Characterizing the building blocks of Problematic Use of the Internet (PUI): The role of obsessional impulses and impulsivity traits among Italian young adults

Francesco Di Carlo [a], Mauro Pettorruso [a,*], Maria Chiara Alessi [a], Elena Picutti [a], Rebecca Collevecchio [a], Giuseppe Migliara [b], Gaia Baroni [a], Francesco Gambi [a], Eduardo Cinosi [c], Giovanni Martinotti [a,d], Jon E. Grant [e], Massimo di Giannantonio [a]

[a] Department of Neuroscience, Imaging and Clinical Sciences, University "G. d'Annunzio" of Chieti – Pescara, Chieti, Italy
[b] Department of Public Health and Infectious Diseases, Sapienza University of Rome, Rome, Italy
[c] Hertfordshire Partnership University NHS Foundation Trust, Welwyn Garden City, Hertfordshire, UK
[d] Department of Pharmacy, Pharmacology, Clinical Science, University of Hertfordshire, Herts, UK
[e] Department of Psychiatry & Behavioral Neuroscience, University of Chicago, Chicago, IL, USA

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ABSTRACT

Background: Problematic Use of the Internet (PUI) is a considerable issue of the modern era, but its risk factors are still poorly understood. Impulsivity and obsessive-compulsive symptoms have been associated with PUI, but this relationship is still debated. In this article we focus on the relationships of PUI with obsessive-compulsive and impulsive symptoms in a cohort of Italian young adults, in order to identify possible vulnerability factors for PUI.
Methods: A sample of 772 Italian individuals aged 18–30 (mean age 23.3 ± 3.3 years old; 38% males and 62% females) was assessed via online survey using the Internet Addiction Test (IAT), the Mini International Neuropsychiatric Interview (MINI) Screen, the Padua Inventory-Washington State University Revision (PI-WSUR) and the Barratt Impulsiveness Scale (BIS-11).
Results: Ninety-seven subjects (12.6% of the sample) reported IAT scores at risk for PUI. PUI participants reported higher levels of impulsivity, obsessive-compulsive symptoms and a higher burden of co-occurrent psychiatric symptoms. In a logistic regression model, obsessional impulses to harm (OR = 1.108, $p < 0.001$), attentional impulsivity (OR = 1.155, $p < 0.001$) and depressive symptomatology (OR = 1.246, $p = 0.012$) had significant association with PUI. Finally, higher severity of PUI has been associated with manic/psychotic symptoms and with attentional impulsivity.
Conclusions: Our findings confirmed the role of impulsivity in PUI, while also underling the association of obsessional impulses with this pathological behavior. We could hypothesize a trigger role of obsessive impulses for the engagement in PUI, together with factors as negative affective states. Further research is needed with respect to more severe forms of PUI, also for establishing tailored interventions.

1. Introduction

The use of the Internet has dramatically increased over recent decades: at the end of 2019 4.1 billion people worldwide, 53.6% of the global population, were connected, as estimated by the International Telecommunication Union [1,2]. This increase has certainly led to great benefits for the users and societies, but it is also associated with cases of Problematic Use of the Internet (PUI) [3]. PUI can produce negative health consequences and according to the World Health Organization it represents a global public health problem [4]. PUI is usually

defined as uncontrolled, excessive use of the Internet [5] and often operationalized as spending more than six hours a day online, reporting a loss of control over the behavior, losing interest in other things, and use of the Internet to escape anxiety and depression [6,7]. PUI, which is able to compromise normal functioning when extremely repeated, is an umbrella term that may refer to many different behaviors (e.g., online gambling, viewing pornography, shopping, on-line gaming, email checking, overuse of social media, messaging) [8]. However, it remains controversial if PUI should be considered as a proper mental health disorder [9–11]. To date only Internet Gaming Disorder has been identified as a condition for further study in the Diagnostic and Statistical Manual Version 5 (DSM-5) [12], while Gaming Disorder has been included in the International Classification of Diseases Version 11

(ICD-11) as "disorder due to addictive behavior" [13,14]. The discussion about consideration of other addictive behaviors in the ICD is still active [15].

