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# What kind of addiction is Internet abuse? Similarities and differences between substance and behavioral addictions

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## ABSTRACT

Internet abuse has been defined as 'addiction', as it shares behavioral, and also neurobiological aspects with other categories of dependencies. Similarities and differences between addictions with and without substances should be further investigated to avoid confusion in diagnostic criteria and intervention planning.
This study aims to investigate whether internet abuse is related to overt substance addiction, if the presence of compulsive tendencies in personality traits can be considered a shared variable, and how different forms of abuse influence overall perceived well-being, taking into account also the level of Social Desirability.
The Internet Addiction Test (IAT), the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), the State-anxiety, Depression, and the Maudsley Obsessional-Compulsive Questionnaire (MOCQ-R) drawn from the Cognitive Behavioral Assessment Battery, and the Short form of the Marlowe-Crowne Social Desirability Scale, were administered to a sample composed of 84 adult subjects, 43 diagnosed as addicted to substances and 43 non-addicted subjects, matched for gender and age. The results show that IAT scores are inversely correlated to the age of the subjects, but not linked with gender. As hypothesized, the control group shows higher levels of well-being, while the subjects diagnosed with substance addiction present higher levels of anxiety, depression, and higher compulsive scores, significantly correlated with depression. Higher levels of internet dependence are found in the non-diagnosed as addicted participants, suggesting caution in classifying dysregulated Internet behavior as 'addiction'.

Keywords: Internet abuse; substance addiction; behavioral dependence; compulsion.

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## Introduction

The birth of the Internet dates back to the 70s of the last century, and especially since the 90s its role in communication has become central and its use exponentially pervasive. The web has changed the way people work, perceive, buy, enjoy free time, and interact with the world, restructuring the concept and the representation of space-time.

The pitfalls resulting from its use have long been a focused on by the scientific community, and not even "digital natives" (Prensky, 2001), i.e. born from 2000 onwards, are exempt from them.

The issue has attracted increasing attention among researchers, also in psychiatry and psychology, as computer use and Internet frequent access have posed problems with increasing forms of abuse (Shaw et al., 2008).

Since early studies by Young (1996), Griffiths (2000) and Aboujaoude (2010) this disorder was defined in different terms, however conducting extensive research about its causes and consequences.

In general, the abnormal use of the Internet, called Internet addiction, is characterized by excessive or poorly controlled concerns, impulses or behaviors regarding Internet use that lead to deterioration or discomfort. Internet "addicts" can use the Internet for prolonged periods, isolating themselves from other forms of social contact and focusing almost entirely on the Internet rather than on the events of wider life. Internet addiction can also be explained as a need to escape oneself and this could justify the excessive need for Internet games (Kwon et al., 2011). Currently there are no universally shared diagnostic criteria or a precise nosographic location of the clinical picture connected to its overuse.

Internet Addiction Disorder (IAD) can be considered as a "*behavioral addiction*" characterized by a strong and insistent desire to connect to the Web (not for studying and work purposes). However, there are criticisms and doubts about the recognition of the syndrome as a real addiction (Ryding & Kaye, 2018; Schimmenti, 2023; Weinstein et al., 2014). In DSM-IV-TR (APA, 2000) Internet dependence was cited among the Impulse Control Disorders, referring to the subjects' inability to control their own actions, even if they are aware that the act in question is harmful to themselves and/or others. Internet addiction was included in the DSM-5 and in the DSM-5-TR (APA, 2022), but only with reference to gambling (as *Internet Gaming Disorders*).

According to Young (2007), Internet dependence develops according to three distinct phases: involvement; replacement; escape. "Surfing" in the Web becomes a fundamental need that progressively excludes every other need, leads to withdraw from the real world and put in the background all daily activities, from school tasks to family responsibilities, social relationships, and working.

In the literature, different models have been proposed for the *Problematic Use of the Internet* (Grant et al., 2010; Weinstein & Lejoyeux, 2010).

