

Socio-demographic factors and different internet-use patterns have different impacts on internet addiction and entail different risk profiles in males and females

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Abstract

OBJECTIVES: Despite the number of studies on factors associated with Internet Addiction, there are inconclusive data for several variables. Furthermore, few Authors have done researches in a gender-specific perspective. Thus, our main objective was to assess the impact of socio-demographic variables and of Internet-use behavior on Internet Addiction in a gender-oriented study, and to set up a risk gender-specific profile.

METHODS: We assessed by questionnaire gender, age, nationality of parents, time spent online and main use of Internet; and we administered the Internet Addiction Test to assess Internet Addiction, in schools or University setting.

RESULTS: Out of 1032 participants, outcomes show that the type and relevance of predictors of Internet Addiction differ between males and females; from these data, we elaborated a risk gender-specific profile. Prevalence of Internet Addiction was 1.5% (male = 1.8%; female 1.2%). The trend of Internet Addiction is decreasing by age except when the main use of Internet is about social networking.

CONCLUSION: This study investigated the role of variables - whose relevance was well accepted but not well defined - in a large sample of Italian participants, and discussed the different impact of these variables on genders. Furthermore, we have updated the prevalence of Internet Addiction in Italy. Clinicians can take advantage by including in their assessments a) evidence related to predictor factors that are not completely overlapping between gender, and b) the risk-profile.

INTRODUCTION

Since the beginning of its worldwide spreading in the early 80s, the recorded rate of Internet utilization in Italy has seen a remarkable increase. This increased use of the Internet has had a positive impact on several areas of people's lives (Lozano-Blasco *et al.* 2022a). However, with the possibility of accessing the Internet at any time and in any place at very affordable costs, and in the presence of specific environmental context (Brand *et al.* 2019) and personal risk factors, the transition from regular use to problematic use can be facilitated (Chao *et al.* 2020; Dell'Osso *et al.* 2021). In the most serious cases, the Internet Addiction Disorder (IAD; Young 1998), characterized by a diminished control over the behavior and continuation of the behavior despite negative consequences leading to functional impairments (Alimoradi *et al.* 2019; Wegmann & Brand 2021), can be established. In the literature, IAD and Problematic Internet Use (PIU; Poon 2018) are often used as synonyms (Pau 2019; Spada 2014).

Surely, the correlation between IAD, psychiatric disorders and psychological characteristics has been extensively studied (Branciforti *et al.* 2023; Corrêa Rangel *et al.* 2022; Ioannidis *et al.* 2019; Lozano-Blasco *et al.* 2022a, b; Mozafar Saadati *et al.* 2021; Pettorruso *et al.* 2020; Reed *et al.* 2018; Stanković & Nesić 2022; Truzoli *et al.* 2020, 2021). Anyway, gender specific differences in terms of personality traits and psychopathological symptoms, remain unclear (Winds *et al.* 2022), although some results (Liang *et al.* 2016) indicate that the relationship between Internet addiction and depression depended on gender.

Although some knowledge has been acquired, there are relevant characteristics that require further investigation to better understand the phenomenon. These topics include gender, age, epidemiological data, Internet-exposure time-lapse, and type of utilization of Internet. In Italy, insufficient attention has been given to the difference between Italian young people and young people residing in Italy with immigration background.

Therefore, while the existence of an Internet Addiction (IA) problem is well documented, many aspects still need to be investigated.

Gender and IAD

In the literature, gender and IAD outcomes are inconclusive (Lopes *et al.* 2022). Laconi *et al.* (2018) stated that PIU is prevalent among women in nine European countries, and Leung (2004) report a prevalence of young female students.

Other findings suggest that PIU is more common among males than females (Anand *et al.* 2018; Anderson *et al.* 2017; Escario & Wilkinson 2020; Karacic & Oreskovic 2017; Li *et al.* 2021; Shi *et al.* 2017; Stavropoulos *et al.* 2018).

Anyway, some studies have shown no significant differences between genders (Dahl & Bergmark 2020;

Sechi *et al.* 2021; Tran *et al.* 2017; Zhang *et al.* 2018b), not even in longitudinal studies (Gámez-Guadix 2014; Gámez-Guadix *et al.* 2015), and in logistic regression model (Hassan *et al.* 2020).

