Anxiety and dependence to Media and Technology Use: media technology use and attitudes, and personality variables in Portuguese adolescents

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Abstract

This study examined the relationships between anxiety/dependence of Information and Communication Technologies (ICT) involving the frequency of and attitudes towards its use and personality dimensions in a sample of Portuguese adolescents. The sample consisted of 322 subjects aged between 12 and 18 years. The Portuguese version of the scale Use and Attitudes towards Information and Communication Technologies (MTUAS-PY; Costa, Matos, Pinheiro, Salvador, Dias & Zenha-Rela, 2016) and the Ten-Item Personality Inventory (TIPI, Gosling, Rentfrow, & Swann Jr., 2003) were used. The results showed that individuals with high anxiety/dependency had higher averages in several ICT use indicators (emailing, social networking, etc.), attributed more importance to ICT, scored higher in the simultaneous execution of multiple tasks, and presented lower scores in the personality dimensions of emotional stability and consciousness. We can conclude that anxiety/dependence relates to the use and attitudes towards ICT as well as with personality variables.

1. Personal Internet use and explanatory hypotheses

The worldwide use of Information and Communication Technologies (ICT) is simultaneously extremely high and has an enormous potential of growth. Forty-six percent of the world population uses the Internet (3.419 billions of people) and 31% (2.307 billions) use social media, mainly Facebook which, in 2015, had 1.550 billion users, surpassing the world's most populous country (mainland China with 1.354 billions) (Kemp, 2016).

The Millennial generation (people born between 1980 and 2000) have been using the Internet and mobile communications systems since birth and, because of that, are called "digital natives" (Prensky, 2001). Generation Z (people born between 1995 and 2015) increased dramatically the intensity and the complexity of ICT usage through smartphones, social networks, and always on-line behavior patterns.

Using the Internet and social networks is a very common activity both globally and in Portugal. Internet and social media access is a reality for 70% of Portuguese families, mainly in men, until the age of 44, and those with a higher level of education (high school and college). Data has also shown 70% of Portuguese are involved in social media interaction, and that 2/3 are using mobile Internet access with smartphones or tablets. In families with children over the age of 15, Internet use increases to 90% (INE, 2015).

The impact of information technology on humans has been receiving increasing attention from behavioral investigators. Rosen, Cheever and Carrier (2015) recently presented an excellent review of extensive contribution to the Psychology of Technology in understanding the social media phenomena and the preference for task switching. Research efforts have also been developed in order to improve our knowledge about gender patterns of ICT use, as well as positive and negative impacts of this use.

1.1 Gender

In the literature, many studies have explored Internet and social media use and differences between genders regarding the involvement with the Internet, type of activities, association with life satisfaction, academic achievement, peer pressure, disclosure of information, and friendship development.

Regarding online activities, studies found several gender differences. Joiner et al. (2005), with a sample of 608 English undergraduate psychology students, found greater male use of the Internet especially in the ownership of a personal page, game websites, and downloading of contents. Hinostroza, Matamala, Labbé, Claro, and Cabello (2014) studied secondary student's computer use and found that usual activities included socializing, academic activities, gaming and production activities, with similar patterns within the same socio-economic group and equivalent levels in ICT experience and self-confidence in use. Searching for homework information and playing games were the most popular online activities for all adolescents. The variable that differentiated user profiles was gender. Girls presented higher values on socializing and academic activities while boys had higher values for gaming and production activities.

Jhala and Sharma (2016) studied Internet use among 1331 Indian adolescents between 13 and 19 years old. Results showed that Internet use is prevalent and influenced by place (rural areas showed greater interference with school activities and preference for online activities, as opposed to going out with friends); school grade (the 9th grade students were more affected) and gender (more intense use for boys). Lin and Yu (2008) found that searching for homework information and playing games were the most popular online activities for all Taiwanese adolescents. While girls tended to prefer searching for information and e-mailing friends, boys tended to prefer playing games and downloading software.

Durkee et al. (2012) studied Problematic Internet Use (PIU) in European adolescents with a special focus on demographic and social factors. Data from 11,956 adolescents (56% female and mean age of 14.9, SD = 0.89) showed that the preferred activities were watching videos, frequenting chat rooms, and social networking. Males had higher scores in playing single-user games and females had higher scores in social networking. Data also showed that lack of emotional and psychological family support were risk factors for PIU.

The link between life satisfaction and Internet use was also studied by Lachmann, Sariyska, Kannen, Cooper, and Montag (2016) who examined the relation of PIU with life satisfaction both in general and in specific aspects, like job satisfaction, leisure, and health. High and negative associations were found between life satisfaction, general and specific, and PIU, with stronger associations for females, although they had lower levels of PIU. The authors suggested that gender was a variable that influences the association between life satisfaction and PIU.

Another focus of research is on the relation between Internet use, academic achievement, and gender (Chen & Fu, 2009). Online searching for information had a positive impact on academic achievement but using the Internet for socializing, gaming, and going to Internet cafes had the opposite effect. Gender differences were found. If searching for information helped boys and girls, online socializing made girls particularly vulnerable to lower academic achievement, while online gaming and going to Internet cafes only impaired boys' academic achievement.