It can be conceived as a disorder of impulse control, characterized by the urge to repeatedly engage in a behavior - surfing online - that is pleasant in the moment, but can lead to subsequent negative effects (Aboujaoude, 2010). Impulsivity as basis of problematic internet use was supported by neurobiological findings (Brand et al., 2014; Park et al., 2017).

Some researchers have considered impulse control disorders as part of the spectrum of obsessive-compulsive disorders (OCD). This model is supported by brain imaging and drug treatment studies and other neurobiological evidence (Lubman et al., 2004; Dell'Osso et al., 2006).

Moreover, since research suggests similarities between behavioral and substances reward processing (Alavi et al., 2012; Karim & Chaudhri, 2012), sharing also neurobiological bases (e.g., Han et al., 2015), it has been suggested that IAD could be included in the spectrum of addictions since it shows the characteristics of excessive use, despite the negative consequences, the phenomena of abstinence and tolerance that characterize many disorders related to the use of substances. The similarity between internet and substance abuse seems confirmed by the higher IAD score of cannabis users compared to non-users (Korkeila et al., 2010).

Also, concomitant psychic disorders seem to be shared between excessive Internet use and substance abuse. The first research conducted by Young (1996) addressed the extent of the problems associated with Internet abuse.

More recent transversal studies in patient samples report high comorbidity of internet addiction with psychiatric disorders such as mood disorders, anxiety disorders (including generalized anxiety disorder, social anxiety disorder) and Attention Deficit/Hyperactivity Disorder (ADHD) (Weinstein et al., 2014). Furthermore, German Internet-dependent students had a 78% rate of comorbid depressive mood disorder and higher rates of impulsivity and depression (Wildt et al., 2007).
A higher percentage of anxiety disorder has been found in a group of IAD users, compared to non-dependent users (Kratzer & Hegerl, 2008). Comorbidity with hypomania, dysthymia, obsessive-compulsive personality disorder, borderline personality disorder and avoidant personality disorder has been found in American adolescents (Bernardi et al., 2009) A combination of alexithymia, dissociative experiences, low self-esteem, and impulse dysregulation has been suggested as a risk factor for Internet obsession in a sample of Italian teenagers (De Berardis et al., 2009).
There is a significant association between Internet abuse and depressive symptoms in South Korean adolescents (Ha et al., 2007), along with high levels of depression and suicidal ideation (Kim et al., 2006). Teens with Internet obsession had higher symptoms of ADHD, depression, social phobia and hostility (Yen et al., 2007). It is not defined whether the disorders found in comorbidity with Internet abuse can be explained by shared risk factors or are better regarded as secondary disorders.
Recent literature has underlined that it is of little use to talk about a generic "internet addiction", while specific Internet-related psychopathologies should be explored in greater depth (Musetti, 2017). For example, Schimmenti et al. (2017) demonstrated that the risk of problematic Internet use during late adolescence may be increased by traumatic memories among males, and by impaired affect regulation among females.
Furthermore, some psychosocial variables should be considered. Gender-based variability studies define the male as more susceptible to the generalized form of Problematic Internet Use (Baloğlu et al., 2020). However, the results would seem different when analyzing the percentages related to specific addictions such as that from social networks and/or smartphones: in this case, on the contrary, women report higher levels of risk (Machimbarrena et al., 2019). A higher IAD average score in male than in women was found by Korkeila et al. (2010). Age also seems to be a negatively correlated risk factor (Tereshchenko & Kasparov, 2019).
The clinical and psychosocial bases of similarities and differences between substance and behavioral abuses should be deepened, to avoid the risks of confusion in diagnostic criteria and application interventions (Flayelle et al., 2022).
This study aims to investigate if the Internet abuse is linked to overt dependence from substances to the presence of compulsive tendencies in personality traits as a shared variable, and how the different forms of abuse affect overall perceived well-being.
The research will take into account also the social desirability, a variable that can intervene in determining the subject's response-set to socially relevant issues such as addiction.
Moreover, the study aims to evaluate how much he excessive use of Internet is influenced by demographic variables such as gender and age.