Age and IAD

The teen-age years appear to be at relatively high risk for developing IAD (Bernheim *et al.* 2013; Derevensky 2019; Hammond *et al.* 2014; Kuss *et al.* 2014). Following Lozano-Blasco *et al.* (2022b) IAD is inversely proportional to age.

However, the outcomes of cross-sectional studies are inconsistent. Some studies show no significant effects of age (Poli & Agrimi 2012); others suggest that older adolescents are at higher risk for IAD (Karacic & Oreskovic 2017); while other researches state that IA behaviors tend to decrease during adolescence (Bakken *et al.* 2009; Yen *et al.* 2009a).

So, there are no definitive studies that differentiate the impact of age between genders.

Time online and IAD

Studies have shown that IAD is significantly associated with the daily time spent online (Durkee *et al.* 2012; Jang *et al.* 2008; Hassan *et al.* 2020). A recent review (Lopes *et al.* 2022) does not show a linear relationship between time spent online and depressive or anxious symptoms, but the longer the time spent online, the worse the outcomes.

Anyway, we do not found significant research on the differential effects of the time online in a gender specificity perspective.

Activity online and IAD

About the type of activity people are involved in online, it has been shown that social websites are popular among internet users (Hassan *et al.* 2020; Truzoli *et al.* 2023). There is also evidence that girls use social media more often than boys do (Lopez-Fernandez 2018; Peris *et al.* 2020), and that the risk and frequency of addictive use of social networking decrease as age increases (Brenley & Covey 2018). Some studies (Liang *et al.* 2016; Su *et al.* 2020) found that males and females exhibit different behavioral patterns of Internet usage, and different types of Internet usage.

But it cannot be excluded that gender-related differences in Internet-use behaviour are going to attenuating, especially for those activities with the most addictive content, as gambling.

Prevalence of IAD

Epidemiological data on the spread of IAD are affected by different factors (Kuss *et al.* 2014; Zhang *et al.* 2018a), like diagnostic uncertainty, some kind of bias or inconsistency when psychometric tools do not fully match, differences in the measure of the cut-offs, and gaps in the level of technological advancement in different society.

In the meta-analysis by Cheng & Li (2014), the global prevalence of IAD among the general population (mean age 18.42 ys) was found to be 6% in 31 different countries.

Studies in European Countries report different prevalence data, ranging 0.6-59.4% (Kaltiala-Heino *et al.* 2004; Laconi *et al.* 2018; Müller *et al.* 2015). Durkee *et al.* (2012) found an overall prevalence of PIU = 4.4% (in Italy = 1.2%).

Epidemiological data are not consistent even in Italy. A study in North-Italy shows an IAD estimated prevalence of 0.8% (Poli & Agrimi 2012). In Central-Italy, the data range from 4.7% (Taranto *et al.* 2015) to 5.4% (Pallanti *et al.* 2006).

In South-Italy, the data range from 1.2% (Villega *et al.* 2011) to 8.2% (Scimeca *et al.* 2014).

Trend of IAD

Other researches have studied the longitudinal trend of IAD. In a short-term longitudinal study, in Chinese adolescents (12-18 ys), Li *et al.* (2019) have found overall a linear decline in adolescent IAD over the six months. Stavropoulos *et al.* (2018) in adolescents (16-18 ys) assessed twice, found that IA symptoms decreased over time for male and female, with a slower rate for boys compared with girls. In a meta-analysis (Dahl & Bergmark 2020), the average weighted persistence was 53%, with inter-study heterogeneity (79.5%) and prevalence levels varied between 1% and 26%.

In conclusion, gender, age, epidemiological data, Internet-exposure time-lapse, and type of utilization of Internet need further investigation.

Furthermore, which is important for the aim of the present research, the relationships between gender and epidemiology, trends in IAD and the type of Internet-use have been studied, but to our knowledge, there are no studies that address in a unitary way the role of socio-demographics factors and the way of using Internet, giving account of the gender-related diversity (LaGrotta 2021) even in order to profiling gender-related risk factors.

The present study makes reference to a conceptual framework of IAD (Stavropoulos *et al.* 2016) that conceptualizes IA symptoms along a continuum of severity and emphasizes the interplay between “push” (factors that increase the user’s vulnerability to IAD; Anderson *et al.* 2017) and “pull” (factors that increase the addictive features of the Internet; i.e. activities such as social networking or downloading that can be self-reinforcing, and decrease of self-consciousness due to excessive time spent in the virtual dimension-virtual diving; Jones *et al.* 2014) factors over the psychosocial development of the Internet user.