Rates of PUI are characterized by an extreme variability, from 1.6% to 36.7% [16–21], this probably reflecting high lability in delimiting the boundaries of this condition. This variability is also due to a lack of shared and agreed diagnostic criteria, and to the subsequent use of different assessment tools and cut-offs scores by different researchers [22]. In addition, samples studied are often widely heterogeneous [4,23–25]. Rates of PUI therefore vary across age, countries and cultures, appearing to be higher in younger people, in male gender and in Asian populations compared to US and European samples [26]. In the case of Italy, a recent study showed that 8.2% of students spend on the Internet more than 6 h/day [27].

A potential link between psychiatric comorbidities and PUI has been repeatedly observed, as for Substance Use Disorders (SUDs), affective disorders, anxiety, Obsessive-Compulsive Disorder (OCD) and Attention Deficit Hyperactivity Disorder (ADHD) [28–30]. A link between PUI and higher risk of self-harm and suicidality has also been suggested [31]. However, individuals with PUI can have a reduced quality of life without presenting any comorbidity [24].

From a phenomenological point of view, some PUI behaviors appears more similar to addictions (e.g. online gambling and viewing pornography), due to aspects like impaired control on the behavior, craving, functional impairment in other areas of life [32]. Conversely, some others like repetitive e-mail checking or excessive video streaming appear to have more parallels with OCD and obsessive-compulsive related disorders [29]. In this regard, PUI has been associated with many obsessive-compulsive personality traits, such as intolerance of uncertainty, need for reassurance, rigidity [33]. Furthermore, impulsivity dimension has been shown to play a role in some PUI behaviors, such as excessive online shopping, that may look like impulse-control disorders [34]. In addition, the risk of developing PUI in young adults correlates with greater impulsivity and with more problems with emotional regulation [35].

Addictive behaviors - like PUI - may be linked to obsessive-compulsive and impulse-control spectrum on a neurobiological level [36–38], due to the dysfunction of fronto-striatal brain circuits [39]. Some evidence suggests the presence of structural and functional alterations in the reward system of people with PUI, in particular a reduction of the orbitofrontal cortex volume and an increased volume of putamen and accumbens, with the latter showing a correlation with obsessionality too [40].

Based on the abovementioned personality traits and comorbidities, PUI can be operationalized as impulse-control and obsessive-compulsive related condition [41,42]. Furthermore, a detrimental effect of emotional dysregulation and negative affective states could act as trigger factors for PUI.

Based on this framework, the aim of the present study was to assess the role of obsessive, compulsive and impulsive symptoms in the clinical presentation of PUI in a cross-sectional sample of Italian young adult. The focus was set on youth because of the higher clinical significance of the behavior in this age range. Moreover, we evaluated the potential association of PUI with different clusters of psychiatric symptoms, in order to better characterize the building blocks that constitute the vulnerability for PUI.

2. Materials and methods

2.1. Setting and measures

Italian individuals between 18 and 30 years old were asked through online advertisements to participate in a survey regarding Internet use. The survey was delivered anonymously through Google forms software. No monetary compensation was prospected. The survey form has been presented after a screening questionnaire regarding socio-demographic data (i.e., age, gender, educational and job status, nationality) and health-related information. Subjects declaring a psychiatric diagnosis or chronically taking psychotropic medications have been excluded from the final sample.