## Materials and Methods

*Identifying the research question*

This study aims to investigate whether internet abuse is related to overt substance addiction, if the presence of compulsive tendencies in personality traits can be considered a shared variable, and how different forms of abuse influence overall perceived well-being, taking into account also the level of Social Desirability.

## *Research Strategy*

### *Internet Addiction Test*

Kimberly Young has developed the diagnostic questionnaire IAT (Internet Addiction Test), composed of 20 different items, which aim to identify those who make prolonged use of the Internet (even 40-50 hours a week) to neglect family affections, work, study, social relations and one's own person: sleepless nights, anxiety, psychomotor agitation, depression related to being off-line, dreams and fantasies concerning the Internet (Young, 2016). The questions are answered by choosing between 5 different alternatives, from "rarely" to "always". The structure of the scale was studied by in Italy by Faraci et al. (2013), confirming a high Cronbach's Alpha value (0.91). According to this Italian study, a threshold of 40 reveals excessive Internet use.

*Warwick-Edinburgh Mental Well-being Scale (WEMWBS)*

WEMWBS is a scale developed to allow monitoring of mental well-being in the general population.
The scale is composed of 14 statements covering emotional and functional aspects of mental well-being, experienced in the last two weeks. The statements have five answer categories from "no time" to "always". Research suggests that WEMWBS may detect clinically significant changes (Collins et al., 2012; Maheswaran et al., 2012).
A Cronbach alpha of 0.87, and a test-retest of 0.80 at one week, indicate good reliability both in terms of internal consistency and stability over time. The Italian version of the scale shows good psychometric qualities (Gremigni & Stewart-Brown, 2011).

*CBA - State Trait Anxiety Inventory, State Form (STAI-X2)*

The test is included in the Cognitive Behavioral Assessment (CBA) battery, a large-spectrum assessment battery that evaluates several pathological personality traits (Sanavio et al., 1985).
The STAI-X2 is the Italian translation and adaptation of the Spielberger's questionnaire aimed at evaluating the anxiety that the person reports, referring to a stable characteristic of the subject, i.e., a state of lasting anxiety, which can constitute a real personality trait. The test consists of 20 items, with response modes linked to a frequency scale. The reliability of this test in the Italian standardization is 0.92.

*CBA - Questionnaire on Depression (QD)*

This questionnaire, also included in the CBA battery (Sanavio et al., 2013), measures the presence of depressive manifestations and dysphoric symptoms. It is composed of 24 items, and high scores to this test indicate the existence of a dysphoric state condition, not necessarily of a clinical character. The reliability is alpha=0.86.

*CBA - Maudsley Obsessional-Compulsive Questionnaire Revised (MOCQ/R)*

This test, adapted in Italy by Sanavio et al. (2013) investigates obsessive-compulsive behaviors and problems. It includes 21 items and provides an overall index (synthetic indication of the presence of obsessive-compulsive disorder), and indices that referring to three sub-scales.
MOCQ/R-1: behavior and concerns related to repeated and unnecessary checks,
MOCQ/R-2: hygiene and cleaning problems, and concerns related to unlikely contamination.
MOCQ/R-3: recurrent doubts and unpleasant and persistent intrusive thoughts.
The Cronbach alpha for the MOCQ/R test is 0.79.

*MC-SDS Short form of the Marlowe-Crowne Social Desirability Scale*

The "Social Desirability" represents the tendency of people to respond to personality tests and questionnaires aiming to present themselves in a favorable light.

From the original *Marlowe-Crowne Social Desirability Scale* (MC-SDS: Crowne & Marlowe, 1960), a short form was derived, standardized in Italy by Manganelli Rattazzi et al. (2000). This short version of the scale, composed of 9 item, each in a six-level judgment scale without neutral point, has a good reliability (alpha=0.69).