Particularly, gender, age, nationality (push factors), and time spent online and type of Internet activities (pull factors) will be analysed in our study. Our main aim is to explore the relationship among the socio-

demographic factors and the ways to use Internet in a gender-oriented perspective.

Assuming that risk factors for IAD are gender-specific (Winds *et al.* 2022), the first aims of the present study have been to assess the impact of the socio-demographic variables and of some Internet-use behavior (amount of time spend online and predominant way for the use of Internet) on IAD in a gender-specific perspective, and to set up a risk gender-specific profile; the second aim was to assess the prevalence of IAD in the whole sample and between age, gender, and cultural background (nationality of parents), and the possible evidence of an IAD trend.

MATERIAL AND METHODS

The research design was cross-sectional.

Participants

We contacted three schools and one University, and all agreed to participate in the study. Of the classes involved, all the students participated.

Inclusion criteria were age between ≥ 12 and ≤ 26 years, and use of the Internet with any device. We excluded students with any certified psychiatric diagnosis.

All students (third year of middle school; first, third and fourth year high school; first and third year of Bachelor of the medical field) have been asked a socio-demographic questionnaire, containing two questions related to Internet use, and the IAT (Young 1998).

Materials

A socio-demographic questionnaire has been used, asking participants about age, gender, school class attended, and nationality of parents. Two questions were specifically related to Internet use: number of hours daily spent on Internet and most predominant online activity. For the online activity, participants were asked to select among online information searching, studying/educational purpose, social networking, online gaming, online gambling, leisure/downloading, purchasing/banking, pornography, and dating.

For the IAT (Young 1998) we used the Italian version (Ferraro *et al.* 2007; Young 1998). The IAT consists of 20 items scored on a 5-point Likert scale (from 1 = “not at all” to 5 = “always”) that assess different aspects of Internet usage, and total scores can range from 20 to 100. Cut-off scores for the IAT divide Internet users into three categories based on use: a score of 20 to 39 signifies an “average online user” who has complete controls over his/her usage; a score of 40–69 signifies frequent problems due to Internet usage; and a score of 70–100 indicates addictive use of the Internet (Young 1998). The Italian translation of the IAT has acceptable psychometric parameters of reliability, discriminating and convergent validity (Ferraro *et al.*

Tab. 1. Number of participants (n), mean (SD) and median (IQR) for IAT score, percentage (95% CI) for the three IAT categories for overall sample, overall males and females, and for the three age group between males and females.

Gender	Group	n	IAT score			
			median (IQR) mean (SD)	≤39	40-69	≥70
				n percentage* (95% CI)		
	Overall	1032	39.0 (33.0-46.0) 40.5 (10.2)	526 51.0% (47.9% - 54.1%)	491 47.6% (44.5% - 50.7%)	15 1.5% (0.8% - 2.4%)
	Overall males	385	41.0 (35.0-48.0) 41.8 (10.1)	175 45.5% (40.4% - 50.6%)	203 52.7% (47.6% - 57.8%)	7 1.8% (0.7% - 3.7%)
Males	≤16 yrs	27	42 (40 - 48) 46 (11.5)	6 22.2% (8.6% - 42.3%)	18 66.7% (46.0% - 83.5%)	3 11.1% (2.4% - 29.2%)
	>16-19 yrs	314	40 (35 - 48) 41.9 (10)	147 46.8% (41.2% - 52.5%)	163 51.9% (46.2% - 57.6%)	4 1.3% (0.3% - 3.2%)
	>19 yrs	44	39.5 (31 - 45) 38.5 (8.9)	22 50.0% (34.6% - 65.4%)	22 50.0% (34.6% - 65.4%)	-
	Overall females	647	39.0 (32.0-46.0) 39.8 (10.2)	351 54.3% (50.3% - 58.1%)	288 44.5% (40.6% - 48.4%)	8 1.2% (0.5% - 2.4%)
Females	≤16 yrs	79	41 (35 - 51) 43.2 (11.3)	33 41.8% (30.8% - 53.4%)	44 55.7% (44.1% - 66.9%)	2 2.5% (0.3% - 8.8%)
	>16-19 yrs	247	41 (34 - 47) 41.6 (10.3)	108 43.7% (37.4% - 50.2%)	136 55.1% (48.6% - 61.4%)	3 1.2% (0.3% - 3.5%)
	>19 yrs	321	37 (31 - 43) 37.6 (9.5)	210 65.4% (59.9% - 70.6%)	108 33.7% (28.5% - 39.1%)	3 0.9% (0.2% - 2.7%)

* Percentages of people within the three IAT categories stratified by the reported subgroups (overall; by gender; by gender and age class)

2007). In our study, the value of Cronbach's alpha was equal to 0.77, ranged from 0.73 a 0.78.

