAS	0.719 **	0.417 **	0.225 **	-0.111 **	0.475 **	–

Note. ** p < 0.001; IAT: Internet Addiction Test; DERS: Difficulties in Emotion Regulation Scale; BFI-15 (N): Big Five Inventory-15 (Neuroticism); BFI-15 (C): Big Five Inventory-15 (Conscientiousness); FoMOs: Fear of Missing Out Scale; BSMAS: Bergen Social Media Addiction Scale.

positive correlation with the FoMOs, DERS and BFI-15 (Neuroticism) scores; and a weak negative correlation with the BFI-15 Conscientiousness score. Similar results are observed for the variables BSMAS and FoMOs.

In general, all variables showed a positive correlation between them (IAT, DERS, BFI-15 Neuroticism, FoMOs and BSMAS). On the other hand, BFI-15 Conscientiousness, proved to be negative, but weakly related to the rest of the variables.

Furthermore, we tested the prediction concerning the link between, IA (i.e., IAT), Social media addiction (i.e., BSMAS), and FoMO (i.e., FoMOs). The direct effect of the DERS score on the IAT score was not significant ($B = 0.020$ [$SE(HCO) = 0.02$] $p = 0.413$). But the total effect of the DERS score on the IAT score ($\beta = 0.227$ [$SE(HCO) = 0.03$] $p < 0.001$ [$CI = 0.1640, 0.2902$]) was significant.

The total indirect effect of the DERS score on the IAT score via the BSMAS and FoMOs scores was positive and significant ($\beta = 0.207$), and

the bootstrapped 95 % CI did not include 0 [0.1580, 0.2575] (Table 4).

In the final model, the five covariates showed different effects: the BFI-15 Neuroticism and Gender were, respectively, positively, and negatively significantly associated with the IAT score ($\beta = 0.911$; $\beta = -2.773$), whereas BFI-15 Conscientiousness, Marital Status, and Cohabitation were not significantly associated with the IAT score ($\beta = -0.681$; $\beta = -0.199$; $\beta = -0.299$). See Fig. 1.

In conclusion, the final mediation model explained 18 % of the variance in IAT.

6. Discussion

The purpose of the present study was to identify the risk factors and mechanisms that expose individuals to risks of developing disorders related to the use of technological tools. To do that, we studied how the relationship between Internet Addiction and some psychological variables could influence its onset. After a careful analysis of the literature, we decided to analyze the role of gender, marital status, cohabitation, emotions, personality traits and new social phenomena on the development of Internet Addiction. We took as starting point the study of Quaglieri et al. (2022) regarding a sample of Italian young adults. We wondered if analyzing the data from a sample of people of a different context and language (Spanish university students) we would have obtained similar results, in such a way as to better support the data already present in the literature and be able to generalize them also in other socio-cultural contexts. For this reason, we considered the same variables and conducted the same analysis of the above study.

Looking at the assumptions made, we can conclude that the results have largely confirmed expectations. Specifically, the first hypothesis (H1) has been confirmed, since the IA has been positively correlated to Social Media Addiction, FoMO, Emotional (Dys)regulation and, even if weakly, with the Neuroticism dimension of the Big Five.

Similarly, there is a positive correlation between Social Media

Addiction, FoMO, Emotional (Dys)regulation and Neuroticism. Moreover, it has been seen that IA has a negative and significant relationship with the Conscientiousness dimension of the Big Five.

The second hypothesis (H2) has also been confirmed: although there is no direct effect, the model shows a total effect of (dys)emotional regulation on IA. That is, the DERS could represent a precursor of Internet Addiction even if not in a direct way: its effect on IA would be mediated by the presence of FoMO and Social Media Addiction. The difficulties in regulating emotions, understanding one's own emotional states and others, may cause users to engage in maladaptive behavior regarding the use of social media and to express anxiety and concern that others are having more rewarding experiences than their own, compulsively comparing their lives with those of others, in a kind of race to who shows to enjoy it more. The presence of these three elements would predict the development of a maladaptive use of the Internet and more specifically the presence of addictive symptoms associated with the use of the Internet. Overall, this finding indicates that for this specific target population, the difficulty in regulating and recognizing their own and others' emotions should not per se predict the development of an Internet Addiction. Rather, people with difficulties in regulating their emotional sphere are more likely to show signs of Internet addiction because they tend to make exaggerated and compulsive use of social media, to manifest forms of social anxiety linked to the continuous comparison of their experiences with those of others, having an excessive need to share, show and stay connected for the fear of missing something rewarding. These results differ slightly from those observed in Quaglieri et al. (2022), where the DERS itself seemed to directly predict the development of IA.