All the participants have been required to fulfill the following psychometric testing:

- the Internet Addiction Test (IAT) to estimate maladaptive Internet use. The IAT comprises 20 questions examining PUI tendencies. The IAT scores from 20 to 100. 20–49 indicates mild Internet use, 50–79 indicates moderate Internet use and 80–100 indicates severe Internet use. PUI was established in presence of IAT scoring 50 or above, consistently with the cut-off adopted in current literature [8,29,43].
- the screening version of the Mini International Neuropsychiatric Interview (MINI-Screen) to examine the possible presence of psychiatric symptoms. MINI-Screen is a short self-report questionnaire with 24 dichotomous items, intended to provide a brief overview of the main psychiatric symptoms. Differently from the MINI interview, MINI-Screen does not allow to make psychiatric diagnosis [44]. This screening-tool was used to allow self-report completion of the form and to reduce response burden. Symptoms screened were clustered into categories. Items 1–6 described symptoms of depression, sadness, anhedonia, suicidal thoughts and were included in a depressive symptoms cluster. Items 7–8 described symptoms of elevated mood and irritability and were included in a manic symptom cluster. Items 9–15 and 20 described symptoms of anxiety, panic, agoraphobia, social phobia and post-traumatic stress disorder and were included in an anxiety symptoms cluster. Items 16–17 described symptoms of hallucinations and delusional thinking and were included in a psychotic symptoms cluster. Items 18–19 described symptoms of fear of being fat and binge eating episodes and were included in an eating disorders symptoms cluster. Items 21–22 described symptoms of alcohol/substance abuse and were included in a SUD symptoms cluster. Finally, items 23–24 described symptoms of irresponsible behavior and absence of guilt and were included in an Antisocial Personality traits cluster.
- the Padua Inventory-Washington State University Revision (PI-WSUR) to identify obsessive-compulsive symptoms. The PI-WSUR consists of 39 items assessing common obsessional and compulsive behavior. The scoring is organized into five categories: "obsessional thoughts of harm to self/others", "obsessional impulses to harm self/others", "contamination obsessions and washing compulsions", "checking compulsions" and "dressing/grooming compulsions". The first two content areas are relevant to obsessions, the third content area represents a mixture of obsessions and compulsions about contamination and the last two contents areas are relevant to compulsions [45];
- the Barratt Impulsiveness Scale (BIS-11) to estimate levels of impulsivity. The BIS-11 is a self-report questionnaire composed of 30 items [46]. The total score is determined by summing item responses, with scores ranging from 30 to 120. Higher scores on the scale stand for higher impulsivity. It is internally organized into six first order factors (Self-Control, Motor, Attention, Cognitive Instability, Cognitive Complexity and Perseverance) and three second order factors: Attentional Impulsivity, Motor Impulsivity and Non-Planning Impulsivity [47].

2.2. Data analysis

Data were processed using IBM SPSS Statistics 25 for Windows. Only data from individuals who filled out the IAT were considered for the analysis. After testing the normal distribution of the variables using the Shapiro-Wilk test, we performed a non-parametric statistical

analysis. Participants at-risk for PUI (IAT total score > 50) have been compared with participants without PUI (IAT < 50) on all variables by using Mann-Whitney U test and Chi-square test, as appropriate. Mann-Whitney U test was used for continuous variables with non-normal distribution, whereas Chi-square test was used for categorical variables. Spearman's correlation coefficient was used for analyzing the relationships between continuous variables in the whole sample. A logistic regression model has been built to identify the psychopathological features associated with the risk for PUI. We included in the multivariate model all variables that have shown a p-value ≤0.25, in order to define the model with the maximum likelihood estimation.

We included in the model the following variables: sex, age, education and job status, the MINI Screen symptom clusters (i.e., depressive symptoms, manic symptoms, anxiety symptoms, psychotic symptoms, eating disorders symptoms, SUD symptoms, antisocial personality traits), BIS-11 attentional impulsivity and the PI-WSUR subscales (contamination obsessions and washing compulsions, dressing/grooming compulsions, checking compulsions, obsessional thoughts of harm to self/other and obsessional impulses to harm self/other).

Finally, we used Spearman's correlation coefficient to analyze the association between IAT scores (as a measure of PUI severity) and continuous variables in the sub-sample of participants with PUI. The significance level has been set at the level of $p < 0.05$.