Studying the importance of peer support, Kıranm and Gündoğdu (2010) evaluated the relationship between Internet addiction, peer pressure, and perceived peer support among 558 Turkish adolescents (52% female) from 9th to 10th grade. Results showed that low levels of peer pressure reduced Internet addiction, and the same effect was present when parental and teacher support was high. Furthermore, a lower incidence of Internet addiction was present in girls. The amount and type of information disclosed on the Internet was studied, by Sozio, et al. (2015), on a multi-nation study that included 8 countries (Brazil and seven European countries that included Portugal) on Internet use, with children from 9 to 16 years of age. Regarding gender, girls tended to present their social-media profiles as private more often than boys, but disclosed more information such as personal photos, full names, and personal address.

Finally, gender differentiation is also present in the strategies to develop intimate relationships with peers. Desjarlais and Willoughby (2010) reviewed several studies on gender differences in Internet usage of social media and concluded that while boys focus on shared online activities and interests, girls tend to engage in discussion (like talking about events, gossiping, sharing compliments) and in personal disclosure behaviors.

The reviewed literature focused primarily on differential Internet use for girls and boys. However, Gross (2004), based on adolescent self-reporting, found that both genders described their online activities as occurring in private settings, as e-mail and instant messages, with friends that are part of offline lives and with common but intimate contents, such as gossiping or talking about friends. Online pretending was more associated with playing a joke than with identity exploration. No associations between on-line activities and well-being were found.

In a sample of Portuguese adolescents, aged between 11 and 15 years, Simões, Camacho, Reis, and Equipa Aventura Social (2014) found no associations between ICT activities and gender.

Bessière, Kiesler, Kraut, and Boneva (2008) in a survey conducted in 2001 and 2002, in the USA, found that almost all respondents reported using the Internet for information, entertainment, and communicating with friends and family. Only 20% used the Internet to meet new people and talk in online groups.

Erwina, Turk, Heimberg, Fresh and Natulab (2004) and Davis (2001) pointed out, as advantages of using the Internet, the access to a wider network of people with similar interests or concerns, and the increased ability to be in contact with geographically distant friends and family members.

1.2 Explanatory hypotheses

Huang (2010, 2012), in literature reviews, identified a debate as to whether the effect of Internet use on psychological well-being is beneficial (augmentation hypothesis) or detrimental (displacement hypothesis). The augmentation hypothesis suggested that the association was positive since the Internet use for communication provides a context for social interaction and interpersonal development, thus improving the user's psychological well-being. The displacement hypothesis indicated that the association between Internet use and well-being was negative, because Internet use for communication replaces face-to-face interaction or real-life interaction. According to Huang (2010, 2012), in the literature reviewed, the findings about Internet use and psychological well-being were diverse. This author added that in two previous meta-analyses and in his meta-analysis with 40 studies about well-being (e.g., loneliness, depression, self-esteem, and life satisfaction), a relationship between Internet use and psychological well-being was not found. An emphasis was given to the need to ameliorate the measurement instruments of social networking use and the complexity of the studies (e.g., moderator effects should be studied).

Nie and Hillygus (2002, 2009) proposed the *time-displacement hypothesis*, asserting that the use of the Internet implies a reduction, in a non-work context, of the time spent in direct contact with friends and family.

It seems that, if on the one hand, the use of online communication could somehow encourage the development of online friendships, increase feelings of self-esteem and social support, on the other hand, it is associated with greater social isolation in real life, and lower quantity and quality of face-to-face friendships, implying a greater risk of online exploitation (Gapsiso & Wilson 2015; Wolak, Mitchell, & Finkelhor, 2003).

Other authors claimed that communicating with others on the Internet via text messages allows preventing certain unpleasant aspects of social interactions while partially meeting the needs for personal contact and belonging (Erwin, et al. 2004).

Desjarlais and Willoughby (2010), in a longitudinal study of adolescents, examined support for the social compensation and rich-get-richer hypotheses, including social anxiety as a moderating factor. The social compensation hypothesis suggests that adolescents with high levels of social anxiety may report more positive friendship quality if they use computers with friends or on line communication than other adolescents who also have high social anxiety but do not use ICT to compensate for their social anxiety. This was suggested to occur because computer-based interactions may create a more comfortable social situation for socially anxious adolescents in comparison to traditional face-to-face interaction. The rich-get-richer hypothesis proposes that subjects who are already comfortable in social situations can use ICT to look for additional opportunities for socialization, with the aim being talking on the phone, or in person. Results showed that, among girls, the main effect of using computers with friends or online communication on friendship quality was positive, providing support for both hypotheses. For boys, social anxiety moderated this relation, supporting the social compensation hypothesis.

More recently, Kardefelt-Winther (2014a) provided a compensation theory that explains excessive Internet use without framing the behavior as pathological and considers the importance of motives. This author hypothesized that excessive Internet use may be a coping strategy to deal with life stress, driven by the necessity to escape real life problems and/or reduce negative moods, i.e., a strategy originated in the confluence of stressful life situations and the ubiquitous availability of Internet. This hypothesis of a coping strategy rather than a compulsive behavior could help explain why some people keep spending so much time online despite experiencing negative outcomes. Positive and negative outcomes were pointed out: an individual feels better because he gets the desired social stimulation but he may not go out and make new offline friends, which in the long run means he could become dependent on the Internet for social stimulation. According to Kardefelt-Winther (2014a), "this scenario would be labelled as an Internet addiction when approached through a pathological perspective" (p. 352). This author also suggested that studies to test this theory should move away from a focus on direct effects models and consider mediation and interaction effects between psychosocial well-being and motivations in the context of Internet addiction. In a study on online playing (World of Warcraft game), with 702 players from 14 to 60 years, Kardefelt-Winther (2014b) studied previously identified aspects as relevant for gaming: social anxiety, loneliness and stress, and motivations such as success, escape, and social interaction. The results showed that stress is the most important aspect, giving empirical support to the compensatory model. The results also revealed that although loneliness and social anxiety were correlated with excessive use, they lost significance when stress was controlled for. Furthermore, all psychological predictors lost significance when escapism and achievement were controlled for "upon entering motivations in the model all psychological characteristics lost significance" (p. 211). Higher levels of stress were associated with negative outcomes of play, but this was an indirect effect explained by the escapism motivation. The author concluded that these results suggested that the effect of psychological characteristics on negative outcomes was indirect, i.e., mediated by motivations.