Finally, as observed in our starting point study (Quaglieri et al., 2022), the final mediation model showed the influence of emotional dysregulation on the FoMO and problematic use of social networks, with a consequent effect on IA. However, there is not a direct effect of the variable DERS on the IA. This is a substantial difference respect as the

Table 4
Model coefficients for the serial mediation analysis (n = 598).

Predictor	BSMAS		FoMO		IAT	
	β (SE HCO)	p	β (SE HCO)	p	β (SE HCO)	p
Independent variable						
DERS	0.023 (0.00)	< 0.001	0.014 (0.00)	< 0.001	0.020 (0.02)	0.413
BSMAS	–	–	0.329 (0.03)	< 0.001	7.826 (0.48)	< 0.001
FoMO	–	–	–	–	1.450 (0.46)	< 0.01
Covariate						
BFI-15 Neuroticism	-0.025 (0.04)	0.486	0.008 (0.03)	0.800	0.911 (0.31)	< 0.01
BFI-15 Conscientiousness	-0.069 (0.04)	0.078	0.046 (0.03)	0.170	-0.681 (0.38)	0.076
Gender	0.234 (0.08)	< 0.01	-0.127 (0.06)	< 0.05	-2.773 (0.74)	< 0.001
Marital Status	-0.060 (0.02)	< 0.01	-0.017 (0.01)	0.303	-0.199 (0.17)	0.239
Cohabitation	0.007 (0.03)	0.780	0.006 (0.02)	0.736	-0.299 (0.23)	0.195
R ²	0.20		0.30		0.57	
F HCO (df)	26.112 (6582) ***		35.664 (7581) ***		72.508 (8580) ***	
Total effect on IAT						
	IAT β (SE)	p			95 % CI LL	UL
DERS	0.227 (0.03)	< 0.001			0.1640	0.2902
BFI-15 Neuroticism	0.715 (0.40)	0.076			0.0759	1.5059
BFI-15 Conscientiousness	- 1.183 (0.50)	< 0.05			-2.1668	- 0.2009
Gender	- 1.019 (0.97)	0.296			-2.9312	0.8928
Marital Status	- 0.722 (0.23)	< 0.01			-1.1721	- 0.2724
Cohabitation	- 0.229 (0.30)	0.448			-0.8223	0.3639
R ²	0.18					
F HCO (df)	21.330 (6582) ***					
Bootstrap indirect effects on IAT						
	IAT β (SE)				95 % CI LL	UL
Total	0.313 (0.04)				0.2438	0.3830
BSMAS	0.175 (0.02)				0.1285	0.2234
FoMO	0.021 (0.01)				0.0076	0.0363
BSMAS, FoMO	0.011 (0.00)				0.0038	0.0193

Note. DERS = Difficulties in Emotion Regulation; BSMAS = Bergen Social Media Addiction Scale; FoMOs = Fear of Missing Out Scale; IAT = Internet Addiction Test. Bootstrap sample size = 5000 (two-tailed); p < 0.001 ***.