3. Results

3.1. Sociodemographic data

The final sample was composed of 772 individuals (38% males, 62% females), mean age of 23.3 ± 3.3 years old (18–30). The majority of participants were students (56.4%), while 27.6% were employed in a work activity. In our sample we found an elevated level of education, with a most represented status of high school diploma (56.6%) or higher (34.2%). Other relevant demographic characteristics are detailed in Table 1.

3.2. Psychopathological variables associated with PUI

12.6% of the sample ($n = 97$) had a IAT score of 50 or higher, fulfilling the criterion of moderate PUI we established. Mean IAT score in the group without PUI was 31.2 ± 8.4, while in the group with PUI it was 59.2 ± 7.4.

Both BIS-11 and PI-WSUR scored significantly higher in subjects with PUI compared to subjects without PUI, as shown in Table 2. Mann-Whitney U test showed strong statistical significance for all the BIS-11 and PI-WSUR sub-scores.

Table 1
Demographic and clinical characteristics in the whole sample ($n = 772$).

Variables	IAT score < 50 N = 675	IAT score ≥ 50 N = 97	p-value
IAT	31.2 (8.4)	59.2 (7.4)	<0.001 [b] *
Age, years	23.4 (3.3)	22.6 (3.3)	0.045 [b] *
Gender, *female, n* (%)	416 (63)	55 (57)	0.287 [a]
Education, *n,* (%)			
Below high school	63 (9.3)	8 (8.2)	0.790 [a]
High school diploma	379 (56.1)	58 (59.8)	
University degree or higher	233 (34.5)	31 (32)	
Job status, *n,* (%)			
Student	368 (56.1)	57 (58.8)	0.379 [a]
Employed	187 (28.4)	21 (21.6)	
Unemployed	102 (15.5)	19 (19.6)	

IAT: Internet Addiction Test; MINI: Mini International Neuropsychiatric Interview; SD: standard deviation.
Continuous variables are expressed as means (SD). Statistics: [a]: chi-square and [b]: Mann-Whitney U test.

Table 2
MINI-Screen, BIS-11 and PI-WSUR scores in the whole sample (n = 772).

Variables	IAT score < 50 n = 675	IAT score ≥ 50 n = 97	p-value
MINI-Screen total	6.3 (4.3)	9.1 (4.1)	<0.001
Depressive symptoms	1.9 (1.6)	2.9 (1.6)	<0.001
Manic symptoms	0.7 (0.7)	0.9 (0.7)	0.025
Anxiety symptoms	1.9 (1.8)	2.9 (2)	<0.001
Psychotic symptoms	0.2 (0.5)	0.4 (0.6)	0.001
Eating disorders symptoms	0.8 (0.8)	0.9 (0.8)	0.101
SUD symptoms	0.2 (0.5)	0.4 (0.6)	0.015
Antisocial personality traits	0.5 (0.7)	0.8 (0.8)	0.002
BIS-11 total	53.2 (21.5)	65 (7.9)	<0.001
BIS-11 attentional impulsivity	13 (5.8)	16 (3)	<0.001
BIS-11 motor impulsivity	17.7 (7.6)	21.3 (4.1)	<0.001
BIS-11 non-planning impulsivity	22.5 (9.2)	26.8 (3.9)	<0.001
PI-WSUR total	21.9 (19.7)	38 (25.8)	<0.001
PI-WSUR obsessional thoughts of harm to self/other	3.5 (4.5)	7.2 (5.7)	<0.001
PI-WSUR obsessional impulses to harm self/other	1.5 (3.2)	5 (6.1)	<0.001
PI-WSUR checking compulsions	7.2 (7.4)	12.2 (9.5)	<0.001
PI-WSUR dressing/grooming compulsions	1.8 (2.6)	2.5 (2.8)	0.02
PI-WSUR contamination obsessions and washing compulsions	7.9 (7.7)	11 (8.3)	<0.001

BIS-11: Barratt Impulsiveness Scale 11; PI-WSUR: Padua Inventory-Washington State University Revision; IAT: Internet Addiction Test; SD: standard deviation.
All data are reported as mean (SD). Statistics: Mann-Whitney U test.