2. Detrimental effects of Internet use

Most humans use the Internet without considerable negative outcomes, exploring its huge benefits. However, for some, use becomes misuse when problematic consequences arise.

The communication mediated by ICT can have a negative effect on the lives of individuals, particularly when its use becomes excessive, and can be particularly severe in subjects with pathologies such as social anxiety. These subjects tend to see the virtual social interactions as less threatening than the face-to-face interaction (Lee & Stapinski, 2012).

Several studies showed that excessive Internet use can lead to negative effects on the lives of adolescents, such as decline in mental health (De Leo & Wulfert, 2013; Shapira, Goldsmith, Keck, Khosla & McElroy, 2000).

Bessière, et al. (2008), in a longitudinal study, explored the impact of different uses of the Internet on a measure of depression, moderated by social resources. The use of Internet for information, entertainment, and escape had no impact on subsequent changes in depression level. Internet use for communicating with friends and family predicted lower depression scores six months later. However, Internet use to meet new people and talk in online groups predicted depression scores and this relationship was influenced by the initial levels of social support: those having high or medium levels of social support showed higher depression scores, and those with low levels of social support did not experience these increases in depression. These authors emphasized that those with lower levels of social support, i.e., fewer strong relationships to neglect, do not suffer the negative impact of this type of Internet use. They concluded that individual differences and people's choices of how they use the Internet may account for the different outcomes.

Young (1998) pointed out that several studies revealed significant correlations between excessive time spent on the Internet and psychological and behavioral problems. This author emphasized that intensive Internet users often have negative changes in their lives within the family and/or in professional and educational contexts, and that this intense use remains despite the negative results: marriages, dating relationships, parent child relationships, and close friendships were disrupted by excessive use of the Internet. Work-related and financial problems were also found. Finally, mild to moderate physical complaints were noted among dependents, and user sleep patterns were typically disrupted, causing excessive fatigue, often making academic or occupational functioning impaired, and decreasing physical exercise. He also found that there was an increased risk for pathological Internet use with more interactive applications utilized by the on-line user.

Weiser (2001) proposed that the psychological effects of Internet use depend primarily on users' reasons and goals. Studying those reasons and objectives allowed the identification of two dimensions accounting for more than 50% of the variance: Socio-affective Regulation (SAR) and Goods-and-information Acquisition (GIA). SAR was conceptualized as a social or affiliative orientation and GIA as a practical or utilitarian one. Social integration and psychological well-being were enhanced by GIA but reduced by SAR use.

Using a web survey and a sample of 1839 college students, Junco and Cotten (2012) found that students' use of the ICT apparatus in several activities was not related with study during schoolwork. Data showed that the use of Facebook and texting during school related activities was negatively associated with overall Grade Point Average (GPA) in school.

Mark, Wang, and Niiya (2014) pointed out that the generalization of ICT use increased the number of multitasking situations, which revealed a relation with stress. Computer logs and data from biosensors of 48 college students during seven days were compared. A positive relationship was found between stress and daily time spent with computers and with the amount of multitasking but that relation is inversed with Facebook and social media use. Also, heavy multitasking was associated with more use of social media and lower positive affect, accompanied by longer duration of computer use for late-nighters.

Brown, Manago, and Trimble, (2016) analyzed the use of mobile phone during a face-to-face interaction and concluded that the higher the use the lower the quality of the interactions. David, Kim, Brickman, Ran and Curtis (2014) considered that the smartphone poses a challenge to individual self-regulation. During homework, frequency of multitasking by texting and using social media was associated with task interference, mainly among owners of a smartphone and women. Larry, Alex, Mark and Nancy (2011) studied the impact of texting on memory recall in a classroom environment. Results showed that the high texting group scored significantly lower (10.6%) than the no/low text messaging groups and that the impact of texting on memory recall was inversely proportional to the time elapsed between receiving the message and answering.

3. Understanding Internet addiction

Research about problematic Internet use began with the work of Young (1996, 1998a, 1998b) and Griffiths (2000). Several authors (Davis, 2001; Griffiths, 1999, 2000; Yellowless and Marks, 2007) emphasized the importance of differentiating between addictions *on* the Internet and addictions *to* the Internet. According to Griffiths (1999, 2000), most Internet addicts use the Internet excessively as a medium to fuel other addictions (e.g., gambling). That is, with the Internet they find new ways of engaging in previous pathological behavior patterns. Other addicts show an addiction to the Internet itself (using idiosyncratic features and specific functions

of the Internet like chat rooms and Facebook). According to Griffits, Kuss, Billieux, and Pontes (2016), this differentiation remains important. In the last decade, research has been growing and developing in order to understand the serious psychological and social problems of this phenomenon, but theoretical models and specialized interventions need to be tested in order to pursue effective recovery programs from Internet addiction. Several variables may influence the use, abuse, and dependence on the Internet, like personality traits, interpersonal skills, and other well-known psychological problems such as depression and anxiety.