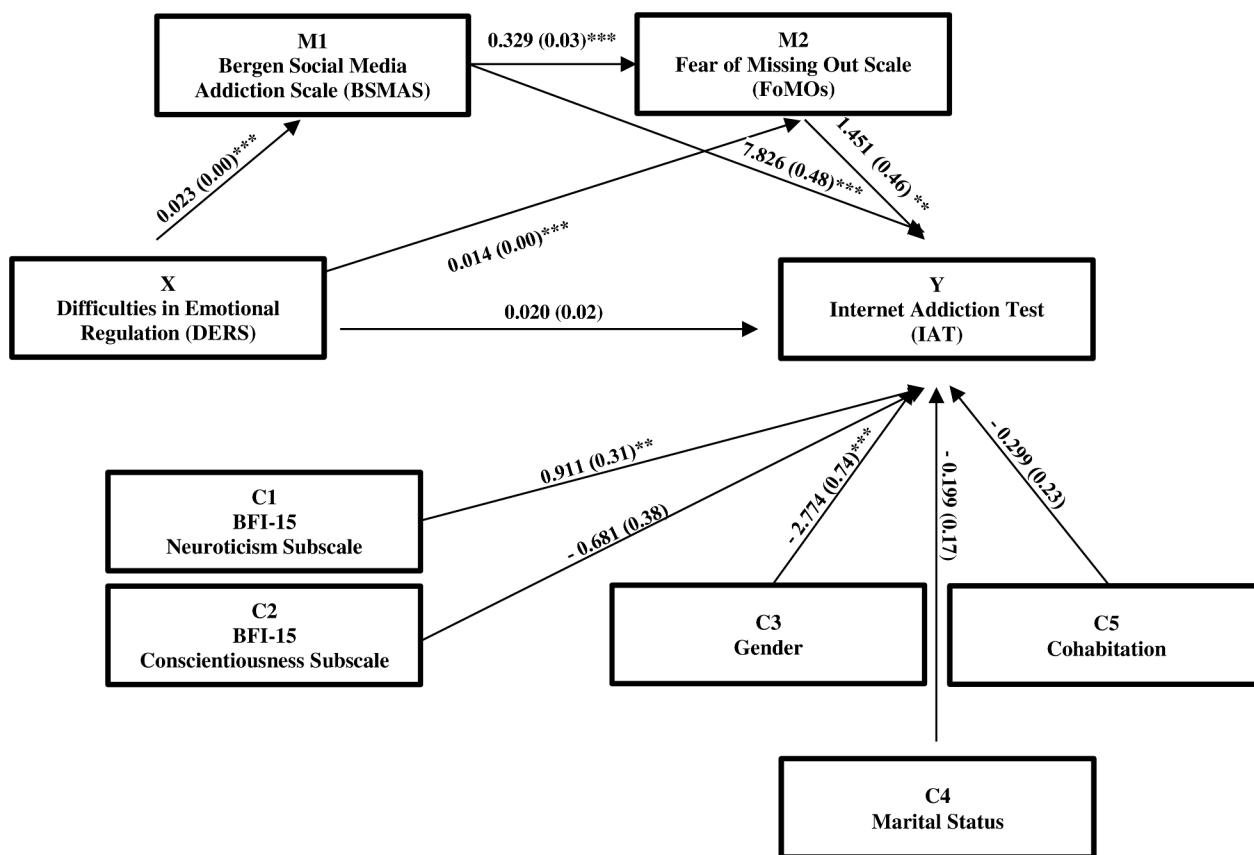


Fig. 1. Mediation Model

Note. Numbers represent standard coefficients and numbers within parenthesis represent standardized errors. X = independent variable; Y=dependent variable; M1 = mediator 1;M2 = mediator 2; C1 = Covariate 1; C2 = Covariate 2; ** = $p < 0.01$; *** = $p < 0.001$.

result obtained in the Italian sample analyzed by Quaglieri et al. (2022), where emotional dysregulation had a direct, indirect, and total effect on IA. In other words, while for the Italian sample the emotional dysregulation directly affects the onset of the IA, in the Spanish sample, a direct effect between emotional dysregulation and IA does not exist. Nevertheless, emotional dysregulation seems to directly affect the FoMO and the problematic use of the social media, and all the three variables together influence the possible onset of the IA. These results are consistent with the observation of Lo Coco et al. (2020) and Quaglieri et al. (2022).

The direct effect of the difficulty in regulating emotions on the problematic use of smartphones and social media had already been observed in various studies (Elhai et al., 2016; Gioia et al., 2021). Likewise, there are other research supporting the direct relationship between Social Media Addiction and FoMO (Varchetta et al., 2020; Dempsey et al., 2019; Casale and Fioravanti, 2020).

Moreover, for our reference sample, the personality trait neuroticism, which characterizes people with high levels of vulnerability, insecurity, and emotional instability, could partly explain the onset of an Internet addiction disorder. Similar results were found in several studies (Blackwell et al., 2017; Tang et al., 2016; Andreassen et al., 2013). As regard the Italian sample, the neuroticism trait did not seem to be a risk factor on the development of IA.

Also, despite in Quaglieri et al. (2022) the Conscientiousness had a protective role on the pathological use of the digital platforms, in this specific case, the trait didn't seem to prevent the overuse of the Internet.