In order to clarify relationships between use of the Internet and demographical/clinical characteristics, correlations of IAT score were explored. Statistically significant correlations were found with age ($R = -0.147$, $p < 0.001$) and with all MINI-Screen symptoms clusters. IAT total score was also correlated with impulsivity (BIS attentional impulsivity, $R = 0.528$, $p < 0.001$; BIS motor impulsivity, $R = 0.392$, $p < 0.001$; BIS non-planning impulsivity, $R = 0.347$, $p < 0.001$) and with obsessive-compulsive domains (PI-WSUR contamination obsessions and washing compulsions, $R = 0.466$, $p < 0.001$; dressing/grooming compulsions, $R = 0.323$, $p < 0.001$; checking compulsion factors, $R = 0.530$, $p < 0.001$; obsessional thoughts of harm to self/others, $R = 0.524$, $p < 0.001$; obsessional impulses to harm self/others, $R = 0.483$, $p < 0.001$).

A logistic regression was then performed using PUI (IAT ≥ 50) as dependent variable, in order to find the best model to estimate presence of PUI in the sample (see Table 3).

Variables were controlled for multicollinearity using variance inflation factor (VIF) [48]. BIS-11 motor impulsivity and non-planning impulsivity were identified as potentially correlated factors and were excluded from the analysis. All the remaining variables plus gender were included. A 3-factor logistic regression model emerged to be the best in estimating presence of PUI, identifying as relevant factors: obsessional impulses to harm self/other (OR = 1.108, $p < 0.001$), attentional impulsivity (OR = 1.155, $p < 0.001$) and the presence of depressive symptoms (OR = 1.246, $p = 0.012$).

3.3. Psychopathological features associated with PUI severity

Finally, we explored the correlations between PUI severity (as measured by IAT total score) and psychopathological dimensions in the sub-sample of participants with PUI ($n = 97$). Among participants with PUI, we found that IAT scores had a direct correlation with manic and psychotic symptoms clusters ($R = 0.212$, $p = 0.037$; $R = 0.209$, $p = 0.04$). Moreover, we found a direct correlation between IAT scores and BIS-11 attentional impulsivity ($R = 0.326$, $p = 0.001$) (see Table 4).

Table 3
Logistic regression model with the maximum likelihood estimation to identify the risk for PUI (IAT ≥ 50).

Variables	Odds ratio	Std. Error	p
Sex (M)	1.309	0.275	0.328
Age	0.986	0.049	0.768
Education status			0.242
Below high school	0.771	0.502	0.605
High school diploma	1.432	0.293	0.220
Job status			0.265
Student	0.699	0.349	0.305
Employed	0.455	0.396	0.047
Depressive symptoms	1.246	0.087	0.012
Manic symptoms	0.928	0.188	0.691
Anxiety symptoms	0.979	0.080	0.793
Psychotic symptoms	0.999	0.243	0.997
Eating disorders symptoms	0.743	0.175	0.090
SUD symptoms	1.106	0.233	0.665
Antisocial personality traits	1.059	0.167	0.732
BIS-11 attentional impulsivity	1.155	0.038	>0.001
PI-WSUR contamination obsessions and washing compulsions	0.993	0.020	0.732
PI-WSUR dressing/grooming compulsions	0.961	0.055	0.472
PI-WSUR checking compulsions	1.022	0.022	0.334
PI-WSUR obsessional thoughts of harm to self/other	1.052	0.034	0.132
PI-WSUR obsessional impulses to harm self/other	1.108	0.026	>0.001

BIS-11: Barratt Impulsiveness Scale 11; PI-WSUR: Padua Inventory-Washington State University Revision; IAT: Internet Addiction Test; MINI: Mini International Neuropsychiatric Interview.