The *Internet Addiction Disorder* is described as excessive Internet use (Weinstein and Lejoyeux, 2010) concomitant with compulsivity and severe interference with daily life and has also been designated as Compulsive Internet Use (Meerkerk, Eijnden, and Garretsen, 2006), Problematic Internet Use (Aboujaoude, 2010; Davis, 2001) or iDisorder (Rosen, 2013). The term was also used to describe "the discomfort or anxiety caused by the non-availability of mobile phones, personal computers or any other virtual communication device in individuals who use them habitually" (King et al., 2013, p. 141).

Beard and Wolf (2001) mentioned that the "Excessive Internet users have been called Internet addicts, pathological Internet users, computer addicts, computer mediated communication addicts, and computer junkies" (p. 378). These authors believe that terms such as *excessive*, *problematic*, or *maladaptive Internet use* are most optimal for describing this behavior as they involve fewer theoretical overtones than terms such as *Internet addiction*.

Davis (2001) introduced the term *Pathological Internet Use* (PIU), as a distinct pattern of Internet-related cognitions and behaviors that result in negative life outcomes. This author proposes that there are two distinct forms: specific and generalized. Specific pathological Internet use involves the overuse or abuse of content-specific functions of the Internet (e.g., gambling). Generalized pathological Internet use is conceptualized as a multidimensional overuse of the Internet itself, i.e., for no specific purpose, which results in negative personal and professional consequences. Symptoms of generalized PIU include maladaptive cognitions and behaviors related to Internet use that are not linked to any specific content and occurs when an individual develops problems due to the unique communication context of the Internet. These individuals are drawn to the experience of being online in and of itself, and demonstrate a preference for virtual, rather than face-to-face, interpersonal communication.

In the process of development of the Generalized Problematic Internet Use Scale (GPIUS), with a factorial analysis, Caplan (2002) identified seven factors that characterize pathological Internet use: "mood alteration, perceived social benefits available online, negative outcomes associated with Internet use, compulsive Internet use, excessive amounts of time spent online, withdrawal symptoms when away from the Internet, and perceived social control available online."(p. 553)

Internet addiction has been extensively studied (cf. Montag & Reuter, 2015; Weinstein, Feder, Rosenberg, & Dannon, 2014) with revisions within the literature showing different numerical indicators. International prevalence rates for Internet addiction range globally from 1.5% to 8.2% (Petersen, Weymann, Schelb, Thiel, & Thomasius, 2009) with a survey of 11 European countries showing a prevalence of 4.4% (Durkee et al., 2012). Recently, Cheng and Li (2014) presented an extensive review of studies from 1996-2012, that used the Young Diagnostic Questionnaire or Internet Addiction Test, and included a total of 89,291 subjects of 31 nations from seven world regions. Data indicated a global prevalence of 6% with highest values in the Middle East (10.9%) and lowest found in Northern and Western Europe (2.6%). Incidence rates vary according different evaluation criteria and various cut off points. The impact of these differences can be very important. With the same measurement instrument, Pontes, Patrão, and Griffiths (2014) found, in Portugal, a prevalence of Internet addiction of 1.2% using the initial cut off presented by Young in 1998 (Internet addiction = 70-100 point) but these values downsize to zero with the second cut-off criteria (Internet addiction = 80-100 points).

Cheng and Li (2014), in a multinational meta-analysis including data from 80 reports and 89,281 participants from 31 nations, found a prevalence of Internet addiction of 6.0% [95% CI 5.1–6.9]. The Internet addiction was positively associated with lower quality of life evaluated by subjective (life satisfaction) and objective (quality of environmental conditions) indicators.

It is very important to study the association between mental health problems and Internet use. Rosen, Whaling, Rab, Carrier and Cheever (2013) studied the association between mental health problems and Internet use, in a cross-sectional design, with a sample 1143 subjects from adolescents to adults, and found data that corroborate the amplification role of social media in psychopathology. Namely, they found that a positive attitude towards information technology was associated with fewer signs of mood disorders but negative attitudes were related with signs of major depression and dysthymia. A positive relation was found between mood disorders and anxiety about not checking text messages and Facebook. Anxiety about missing text messages predicted antisocial and paranoid disorders, and anxiety about not checking Facebook predicted narcissism, antisocial, and compulsive disorders.

Vaghela (2014) found out, in a sample of 160 male adolescents, that Internet addicts have a greater level of anxiety than non-addicts, regardless of the environment (rural or urban).

In youth, although findings are controversial, loneliness or certain types of loneliness, like family-related or peer-related loneliness, are associated with Internet usage or problematic use (Kim, LaRose, & Peng, 2009; Morahan-Martin & Schumacher, 2000, 2003; Teppers, Luyckx, Klimstra & Goossens, 2014). Loneliness is also related with social anxiety (Huan & Chye 2014), which, in turn, is another variable clearly associated with problematic Internet use (Huan, Ang, & Chye, 2014; Lee & Stapinski, 2012).

The question about causality between Internet addiction and psychopathology has been studied with inconsistent results. Ciarrochi, Parker, Sahdra, Marshall, Jackson and Gloster (2016) recently presented a four-year longitudinal study, with 2068 subjects followed from grade 8 to 11. Results showed that compulsive Internet use predicted mental health problems but that mental health problems are not predictors of compulsive Internet use. Furthermore, results showed that both variables have increased values along the study, and that females presented higher values than males. On the other hand, in a longitudinal study with teens, young adults and adults, Ko, Yen, Cfhen, Yeh and Yen (2009) found that psychopathology predicts Internet addiction.