Procedures

With the consent of schools and University departments, students gave their informed consent to voluntary free participation. Among participants, those in legal age signed the consent, while the parents signed for minors.

Students took part in a single group-testing session (up to 60 min) during which the self-report measure was administered in each classroom by two trained psychologists. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975 and its later amendments.

Statistic

The independent variables were age, gender, nationality of parents, number of hours spent on the Internet and most predominate online activity, while the dependent variable was the outcome on the IAT (level of IA).

To evaluate the differences following the studies above (i.e. Hammond et al. 2014; Stavropoulos et al. 2017, 2018), the sample has been split in three different age groups. Considering that there is no unique subdi-

vision of the adolescent stages (i.e., Armstrong 2007; Smorti et al. 2009; Yen et al. 2009b), we have divided the total sample into the following three age groups: ≤16 ys (early adolescence); >16-19 ys (middle adolescence); >19 ys (young adulthood).

For descriptive purposes, categorical variables were reported as counts (percentages) whereas quantitative variables were summarized as mean (standard deviation) or median (interquartile range, IQR) as appropriate.

Univariate and multivariate logistic regression analyses were performed to assess the predictive effect of some predefined individual factor (age, number of hours spent on the Internet and most predominate online activity) on the risk of addictive use of the Internet (IAT > 39, primary outcome), separately for males and females. All the factors were considered at the univariate stage. In the multivariate models only the statistically significant factors at univariate analysis (p < 0.05) were taken in account. A stepwise procedure was then used to select the best multivariate model to predict the risk of addictive use of the Internet. Odds ratios (OR) with 95% confidence intervals (CI) were obtained from estimated logistic regression parameters. Finally, the factors identified as predictors at multivariate stage were combined to derive an individual risk score (i.e. estimated risk of addictive use of the Internet). Addictive-use risks were estimated

from multivariate logistic regression parameters estimates. With reference to the hypothesis of gender differences, we performed the above-described logistic regression analysis by running a model including only females and one model including only males. *p* values < 0.05, two sided, were considered statistically significant. All the statistical analyses were performed with SAS statistical software (release 9.4).

RESULTS

We included 1032 participants (mean age = 18.24, SD = 2.89, range 12.11-25.90; males = 37.31%; females = 62.69%), all of them living in Northern Italy. Among all the Italian resident participants, 6.1% had non-Italian parents. We had no missing data.

The summary data of the number of participants, the mean IAT score and the percentage of the three IAT categories for the total sample, for all males and females, and for the three age groups are shown in Table 1.

When we compared the prevalence of IAD according to nationality of parents, we found no differences (participants with non-Italian parents: n = 33, 55.6% IAD prevalence; participants with Italian parents: n = 969, 48.6% IAD prevalence; *p* = 0.32).

In Supplementary materials (from S1 to S4) the data in Tab.1 have been shown as disaggregated by socio-demographic and Internet use behavior characteristics

Tab. 2 shows the overall (univariate and multivariate) logistic regression analysis to identify the factors most associated with addictive internet use.

For males, we found that age and the amount of time spent online are the two most important factors in predicting the risk of addictive use of the Internet (IAT > 39). Participants passing online more than 7 hours per day and those aged less than 16 are at higher risk of addictive (OR = 2.24 and OR = 3.42 respectively).

For females, we found that age, time spent online, and predominant online activity are associated with the risk of addictive use of the Internet. In particular, age ≤ 19 years (OR = 1.65), passing online more than 7 hours per day (OR = 5.02), online activity consisting in gaming or gambling or shopping or banking or pornography (OR = 3.46) are risk factors for the addictive use.

Finally, to show how the above reported risk factors might affect the risk of addictive use, starting from the results of multivariate models reported in Tab. 2, we estimated the IAD risk including age and time spent online for males; age, time spent online and type of main use for females (Tab. 3).