Furthermore, most of the sample consisted of women; therefore, it was not possible to consider gender as a variable between subjects, but only as a covariate, but it seems to play a very important role. In

accordance, women has shown more frequently symptoms associated with social media addiction (Stevens et al., 2021; Varchetta et al., 2020; Mari et al., 2023; Andreassen et al., 2016). in the mediation model analyzed. In the study by Quaglieri et al. (2022) these variables were not investigated.

7. Limitations and suggestions for future research

The first limit concerns the sample: the self-selection of respondents, the little heterogeneity and the relatively low number of participants does not allow a generalization of the results. Based on general population rather than clinical samples, research tends to be exploratory and confirmatory in nature. This makes it even more difficult to identify those psychological alterations that would give a clearer direction to understanding the disorder in its different facets.

This study is also limited by the use of a self-report methodology; therefore, participants may have responded by more or less knowingly following the social desirability bias (the propensity to give false answers, but aimed at appearing different from what you are, pretending to be a person who deserves to be sanctioned positively at the social level).

Moreover, the psychiatric history and the possible presence of mental/psychological disorders of participants was not considered. This factor could affect the onset of disorders related to a maladaptive use of the internet. In fact, several research highlighted the comorbidity of mental disorders (such as ADHD, depressive disorder, PTSD, sleep disorders, obsessive compulsive disorder or eating disorder) among people who showed symptoms related to a problematic use of internet (Szczygieł and Podwalski, 2020; Leménager et al., 2018). At the same time, some socio-demographic variables could influence the results obtained.

For example, it is possible that the marital status or living conditions could affect the time, methods, and purposes of the use of social media and, in general, of the Internet. Future studies could further investigate how marital status and cohabitation may affect dysfunctional network-related behaviors.

A limitation of our study is the large number of women, though this data might have influenced the interpretation of the results. Further results are needed to clarify the relationship between gender and technology addictions.

Finally, no definitive conclusions can be drawn on the directionality of the effects between the variables considered. It may indeed be possible that Social Media Addiction or FoMO have exerted their influence on the difficulty to regulate emotions and not vice versa, or it is possible that high levels of Internet Addiction make people more impulsive and less able to self-regulate, and that therefore there have been changes in the psychological state of individuals after the onset of the disorder.

Future research should seek to replicate current results and further investigate whether there are other variables that may influence or be affected by technological dependencies. Identify both risk and protection factors more accurately and then propose models that highlight other important relationships in understanding the new digital age disorders, such as Phubbing, Nomophobia, Internet Gaming Addiction, Cybersex addiction etc. Moreover, it would be useful to evaluate possible differences in gender, and age, considering different types of populations that include people with different cultural levels, with different medical history and different types of education. Finally, it would be necessary to conduct a longitudinal research in order to analyze over time both the possible causes and the consequences of a potential dependence on the Internet. Being a relatively young and constantly evolving field of research given the rapid change that accompanies the digital world, the results obtained should also be replicated in other cultural contexts to assume more validity and reliability.

8. Implications for practice

Xu and Tan (2012) suggest that the transition from normal to problematic use of the Internet and social networks occurs when the individual begins to consider them an important (or even exclusive) mechanism to relieve stress, loneliness, or depression. The use of the Internet can provide a series of continuous rewards (gratifications, self-efficacy, satisfaction of some needs) that push people to engage more and more in the same activity, to the point of ignoring one's own real relationships and encountering various problems in everyday life.

In this sense, through psychoeducation programs aimed at adolescents and young adults, it could be possible to work both in a preventive and "curative" perspective, going to identify those activities that can provide the same rewards but in a more functional and healthier way.

In summary, the results of this research shed light on the potential risk and protection factors of technological addictions, and these dates can help to understand the phenomenon itself to subsequently create intervention programs in various sectors aimed to prevention, awareness-raising and possibly a therapeutic path for the users involved.

9. Compliance with ethical standards

9.1. Statement 2: contributors

Conceptualization, M.V., A.Q., A.F., M.M.-V., F.G.-S., A.M.G. and E.M.; methodology, M.V., A.Q., A.F. and E.M.; software, M.V.; formal analysis, A.Q., F.G.-S., and E.M.; writing—original draft preparation, M.V., M.M.-V., C.C., and E.M.; writing—review and editing, M.V., A.F., M.M.-V., F.G.-S., C.C., A.M.G. and A.Q.; supervision, M.M.-V., A.M.G. and F.G.-S. All authors have read and agreed to the published version of the manuscript.

Declaration of Competing Interest

None.

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