Cognitive-behavior theory attempts to develop models about the etiology, development, and outcomes associated with addictions and other health and behavior problems, and it has been applied to technology and Internet usage.

Young (1998) developed a cognitive model to explain why Internet users develop a habit or compulsive use and how negative self-thoughts maintain patterns of compulsive behavior.

Davis (2001) characterized the cognitive symptoms of PIU as a ruminative cognitive style, feelings of self-consciousness, low self-worth, a depressogenic cognitive style, low self-esteem, and social anxiety. This author described a cognitive-behavior model of PIU that emphasizes the role of maladaptive cognitions, along with reinforcement, in intensifying or maintaining the maladaptive responses. These cognitions can be divided into two subtypes: thoughts about the self and thoughts about the world. Thoughts about the self are guided by a ruminative cognitive style, like constantly thinking about problems associated with the individual's Internet use, rather than being able to be distracted by other events in one's life. This cognitive pattern interferes with instrumental behavior (i.e. taking action), and with engaging in effective interpersonal problem solving. The individual has a negative view of himself and uses Internet to achieve more positive responses from others. Cognitive distortions about the world involve maladaptive cognitive processes, like all-or-nothing thinking, with Internet being the only place where the individual feels respected, which, in turn, exacerbates Internet dependence. These are the main proximal causes of PIU identified in the proposed model. As a distal cause that vulnerabilitizes for PIU, the role of existing psychopathology is emphasized.

4. Personality dimensions and Internet use

According to the Diathesis-stress model, used to explain abnormal behavior, we can conceive that one other distal contributory cause ("diathesis") of PIU, besides existing psychopathology, is personality. Some dimensions of personality might render individuals vulnerable to pathological Internet use and interact with "stress" or life event (introduction to Internet or some new technology found on the Internet).

Users with different personality characteristics have their own preferences, needs, and motives, using new technologies in a variety of ways and obtaining diverse results. The personality characteristics can interact with Internet usage adding its negative or positive impact on psychological functioning and well-being.

Several studies, using the personality theory of the Big Five model (Costa & McCrae, 1992; 1994) to characterize the determinants of pathological and general Internet use were carried out in different countries.

Tan and Yang (2012), in a sample of 148 individuals, mainly young males, found that social networking and transactions were mainly influenced by levels of extraversion (higher levels of extraversion were associated with higher scores in social networking and transactions), and, in a lower degree, by neuroticism, but finance (e.g., online payments) was only affected by extraversion (also with a positive association).

Kuss, Griffiths and Binder (2013) studied the relationships between Internet activities and personality dimensions in 2257 English university students. Results showed that 3.2% of the students (1.2% for males and 1.9% for females) were classified as addicted to the Internet and that high neuroticism and low agreeableness combined with frequent online shopping and social online activities increased the probability of being Internet dependent. Furthermore, neuroticism and online shopping lowered that risk, but online gaming and openness to experience augmented it.

In the Netherlands, in a sample of 3105 adolescents, (Kuss, Van Rooij, Shorter, Griffiths, & Van de Mheen, 2013) found that 3.7% of the subjects were potentially addicted to the Internet (1.7% males and 2.0% females). The risk was expanded with online gaming and social applications activities and reduced for extraversion and conscientiousness.

Servidio (2014), in a sample of 190 Italian college students, found that it was more frequent that males had, not Internet addiction, but a "moderate behavior disorder" (11% for males and 8.18% for females), and that agreeableness and extraversion were negatively associated with Internet addiction, but that openness showed a positive relation to it.

Samarein, et al. (2013), among 400 Iranian university students, found that mean scores for Internet addic-

tion were higher in males and, in general, positively related to neuroticism and negatively associated with extraversion, agreeableness and conscientiousness.

Öztürk, Bektas, Ayar, Özgüven Öztornacı, and Yağcı (2015) studied 328 Turkey adolescents and concluded that extraversion and openness scores of adolescents at risk for developing Internet addiction were significantly higher than those adolescents that were not at risk. Logistic regression results showed that only 8.6% of the risk for Internet addiction was explained by personality traits and that only openness to experience presented statistically significant values.

Papastylianou (2013) studied the relation of Internet use, personality and depression, in a sample of 404 Greek college students, mainly females. They obtained that 9.4% of the individuals were addicts/marginally addicts. Internet addiction was mainly related with openness and only marginally with neuroticism but further analysis controlling for depression and other aspects (gender and type of studies like social sciences, humanities and exact sciences) showed that only openness remained significantly correlated and that depression increased the probability of Internet addiction.

5. Aims and Methods

The main purpose of this research was to identify possible trends in youth's Media and Technology Use (MTU) and Attitudes, taking in to account the possible influence of gender, and emphasizing the role of anxiety/dependence related to MTU and its possible association with personality. Specific aims were to study the relationships of anxiety/dependence with other dimensions of MTU, like smartphone use, emailing, gambling, media sharing, text messaging, internet search, online friendships, and attitudes towards MTU, also exploring their relationship with the personality dimensions of the Big Five model.