Tab. 2. Risk factors for addictive internet using (IAT>39) * reference category

Variable	Univariate		Multivariate		
	OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>	
Males[^]					
Age	>16 yrs	1*	1*		
	≤16 yrs	3.13 (1.23-7.94)	0.02	3.42 (1.33-8.80)	0.01
Time spent online	1-3 hrs	1*	1*		
	4-7 hrs	1.83 (1.19-2.80)	0.007	1.92 (1.25-2.97)	0.005
	>7 hrs	2.25 (1.08-4.70)		2.24 (1.07-4.70)	
Type of main use	1-2	1*			
	3	1.31 (0.64-2.68)	0.08	----	----
	6	2.24 (1.05-4.77)			
	4-5-7-8	1.89 (0.92-3.91)			
Females[§]					
Age	>19 yrs	1*	1*		
	≤19 yrs	2.48 (1.81-3.41)	<0.0001	1.65 (1.14-2.37)	0.007
Time spent online	1-3 hrs	1*	1*		
	4-7 hrs	3.01 (2.16-4.21)	<0.0001	2.59 (1.82-3.67)	<0.0001
	>7 hrs	6.25 (2.74-14.27)		5.02 (2.15-11.70)	
Type of main use	1-2	1*	1*		
	3	3.03 (1.69-5.43)	<0.0001	2.83 (1.54-5.20)	0.004
	6	2.69 (1.45-4.98)		2.20 (1.15-4.21)	
	4-5-7-8	5.78 (2.85-11.75)		3.46 (1.60-7.49)	

Legenda:

Logistic regression analyses were performed separately for males and females.

[^] Males: since we found in our data that the risk of students aged 16-19 years was very similar to the risk of students aged >16 years, in order to increase the power of our analysis, we dichotomized considering >16 vs ≤16 years.

[§] Females: since we found that the risk of students aged 16-19 years was very similar to the risk of students aged ≤16 years, in order to increase the power of our analysis, we dichotomized considering >19 vs ≤19 years. This increased the efficiency of statistical analysis.

Type of main use (typology of use): 1 info searching; 2 studying/education; 3 social networking; 4 online gaming; 5 online gambling; 6 leisure/downloading; 7 purchasing/banking; 8 pornography; None of the subjects selected the n.9 option (dating).

Tab. 3. Estimated IAD risk according to significant individual risk factors

	Time spent online (hours)	Age (yrs)	IAD risk*	
Males	1-3	>16	44%	
	4-7	>16	60%	
	>7	>16	63%	
	1-3	≤16	72%	
	4-7	≤16	83%	
	>7	≤16	86%	
	Time spent online (hours)	Age (yrs)	Type of main use	IAD risk
Females	1-3	>19	1-2	15%
	1-3	≤19	1-2	22%
	1-3	>19	6	27%
	4-7	>19	1-2	31%
	1-3	>19	3	32%
	1-3	>19	4-5-7-8	37%
	1-3	≤19	3	44%
	1-3	≤19	6	38%
	4-7	≤19	1-2	42%
	1-3	≤19	4-5-7-8	49%
	4-7	>19	6	49%
	4-7	>19	3	55%
	>7	≤19	1-2	58%
	4-7	≤19	6	61%
	>7	>19	6	65%
	4-7	≤19	3	67%
	>7	>19	3	71%
	4-7	≤19	4-5-7-8	71%
>7	≤19	6	76%	
>7	≤19	3	80%	
>7	≤19	4-5-7-8	83%	

Legenda:

^ some combinations of factors were not observed in our data.

* data sorted by ascending IAD risk by gender

Type of main use (typology of use): 1 info searching; 2 studying/education; 3 social networking; 4 online gaming; 5 online gambling; 6 leisure/downloading; 7 purchasing/banking; 8 pornography; None of the subjects selected the n.9 option (dating).

As shown in Tab. 3, it should be noted that males are on average more at risk of IAD than females: depending on individual risk factors, the risk of IAD ranged from 44% to 86% for males and from 15% to 83% for females. This result suggests that males start at a higher level of risk than females.

DISCUSSION

The aims of the present study were to assess the impact of socio-demographic variables and some ways to use Internet on IAD in a gender-oriented perspective,

and to profile a risk gender-specific type; in addition, to assess the prevalence of IAD in the overall sample, splitting by age, gender and by nationality, showing up the possible arising of a trend.