Table 4
Correlation analysis of PUI severity (IAT total scores) with impulsivity traits (BIS-11), obsessive/compulsive symptoms (PI-WSUR) and psychiatric comorbidity (MINI-Screen) in the sub-sample with PUI (n = 97).

	Spearman's R	p-value
Age	−0.046	0.656
MINI-Screen		
depressive symptoms	0.068	0.510
manic symptoms	**0.212**	**0.037** *
anxiety symptoms	0.080	0.434
psychotic symptoms	**0.209**	**0.040** *
eating disorders symptoms	0.105	0.307
SUD symptoms	0.052	0.614
Antisocial Personality Disorder traits	0.163	0.111
BIS-11		
attentional impulsivity	**0.326**	**0.001** *
motor impulsivity	0.107	0.297
non-planning impulsivity	0.156	0.128
PI-WSUR		
contamination obsessions and washing compulsions	−0.033	0.748
dressing/grooming compulsions	0.014	0.888
checking compulsion factors	0.022	0.827
obsessional thoughts of harm to self/others	−0.088	0.939
obsessional impulses to harm self/others	0.125	0.223

BIS-11: Barratt Impulsiveness Scale 11; PI-WSUR: Padua Inventory-Washington State University Revision; IAT: Internet Addiction Test.
Statistics: Spearman's rank correlation.

4. Discussion

The present study examined a sample drawn from the general Italian population aged 18–30, in order to assess cross-sectional PUI rates, correlations and possible predictors of PUI. We focused on co-occurring impulsive and obsessive-compulsive symptoms (Padua Inventory) and psychiatric symptomatology, in order to clarify whether the presence of PUI could be associated with the severity of such clinical features. In our sample, impulsivity and obsessive-compulsive symptoms were both significant predictors for PUI.

4.1. Demographic characteristics and PUI

12.6% of our sample exhibited PUI. As stated in the methods, the IAT cut-off for defining PUI was set at 50, consistently with other research works [8,29,43]. However, the threshold for clinical significance for PUI remains debated and an agreement about the definitions of PUI would facilitate future research. PUI rates have been reported to widely vary across populations [28] because of accessibility of the Internet in different countries, sociodemographic factors, various definitions of PUI, different diagnostic instruments and cut-off used. Among the other factors, the focus on young adult probably impacted on our result, being young people and students more at risk for PUI [6,49].

Even in the age range we examined, the group with PUI was significantly younger than the other. Interestingly, we did not find any significant gender difference concerning PUI. This finding is in contrast with other studies addressing adolescents that have found a male preponderance [50]. Our findings, however, replicate the results of other studies conducted on the general population [29]. Job status and educational background did not significantly differ in the two sub-samples, probably due to our population being mainly comprised of students.

4.2. Psychopathological symptoms and PUI

Subjects with PUI scored significantly higher in all MINI-Screen symptoms cluster, except for eating disorders symptoms. Depressive symptoms moreover appeared to be a significant predictor for PUI in the regression model, revealing a relevant association with pathological online behaviors. Although not suitable to establish diagnoses, our data reveal a higher burden of psychiatric distress in participants with PUI. These findings appear in line with previous research suggesting the presence of a link between PUI and other mental health problems [44]. Treating psychiatric co-morbidities as early as possible, if any, has been suggested as effective to prevent the transition toward PUI [35,51]. Thus, key objectives for future PUI research include accurate assessment of the impact that comorbidities have on functional impairment [3].

4.3. Impulsivity, obsessive-compulsive symptoms and PUI

The participants with PUI reported both more impulsive and more obsessive-compulsive symptoms. Furthermore, both impulsivity (BIS-11 attentional impulsivity) and obsessive-compulsive symptoms (PI-WSUR "obsessional impulses to harm self/other") fitted in the model with the maximum likelihood estimation to identify the risk for PUI. This finding may suggest shared traits driving the behavior and that an impulsive-compulsive model may be too simplistic to capture the complex behavior of PUI.