5.1. Participants

The sample was a convenience one and comprised of 322 students (58.91% female and 41.09% male) between 12-18 years of age, with an average age of 14.78 years ($SD = 2.04$), attending between the 6th grade to the 12th grade. Males (M = 14.62, SD = 2.09) and females (M = 14.72, SD = 2.12) did not differ in age [F(1, 330) = 0.200, p = .655]. Regarding educational level, 30% of the cases attended the 6th grade (second cycle of studies in Portuguese educational system), 35% of the subjects attended grades between 7th and 9th (third cycle of studies) and 36% attend grades between 10th and 12th (high school). There were no differences in the frequency of the three educational levels [$\chi^2(2) = 2.168$, p = .338]. In the second cycle of studies, 42.9% of the subjects were males and 57.1% were females, in the third cycle of studies, 51.5% were boys and 48.5% were girls. In high school, 25.0% were males and 75.0% were females. The differences between educational groups, regarding gender, were statistically significant [$\chi^2(2) = 12.945$, p = .002]. In the post hoc procedures for Chi-Square, we verified that the number of boys was significantly lower than the number of girls, in high school (p<.05).

Exclusion criteria were: (a) to be younger than 12 years or older than 18 years of age, and (b) clear evidence of difficulties in understanding that would preclude the correct completion of the assessment instruments.

5.2 Instruments

Media and Technology Usage and Attitudes Scale – Portuguese version for Youth (MTUAS-PY, Costa, et al. 2016)

The scale MTUAS-PY is a translation and adaptation to Portuguese youth, between 12 and 18 years of age, of the Media and Technology Usage and Attitudes Scale (Rosen, Whaling, Carrier & Rokkum, 2013) originally designed for adults. The MTUAS-PY is a self-report instrument that assesses technology and media usage (41 items), and attitudes toward technology (15 items). The first 40 items, regarding technology and media usage, are rated by frequency of use on a Likert scale of 10 points (1 = "Never" to 10 = "All the time") and items 41 to 44 are assessed with a Likert scale of 9 points to evaluate the number of online friendships (1 = "0" to 8 = "751 or more"). As regards the use of Information Technology (items 1-41), the ACP oblimin rotation revealed ten factors that explained 72.81% of total variance: (1) Facebook use (11 items), (2) e-mailing (5 items), (3) media sharing/Internet searching (6 items), (4) smartphone usage (5 items), (5) picture and video recording (2 items), (6) video gaming (3 items), (7) information searching (3 items), (8) watching TV (2 items), (9) media searching (2 items), and (10) online friendship (2 items). Attitudes toward technology are assessed with 15 items on a Likert scale of 5 points (1 = "Strongly disagree" to 5 = "Strongly agree"). An ACP with varimax rotation found four factors that explain 60.92% of the variance: (1) anxiety and dependence (6 items), (2) preference for task switching (3 items), (3) positive attitude (3 items), and (4) negative attitude (3 items). In our sample, Cronbach alphas for the 14 factors varied between .952 and .672.

TIPI

The Ten-Item Personality Inventory is a very short inventory (TIPI, Gosling, et al., 2003) based in the Big-Five personality dimensions model proposed by Costa and McCrae (1992, 1994). The TIPI is a 10-item self-

report instrument which evaluates five dimensions: Extroversion (Item 1- Extraverted, enthusiastic and Item 6 - Reserved, quiet), Agreeableness (Item 2 - Critical, quarrelsome and Item 7 - Sympathetic, warm), Conscientiousness (Item 3 - Dependable, self-disciplined and Item 8 - Disorganized, careless), Emotional stability (Item 4 - Anxious, easily upset and Item 9 - Calm, emotionally stable), and Openness to experience (Item 5 - Open to new experiences, complex and Item 10 - Conventional, uncreative). The items are rated on a Likert scale of 7 points (from 1 = "Disagree strongly" to 7 = "Agree strongly"). The authors present the instrument as a useful alternative to a personality evaluation when a brief measure is necessary. Original studies of validity emphasized its adequate level of convergence with the Big Five Inventory (BFI, John & Srivastava, 1999) and good test-retest reliability levels. The level of convergent correlations with the BFI were r = .87 (p < .01) for extraversion, r = .81 (p < .01) for emotional stability, r = .75 (p < .01) for conscientiousness, r = .70 (p < .01) for agreeableness, and r = .65 (p < .01) for Openness. The test-retest reliability was computed comparing evaluations in two sessions separated by six weeks. Results presented a mean r = .72, with values oscillating between r = .62 for Openness and r = .76 for Conscientiousness.

5.3 Procedure

The sample collection took place in 2016 and the questionnaires were administered individually. All the participants that volunteered to participate signed an informed consent and their answers were anonymous. Permission to conduct the study, integrated in a research project, was obtained from national entities that regulate scientific research.

6. Results
6.1 Data analysis

The IBM SPSS Statistics for Windows Version 22 (IBM Corp., 2011) was employed for the descriptive and inferential analyses.

Outliers were identified and accommodated with winsorization. The distribution of the sample was studied. Normalities were assessed by skewness and kurtosis coefficients. According to the Central Limit Theorem the sample was considered large, allowing the use of parametric tests.

Differences between genders, regarding MTUAS-PY and TIPI, were calculated with ANOVA. To test the homoscedasticity (Test of Homogeneity of variances) the Levene test was computed, and, when heterocedasticity was found, the Brown-Forsythe correction was calculated.