Our data in the overall sample show IAT mean score just above the first cut-off, with similar values between genders. On this topic, our data are consistent with the results reported by in literature (Dahl & Bergmark 2020; Gámez-Guadix et al. 2015; Hassan et al. 2020; Sechi et al. 2021).

However, it is worth highlighting that males and females may differ in some specific risk factors; indeed,

in our study the multivariate analysis has shown that in women the variable “type of main use” is a specific predictive factor.

Using the results of the logistic models, we set-up two risk gender-specific profiles, for males and women. The multiple matches of gender-related variables can offer an accurate clue, and that can be included in the test battery for psychological or psychiatric assessment.

Time spent online is a greater risk factor for women (five-time greater risk if the time is >7 hours) compared with males (double risk only). As in S2 in Supplementary materials, the percentage of beyond cut-off of IAT scores (≥ 40 e ≥ 70) for the total sample raises as the time spent online. These data are consistent with the previous literature (Durkee et al. 2012; Hassan et al. 2020; Lopes et al. 2022). Ultimately, the factor time spent online turn out to be a significant variable, still gender-specific.

Furthermore, age is a gender specific risk factor (for young male ≤ 16 ys).

We found different effect between genders also for the variable “Type of main online activity”. What people do when they are connected has a significant impact especially on females who have about three and a half times the risk of developing IAD if they are involved in activities with high addictive content compared with low-addictive content activities like info-searching or studying/education. In the total sample, females involved in online gaming, gambling, purchasing/banking and pornography are 24.25%, while males involved in the same activities are 34.29% (see S4 in Supplementary materials). Most of the participants in the overall sample are involved in social networking: again, females more than males (see S2 and S3 in Supplementary materials), and those above the first IAT cut-off (≥ 40) even more, consistently with the studies by Lopez-Fernandez (2018), Hassan et al. (2020), and Peris et al. (2020).

As shown in Brenley & Covey (2018), as the age raises, the use of social networking decreases: in our data, this specific trend has found only a limited confirmation while social-networking decreases from younger participants to medium-group subject and it increases again in oldest participants. In fact, the role of social networking can be different in different range of age (i.e. feeling of belonging to a group in teen-agers vs socializing for more mature people; or sensation seeking vs avoidance; see Truzoli et al. 2023).

The present paper has allowed an up-date of the IAD prevalence in Italy. Almost half of the total sample is beyond the first cut-off ≥ 40 , while 1.5% exceed the second cut-off ≥ 70 (males = 1.8%; females = 1.2%). The prevalence of participants with IAT ≥ 70 in our study is consistent with the results (1.2%) found by Villella et al. (2011) and with the results reported by Durkee et al. (2012) who found a prevalence in Italy of 1.2% (males = 1.6%; females = 1.0%).

We found no significant differences of prevalence between Italian people and people Italy-inhabitant with no Italian parents, even though people Italy-inhabitant with no Italian parents seem to spend more time online. Although it is speculative, we can conjecture that culture and parenting styles are less relevant on surfing behavior than the social melting process (integration) and than the peer relational dynamics; both these factors can result in greater conformity in Internet use.

Either for males and females, a trend of IAT by age has been shown: when age increase the IAT scores decrease. This outcome is consistent with that by Lozano-Blasco et al. (2022b) and Stavropoulos et al. (2018). As possible explanation for the decrease of excessive Internet use in both gender by the age, two factors can be taken in account: a) the greater brain development with enhance inhibitory control and better craving management; b) grater need of taking on responsibility in different area of social and professional life.

CONCLUSION

From the above, the general indication that can be drawn is that the analysis of how socio-demographic variables and the way of use of Internet affect in different ways the genders could be more informative than analyzing only the gender differences between the percentages of IAD.

About the conceptual framework of IAD supported by Stavropoulos et al. (2016), our study supports the importance of age (push factor), and of time spent online and the main way to use Internet (pull factors), but add an analysis from a gender-specific perspective.

In summary, this study enables to update data on variables which relevance has been well accepted but not well defined in a large sample of Italian participants, and discusses the different impact of these variables between genders.

As far as we know, it is the first research that assesses the possible difference between Italian natives and people born in Italy from no-Italian parents.

Our study also suggests an analysis of the risk prediction for the IAD, available for clinicians.