We found that the PI-WSUR factor score "obsessional impulses to harm self/others" was highly associated with the presence of PUI. We speculate that some features typical of obsessive-compulsivity, like cognitive inflexibility, rigidity, anticipatory worry and need for certainty could be factors facilitating PUI. Negative moods associated with obsessional impulses could act as internal triggers, driving the individual to act the pathological behavior. In fact, engaging in specific on-line activities can be apparently very helpful for dealing with negative emotions linked to obsessionality. Cyberchondria could represent an effective example of how intolerance of uncertainty and obsessional beliefs could act as triggers for pathological on-line behaviors [34]. Support for this theory may also come from the general observation that many core features of the Internet, such as controllability, security guaranteed by distance, anonymity and rituality, could act as effective regulators for obsessional tendencies.

As stated by accredited models of addictive behaviors [52], a strong association between impulsivity and PUI is confirmed in our sample. The correlation of attentional impulsivity with IAT was maintained also in the group of participants with PUI, suggesting a relation between impulsivity and severity of PUI. In contrast to other works on the same

subject [29,33], some other PI-WSUR factor scores, such as those mainly investigating compulsive symptomatology of the obsessive-compulsive spectrum ("checking compulsions", dressing/grooming compulsions") did not fit in the model with the maximum likelihood estimation to identify the risk for PUI. We hypothesize that both the young age of the participants and the mild severity of PUI cases could situate our sample in the early stages of development of PUI. In these early stages the problematic behavior is driven more by impulsivity, impairment of inhibitory control and expectancies of gratification or relief from discomfort, rather than from compulsivity and compensation [52–54].

4.4. Limitations

The study here presented has some limitations. Firstly, no causal relationships can be derived between the variables because of the cross-sectional design. Moreover, due to the online recruitment method used, the likelihood to participate in the survey could be higher for people with PUI. Therefore, the generalizability of these findings could not accurately extend to the general population. Another limitation is the lack of robust clinical data about the sample, due to the use of the MINI-Screen instrument instead of the full MINI interview.

Consequently, major diagnostic entities such as depression or anxiety could not be effectively screened and could so contribute in part for the correlations observed in our analysis. Moreover, due to the recruitment method, we used only self-report questionnaires to evaluate multifactorial dimensions as impulsivity and compulsivity. This possibly limited the ability of our survey to detect these dimensions.

The PUI population we studied consists of healthy young adults with a mean IAT score of 59.2. Further research focusing on the higher, most severe band of the PUI (IAT ≥ 80) is needed to compare those patients with samples of low to moderate PUI subjects. Furthermore, in our survey Internet use was not distinguished by type of online activity; different activities, including gaming, shopping, on-line gambling, social networking, pornography or streaming videos could contribute in different ways to the findings we presented.

5. Conclusions

The meaningfulness of PUI as a separate diagnostic entity, as well as its diagnostic boundaries are still debated. As our data confirm, PUI behaviors in young adults are linked with higher psychopathological burden, thus requiring clinical attention. Specifically, depressive symptoms emerged to act as a relevant predictor of PUI in our cross-sectional sample. The construct of attentional impulsivity demonstrated to have a strong association with this pathological behavior, phenomenologically linking PUI with other addictive behaviors. The significant association between PI-WSUR factor score "obsessional impulses to harm self/others" and PUI may suggest a possible role of obsessive impulses and beliefs as triggers in the development of PUI. In this sense, subjects may abandon to the pathological online behavior to relief from discomfort linked to obsessive ruminations.

Further research is needed to fully understand the role of impulsivity, compulsivity and obsessionality, both for diagnostic and for therapeutic purposes. This would allow treatments for PUI targeted on specific dimensions, e.g. intolerance of uncertainty or reward seeking, in order to reach a more specific clinical approach. Moreover, gaining more insight into the trajectory of vulnerability factors implicated in the development of PUI may allow us to define timing interventions to cope with these disturbances, thus preventing the transition toward a disabling condition.

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