The scores of the Internet anxiety and dependence factor were transformed into three categories: high, moderate, and low scores. The recoding was based on tertiles (tertile splits) in which each of the three groups contains approximately the same number of cases (rank cases procedure Nties of the IBM SPSS 22). Gender and age differences, between the three categories of anxiety and dependence to the Internet and between the three educational levels were tested using Chi Square test or ANOVA.

ANOVA was also used to test differences between the three categories of anxiety/ addiction on the mean scores of the remaining 13 factors of MTUAS. The Scheffé test was calculated in post hoc comparisons and, in case of heterocedasticity, the Games-Howell index was calculated.

The magnitude of the effect was obtained with the Cohen's d test (Cohen, 1988). The interpretation proposed by Cohen (1988) was as follows: .20 - small; .50 - moderate; .80 - high.

Significance was set at the .01 and .05 levels.

6.2 Descriptive data and comparison by gender

Descriptive statistics were calculated both for the total sample and for boys and girls on the MTUAS-PY and MIPI values. When the comparison of means by gender showed statistically significant differences, the magnitude of effect was computed.

Results for MTUAS-PY are divided in usage and attitudes (Table 1). For the sample considered globally, regarding the frequency of usage, the highest mean values were found on smartphone usage, Facebook usage, and media searching and the lowest values were found for online friendship and information searching. Concerning attitudes, the highest values were obtained for positive attitudes and the lowest for preference for task switching.

When boys and girls were compared, gender differences were found in MTUAS-PY usage and attitudes. In usage, boys present statistically significant higher values for video gaming [F(1,321) = 50.545, p = .000, d = .79]. Girls, on the other hand, presented higher values in Facebook usage [F(1,321) = 6.578, p = .011, d = .26], e-mailing [F(1,321) = 24.859, p = .000, d = .56], and picture and video recording [F(1,321) = 17.393, p = .000, d = .47]. In attitudes, boys presented higher values in preference for task switching [F(1,321) = 10.338, p = .001, d = .36] and girls had higher values in negative attitude [F(1,321) = 9.153, p = .003, d = .35].

In summary there were statistically significant differences between genders on usage and attitudes in 6 of the 14 sub-scales of MTUA-PY. Boys presented higher values on video gaming and in preference for task switching with a moderate effect size. Girls have higher values for Facebook usage, e-mailing, pictures and

video recording, and in negative attitudes also with a moderate effect size.

Table 1. MTUAS-PY values for the total sample (N = 322) and comparison of means by gender

MTUAS-PY	Total		Boys		Girls		F(1,321)	Cohen d
	M	SD	M	SD	M	SD		
Usage								
UF1 - Facebook usage	5.72	2.37	5.31	2.55	6.00	2.21	6.578a**	0.26
UF2 - e-mailing	4.26	2.08	3.60	1.92	4.71	2.04	24.859**	0.56
UF3 - media sharing/ Internet searching	4.91	1.81	4.80	1.91	4.98	1.71	0.843	-
UF4 - smartphone usage	7.67	1.83	7.53	1.86	7.79	1.68	1.769	-
UF5 - picture and video recording	4.15	1.68	3.70	1.51	4.43	1.63	17.393**	0.47
UF6 - video gaming	4.55	2.48	5.64	2.33	3.80	2.31	50.545**	0.79
UF7 - information searching	3.75	1.86	3.52	1.76	3.88	1.86	3.175	-
UF8 - watching TV	5.06	2.07	5.00	2.08	5.10	2.07	0.210	-
UF9 - media searching	5.72	2.14	5.68	2.29	5.75	2.04	0.076a	-
UF10 - online friendship	2.37	1.70	2.35	1.58	2.33	1.57	0.011	-
Attitudes								
AF1 - anxiety/dependence	3.41	0.80	3.42	0.71	3.39	0.84	0.077a	-
AF2 - preference for task switching	2.42	0.85	2.59	0.84	2.29	0.82	10.338	0.36
AF3 – positive	4.25	0.57	4.26	0.54	4.26	0.52	0.300	-
AF4 – negative	3.11	0.82	2.94	0.76	3.22	0.84	9.153	0.35

a Significant Levene Test, with Brown-Forsythe correction. * p < .05; ** p < 0.01

Table 2. TIPI means (M), and standard deviations (SD) for the total sample (N = 322) and comparison of means by gender

TIPI	Total		Boys		Girls		F(1,321)	Cohen d
	M	SD	M	SD	M	SD		
Extraversion	9.35	2.31	9.47	2.41	9.29	2.24	0.473	-
Agreableness	10.42	1.89	10.31	1.93	10.51	1.84	0.880	-
Conscientiousness	10.01	2.33	8.99	2.27	10.67	2.12	46.145**	0.77
Emotional stability	9.47	2.39	9.64	2.32	9.40	2.46	0.800	-
Openess to experience	10.32	1.96	10.22	2.11	10.36	1.85	0.418	-

** p < 0.01

Mean scores for TIPI on the 5 sub-scales ranged between a lowest value for Extraversion and the higher for Agreeableness (Table 2). Comparison of values by gender only detected statistically significant differences on Conscientiousness [$F(1,321) = 46.145$, $p = .000$, $d = .77$] with higher values for girls compared with boys.