Following our results, it can be evaluated the opportunity for prevention resources and programs to be allocated to adolescents, considering gender specificity. The clinical assessment should include, for both gender the assessment of the amount of time spent online and the main use of Internet, because these factors are related to a greater risk of developing IA. Lastly, the risk profiles can be of support for the clinician during the assessment.

This study has some limitations. First, IAD has been assessed via a self-report scale so that we cannot exclude the presence of a response bias. Multiple assessment procedures might have guaranteed more methodological sound assessment. In addition, participants are a convenience sample, and this might be a limitation for

external validity. The research design has been focused on socio-demographic variables and some ways of using Internet seen as relevant but not exhaustive. The results on the prediction of the IAD risk considering individual factors are mainly descriptive and should be interpreted with caution: further studies with a greater sample are needed for a further confirmation.

In conclusion, we found that younger age, large amounts of time spent online and the type of Internet-use, with gender specificities, are important risk factors for internet addiction.

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SUPPLEMENTARY TABLES

Supp. Tab. 1. Data (absolute number; percentages) on time spent online split following the IAT three cut-offs and the overall sample

Time spent online	IAT cut-off: n (%)			Total sample: n (%)
	≤ 39 (%)	≥ 40 ≤ 69 (%)	≥ 70 (%)	
1-3 hrs	340 (64.64)	200 (40.73)	4 (26.67)	544 (52.71)
4-7 hrs	165 (31.37)	245 (49.9)	7 (46.67)	417 (40.41)
>7 hrs	21 (3.99)	46 (9.37)	4 (26.67)	71 (6.88)

Supp. Tab. 2. Data (absolute number; percentages) on type of use split following the IAT three cut-offs and the overall sample

Type of main use	IAT cut-off: n (%)			Total sample
	≤ 39 (%)	≥ 40 ≤ 69 (%)	≥ 70 (%)	
1	47 (8.94)	16 (3.26)	0	63 (6.1)
2	33 (6.27)	18 (3.67)	0	51 (4.94)
3	231 (43.92)	206 (41.96)	7 (46.67)	444 (43.02)
4	61 (11.6)	88 (17.92)	3 (20.00)	152 (14.73)
5	9 (1.71)	24 (4.89)	1 (6.67)	34 (3.29)
6	136 (25.86)	135 (27.49)	4 (26.67)	275 (26.65)
7	2 (0.38)	2 (0.41)	0	4 (0.39)
8	7 (1.33)	2 (0.41)	0	9 (0.87)

Legenda: Type of main use (typology of use): 1 info searching; 2 studying/education; 3 social networking; 4 online gaming; 5 online gambling; 6 leisure/downloading; 7 purchasing/banking; 8 pornography; None of the subjects selected the n. 9 option (dating).

Supp. Tab. 3. Data (absolute number; percentages) on time spent online split following the typology of use and the IAT three cut-offs between males and females.

		M			F		
		IAT cut-off					
		≤ 39	≥ 40 ≤ 69	≥ 70	≤ 39	≥ 40 ≤ 69	≥ 70
Time spent online 1	Type of main use						
	1	12 (12.5)	2 (2.5)	0	21 (8.61)	2 (1.67)	0
	2	5 (5.21)	2 (2.5)	0	22 (9.02)	4 (3.33)	0
	3	33 (34.38)	24 (30.00)	1 (50.00)	123(50.41)	59 (49.17)	1 (50.00)
	4	17 (17.71)	16 (20.00)	0	14 (5.74)	15 (12.5)	0
	5	3 (3.13)	6 (7.5)	0	0	0	0
	6	20 (20.83)	28 (35)	1 (50.00)	62 (25.41)	38 (31.67)	1 (50.00)
	7	0	0	0	1 (0.41)	2 (1.67)	0
	8	6 (6.25)	2 (2.5)	0	1 (0.41)	0	0
Time spent online 2							
	1	5 (7.58)	9 (9.00)	0	9 (9.09)	2 (1.38)	0
	2	1 (1.52)	3 (3.00)	0	5 (5.05)	7 (4.83)	0
	3	30 (45.45)	31 (31.00)	2 (66.67)	40 (40.4)	77 (53.1)	3 (75.00)
	4	15 (22.73)	20 (20.00)	0	10 (10.1)	25 (17.24)	1 (25.00)
	5	2 (3.03)	13 (13.00)	0	1 (1.01)	0	0
	6	12 (18.18)	24 (24.00)	1 (33.33)	34 (34.34)	34 (23.45)	0
	7	1 (1.52)	0	0	0	0	0
	8	0	0	0	0	0	0
Time spent online 3							
	1	0	1 (4.55)	0	0	0	0
	2	0	0	0	0	2 (8.7)	0
	3	4 (30.77)	7 (31.82)	0	1 (12.5)	8 (34.78)	0
	4	3 (23.08)	6 (27.27)	1 (50.00)	2 (25.00)	6 (26.09)	1 (50.00)
	5	3 (23.08)	5 (22.73)	1 (50.00)	0	0	0
	6	3 (23.08)	4 (18.18)	0	5 (62.5)	7 (30.43)	1 (50.00)
	7	0	0	0	0	0	0
	8	0	0	0	0	0	0