*Participants*

The participants were 86 adult subjects, divided in two groups. Forty-three were addicted to substances, recruited from a Service for diagnosis and care of addiction, and labelled as group *"Diagnosed with addiction"* (34 males, 8 females, 1 unspecified gender; mean age 40.02, standard deviation 10.87).

A control group of 43 non-addicted subjects (having never made use of substances) was selected matching the number of respondents for gender and age with the diagnosed group: 33 males, 9 females, 1 unspecified gender; mean age 39.72, standard deviation 12.21.

After the matching, the two groups resulted very similar, and therefore comparable, for gender (Pearson chi-square=0.07, df=2, p=0.96), and for age (t=0.12, df=84, p=0.90).

*Procedure and data analysis*

Both groups responded to a form containing the materials described above. Preliminarily, they filled an informed consent to the use, in aggregated modality, of the data of the anonymous protocol.

Ethical codes for the research of the Italian Association of Psychology were fully respected in the procedure and the use of the data.

The data were analyzed through statistics as t-tests for independent samples, Pearson correlations, and a stepwise regression model. The analyses were performed using *Systat* software, version 13.

## Results

A preliminary analysis was conducted to search for gender differences in the Internet dependence, using the t-test for independent samples for analyzing the differences in IAT scores within the groups of the sample. In both groups the difference is small and not significant, also taking into account the numerical inconsistency of genders in the two samples. For the substance-addicted group: males' mean=19.82 (n=34), s.d.=7.96, females' mean 21,13 (n=8), s.d. 6.58, t=-0.43, d.f=40, p=0.67. For the controls: males' mean=24.42 (n=33), s.d.=7.87, females' mean 21.44 (n=9), s.d. 7.40, t=1.02, d.f.=40, p=0.54.

Considering the absence of gender differences in Internet dependence, the subsequent analyses were conducted on the whole sample. The differences between the two groups for each independent variable were investigated comparing the means through the t-test for independent samples (Table 1).

The Control sample, as foreseeable, reports a higher level of well-being than the group of subjects diagnosed with substance addiction, but shows a higher score in the internet dependence variable. Some hypotheses to explain this unexpected result will be presented in the discussion of the results.

The subjects diagnosed as substance addicted, compared to the controls, show significantly higher scores of anxiety, depression and obsessive-compulsive disorders, both in total score and in its sub dimensions Cleaning, and Doubting, and this could be hypothesized in line with the theoretical assumptions.

To assess the relationships among variables, the zero-order intercorrelations among variables were calculated by means of Pearson coefficient.

Beyond the obvious and expected intercorrelations among the clinical relevant variables (Anxiety, Depression, Obsessive-compulsive), we focused attention on the correlations between Internet Dependence, Well-being and Social desirability, comparing the two groups (Table 2).

The score of internet dependence significantly correlates with anxiety, depression, checking, and doubting in the controls, not in the addicted group, where the only significant correlation is with social desirability.

The well-being score correlates negatively in both groups, as expected, with the tendency to anxiety and depression; in the addicted group a significant inverse correlation is also shown between well-being and doubting and desirability.
Finally, the correlation with age is inverse, as expected, and significant for internet addiction, not for well-being in the addicted group. Among controls the relation between age and IAT is inverse, while with well-being is positive, both not significant.
With the aim of furtherly investigating the causal relationships among the variables, a multiple regression, with stepwise method, was conducted. The diagnosis (addiction vs controls) was used as dependent variable, the other variables as predictors. Only the total obsessive-compulsive score was included in the regression model, excluding the subtests to avoid duplications in the model, as they contribute to the total score.
The results of the analysis are shown in the table 3. Internet dependence confirmed to be an inversed predictor of the diagnosis of substance addiction, while the obsessive-compulsive score is a positive predictor.

*Tables*

*Tab. 1 – Difference between groups in the test scores*

| | *Control group (n= 43)* | | *Substances Addicted group ( n= 43)* | | | |
|---|---|---|---|---|---|---|
| ***VARIABLES*** | *Mean* | *St.Dev.* | *Mean* | *St.Dev.* | *t* | *p* |
| Internet Dependence (IAT) | 23.60 | 7.78 | 20.33 | 7.75 | 1.96 | 0.05 |
| Well-being (WEMWBS) | 52.37 | 8.46 | 47.07 | 9.22 | 2.78 | 0.01 |
| Anxiety (STAI) | 37.72 | 9.64 | 47.21 | 12.21 | - 4.00 | <0.001 |
| Depression (QD) | 3.77 | 5.31 | 9.37 | 6.35 | - 4.44 | <0.001 |
| Obsess. - Comp. (MOCQ-R) overall score | 4.67 | 3.29 | 8.42 | 5.07 | - 4.07 | <0.001 |
| Checking | 2.58 | 2.00 | 3.42 | 2.69 | - 1.64 | 0.73 |
| Cleaning | 1.86 | 1.51 | 3.67 | 2.24 | - 4.40 | <0.001 |
| Doubting | 0.93 | 1.14 | 1.77 | 1.43 | - 3.00 | <0.001 |
| Desirability (MC-SDS) | 30.50 | 8.53 | 27.81 | 7.34 | 1.56 | 0.12 |

*Tab. 2 - Pearson Correlations among Internet addiction, Well-being, and other variables, separated for the two groups.*

| | **Control group (n=43)** | | **Addicted group (n=43)** | |
|---|---|---|---|---|
| ***Variables:*** | *IAT* | *W-B* | *IAT* | *W-B* |
| Internet Dependence (IAT) | - | -0.17 | - | -0.10 |
| Well-being (WEMWBS) | -0.17 | - | -0.10 | - |
| Anxiety (STAI) | 0.54* | -0.65* | 0.09 | -0.80* |
| Depression (QD) | 0.39* | -0.45* | 0.12 | -0.82* |
| Obsess. -comp. (MOCQ-R) overall score | 0.24 | -0.24 | 0.00 | -0.18 |
| Checking | 0.34* | -0.09 | -0.02 | -0.08 |
| Cleaning | -0.02 | -0.20 | 0.04 | -0.06 |
| Doubting | 0.36* | -0.18 | 0.00 | -0.39* |
| Desirability (MC-SDS) | 0.12 | -0.18 | 0.36* | -0.36* |
| Age | -0.20 | 0.13 | -0.31* | -0.22 |

* p<.05 after Bonferroni correction for multiple comparisons

*Tab. 3 - Results of multiple stepwise regression of variables on the dependent variable (diagnosis of addiction vs controls).*

| *Predictors in the final model:* | *Std. Coefficient* | *t* | *p-value* |
|---|---|---|---|
| Internet depend. | -0.26 | -2.77 | 0.01 |
| Obsess.-compuls. | 0.25 | 2.47 | 0.02 |

*N=86, multiple R=0.56, squared multiple R=0.32, standard error of estimate=0.43.*

## Discussion

In the present study, the relationships between the excessive use of internet, as a specific form of addiction without substances, and the presence/absence of diagnosed substance addiction, have been analyzed. These addictions have been hypothesized to be differently related to socio-demographic variables (age, gender), level of well-being and personality traits such as anxiety, depression and obsessive-compulsive thoughts and behavior.

The results show that the tendency to Internet abuse is inversely correlated to the age of the subjects, but not linked with gender. Analyzing the differences between the two samples of the study, the Controls confirm to have higher levels of well-being, while the subjects diagnosed with substance addiction present higher levels of anxiety, depression, and have higher obsessive-compulsive scores, especially in the *Cleaning* and *Doubting* (not in *Checking*) subdimensions.