Legenda: M = Male; F = Female.

Type of main use (typology of use): 1 info searching; 2 studying/education; 3 social networking; 4 online gaming; 5 online gambling; 6 leisure/downloading; 7 purchasing/banking; 8 pornography; None of the subjects selected the n. 9 option (dating).

Time spent online: 1=1-3 hrs; 2=4-7 hrs; 3=>7 hrs

Supp. Tab. 4. Data (absolute number, percentage) on time spent online and on type of use of Internet split by total sample, males, females, three age-range, Italians and non-italians

	Time spent online	Type of use		Time spent online	Type of use
	N (%)	N (%)		N (%)	N (%)
Total sample	1 = 544(52.71)	1 = 63(6.1)	>16-19 yrs	1 = 229(41.04)	1 = 27 (4.84)
	2 = 417(40.41)	2 = 51(4.94)		2 = 272(48.75)	2 = 13 (2.33)
	3 = 71(6.88)	3 = 444(43.02)		3 = 57(10.22)	3 = 193(34.59)
		4 = 152(14.73)			4 = 146(26.16)
		5 = 34(3.29)			5 = 34(6.09)
		6 = 275(26.65)			6 = 134(24.01)
		7 = 4(0.39)			7 = 2(0.36)
		8 = 9(0.87)			8 = 9(1.61)
Male	1 = 178(46.23)	1 = 29(7.53)	>19 yrs	1 = 263(71.66)	1 = 36(9.81)
	2 = 169(43.9)	2 = 11(2.86)		2 = 96(26.16)	2 = 33(8.99)
	3 = 38(9.87)	3 = 132(34.29)		3 = 8(2.18)	3 = 193(52.59)
		4 = 78(20.26)			4 = 2(0.54)
		5 = 33(8.57)			5 = 0
		6 = 93(24.16)			6 = 102(27.29)
		7 = 1(0.26)			7 = 1(0.27)
		8 = 8(2.08)			8 = 0
Female	1 = 366(56.57)	1 = 34(5.26)	Italian	1 = 521(53.77)	1 = 59(6.09)
	2 = 248(38.33)	2 = 40(6.18)		2 = 383(39.53)	2 = 49(5.06)
	3 = 33(5.1)	3 = 312(48.22)		3 = 65(6.71)	3 = 418(43.14)
		4 = 74(11.44)			4 = 137(14.14)
		5 = 1 (0.15)			5 = 33(3.41)
		6 = 182(28.13)			6 = 260(26.83)
		7 = 3(0.46)			7 = 4(0.41)
		8 = 1(0.15)			8 = 9(0.93)
≤16 yrs	1 = 52(48.6)	1 = 0	Non Italian parents	1 = 23 (36.51)	1 = 4(6.35)
	2 = 49(45.79)	2 = 5(4.67)		2 = 34 (53.97)	2 = 2(3.17)
	3 = 6(5.61)	3 = 58(54.21)		3 = 6 (9.52)	3 = 26(41.27)
		4 = 4(3.74)			4 = 15(23.81)
		5 = 0			5 = 1(1.59)
		6 = 39(36.45)			6 = 15(23.81)
		7 = 1(0.93)			7 = 0
		8 = 0			8 = 0

Legend: Type of main use (typology of use): 1 info searching; 2 studying/education; 3 social networking; 4 online gaming; 5 online gambling; 6 leisure/downloading; 7 purchasing/banking; 8 pornography; None of the subjects selected the n. 9 option (dating).

Time spent online: 1 = 1-3 hrs; 2 = 4-7 hrs; 3 = >7 hrs