In this group, also the correlation between obsessive-compulsive (OCD) scores and depression is significant. These results confirm the epidemiological and clinical hypothesis (Lubman et al., 2004; Dell'Osso et al., 2006) that substance addiction is linked to compulsive behavioral and cognitive aspects of personality, and indeed the OCD overall score is significantly predictive of diagnosed addiction, confirming the data present in the literature (e.g., in adolescents, Tereshchenko & Kasparov, 2019), while anxiety or well-being are not predictive variables. Only in the Control sample the *Doubting* and *Checking* subdimension correlates with levels of Internet use, and this can be explained by the motivations and procedures required for frequent use of the internet and social media.

Very interesting, and perhaps counter-intuitive, is the result that higher levels of internet dependence are found in the non-diagnosed as addicted participants. The explanation for this unexpected finding could be twofold.

Subjects with substance dependence show a lower social desirability than controls, but a higher correlation between desirability and IAD, confirming the diversity of social attitudes in different forms of dependence, which could explain the lower tendency of our sub-sample to disclose addictions other than substance dependence. This aspect linked to social desirability, less present in the addiction literature, should be investigated more in-depth in future studies. Another possible explanation is that internet abuse is somehow alternative to substance addiction, satisfying the needs for compensation of emotional discomfort in a different way, as the correlations analyzed separately in the two groups can highlight. While in the Control group anxiety and depression scores covariate with higher levels of Internet addiction, in the group of substance-addicted they correlate only with levels of perceived well-being.

This explanation of the substantial difference between excessive Internet use and substance addiction agrees with the caution recommended by Schimmenti (2023) in classifying dysregulated Internet behavior as 'addiction', recognizing the specific motivations that lead individuals to behave abnormally in the online environment as crucial.

## Conclusion

The study of Internet Addiction is an increasingly relevant and crucial field, considering the widespread diffusion and pervasive use of the Internet and its derivatives.
Research plays a fundamental role in deepening the understanding of this complex phenomenon and in identifying effective prevention and intervention strategies, improving the identification of risk and protective factors, encouraging the development of personalized interventions, and intervening by trying to support prevention and therapeutic plans.

Very relevant to this aim it is to assess if and how the tendency to new addictions shares psychological characteristics with traditional addiction to substances, and/or in what each form of dependence is different from others. From our study some key variables emerge as crucial in the in-depth reading of the phenomenon, confirming the hypothesis that addiction is linked to compulsive behavioral and cognitive aspects of the personality. This link is stronger in substance addiction, and more limited to doubting or checking components in the tendency to Internet abuse.
The results confirm the caution in defining excessive Internet use as an 'addiction' analogous to substance abuse, although some neurophysiological bases and behavioral and pathological correlates may be shared.
The institutions involved in training and care should focus attention on the specificities of the new addictions, working for preventive and therapeutic interventions mainly on the determinants that influence their development. Psychological research can give support to the interdisciplinary approach needed to develop a comprehensive framework to understand, prevent, and treat effectively old and new forms of addictions.

## Limitations

A limitation of our study consists in the assessment of variables like anxiety, depression, obsession and compulsion, indicating potentially pathological outcomes, through continuous data from psychometric tests, without considering the thresholds that differentiate "normality" from pathology. Even the admission of excessive Internet use rarely reaches the threshold of actual addiction (<5% in our sample, similar to that found by epidemiological studies in European countries), thus representing a trend rather than actual abuse. Therefore, no categorical diagnoses were detected in our study, but a more or less tendency towards the abnormal outcome. Only the group of drug addicts had a formal diagnosis made by the facility where the participants were cared for.
Another limitation of the study was the impossibility of distinguishing internet and smartphone abuse, which involves the excessive and uncontrolled use of social media. The use of both devices was closely associated in most of the cases examined.

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## Declaration of Interest

No specific interest is to be disclosed for this article.

## Authors' Contribution

Both authors contributed equally to the research design, data processing and discussion.

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