6.3 Internet anxiety/dependence and the personality measured by TIPI

Three categories in the Internet anxiety and dependence factor of MUTUAS-PY (low, moderate or high anxiety and dependence) were considered and results were analyzed taking in to account these different severity levels. The anxiety/dependence measure used is composed by 6 items: three items that belong to original anxiety and dependence factor of the MTUAS (Rosen et al., 2013) ("I get anxious when I don't have my cell phone", "I get anxious when I don't have the Internet available to me", and "I am dependent of my technology") associated with other three items that describe a positive, may be idealized, attitude toward technology ("Technology will provide solutions to many of our problems", "With technology everything is possible", and "I feel that I get more accomplished because of technology").

Descriptive data regarding the three categories are described in Table 3.

Table 3. Descriptive data of the Internet anxiety and dependence categories

Anxiety/dependence	Count	Minimum	Maximum	M	SD
Low	112	1.49	3.00	2.53	0.40
Moderated	111	3.17	3.83	3.48	0.23
High	99	4.00	5.00	4.30	0.33

Differences regarding the anxiety and dependence categories across genders and ages were studied. No significant differences were found between genders ($\chi^2(2) = 0.746$, p = .689). There were also no differences in mean age between the three groups (F (2, 321) = 0.746, p = .475).

Data showed that the three groups were homogenous regarding gender and age.

The differences between the three levels of Internet anxiety and dependence in the personality dimensions measured by TIPI were then analyzed (Table 4).

Table 4. Means, standard deviations and ANOVA for TIPI dimensions, according to the categories of Internet anxiety and dependence

TIPI	Anxiety/dependence	N	M	SD	F(2,321)	Post hoc	Cohen's d
Extraversion	Low	113	9.30	2.12	0.122a	-	
	Moderate	116	9.37	2.20			
	High	102	9.44	2.63			
Agreeableness	Low	113	10.60	2.01	0.892	-	
	Moderate	116	10.41	1.68			
	High	102	10.25	1.95			
Conscientiousness	Low	113	10.27	2.13	3.558**	L>H, p = .044	0.33
	Moderate	116	10.14	2.23			
	High	102	9.48	2.59			
Emotional stability	Low	113	9.85	2.35	5.694**	L>H, p = .007	0.45
	Moderate	116	9.69	2.38		M>H, p = .030	0.38
	High	102	8.79	2.39			
Openness to experience	Low	113	10.19	1.81	0.494a	-	
	Moderate	116	10.29	2.12			
	High	102	10.46	1.94			

a Significant Levene Test, with Brown-Forsythe correction. ** p < 0.01

Significant differences were found for Conscientiousness and Emotional stability, but the three groups were homogenous on Extraversion, Agreeableness and Openness to experience. Regarding the Conscientiousness dimension, significant differences [F(2,321) = 3.558, p = .030], were obtained between the Low and the High anxiety and dependence groups, with higher values obtained for the Low group when compared with the High group (p = .044, d = 0.33). Emotional stability also presented significant differences [F(2,321) = 5.694, p = .004], revealing higher values for the Low group compared with the High group (M = 8.70, SD = (p = .007, d = 0.45), and also higher scores for the Low group compared with the Moderate group (p = .030, d = 0.38). The effect sizes were low.

We can state that those who had higher anxiety and dependence on MTUAS-PY were those who had lower scores in Emotional Stability (described as calm, relaxed, and not anxious or easily upset) and lower scores in Conscientiousness (described as dependable, self-disciplined, organized, and careful).

6.4 Internet anxiety and dependence, and usage and attitudes measured by MTUAS-PY

The study of the differences between the three levels of Internet anxiety and dependence in the several factors of usage and attitudes measured by MTUAS-PY revealed that the only factor where there were no significant differences was watching TV. In all other nine factors statistically significant differences were obtained (Table 5).

Table 5. Means, standard deviations and ANOVA for the MTUAS-PY usage factors, according to the categories of Internet anxiety/addiction

	Anxiety/dependence	N	M	SD	F(2,321)	Post hoc	Cohen d
UF1 - Facebook usage	Low	112	5.02	2.24	16.585**	H>L, p = .000	0.82
	Moderate	111	5.53	2.46		H>M, p = .000	0.55
	High	99	6.78	2.05			
UF2 - e-mailing	Low	112	3.84	2.01	4.684**	M>L, p = .010	0.42
	Moderate	111	4.68	2.06			
	High	99	4.25	2.09			
UF3 - media sharing/ Internet searching	Low	112	4.38	1.82	8.717**	M>L, p = .043	0.34
	Moderate	111	4.97	1.68		H>L, p = .000	0.56
	High	99	5.38	1.77			
UF4 - smartphone usage	Low	112	7.07	1.83	13.759**	H>L, p = .000	0.72
	Moderate	111	7.86	1.67		M>L, p = .002	0.25
	High	99	8.26	1.49			
UF5 - picture and video recording	Low	112	3.74	1.44	7.701**	H>L, p = .001	0.55
	Moderate	111	4.11	1.64			
	High	99	4.60	1.70			
UF6 - video gaming	Low	112	4.13	2.35	3.782a*	H>L, p = .013	0.39
	Moderate	111	4.46	2.65			
	High	99	5.05	2.34			
UF7 - information searching	Low	112	3.21	1.49	8.726a*	H>L, p = .000	0.58
	Moderate	111	3.75	1.73		M>L, p = .037	0.34
	High	99	4.24	2.07			
UF8 - watching TV	Low	112	4.89	2.07	2.07	-	
	Moderate	111	4.90	2.10			
	High	99	5.40	2.05			
UF9 - media searching	Low	112	5.23	2.30	4.638**	M>L, p = .035	0.33
	Moderate	111	5.97	2.15		H>L, p = .032	0.37
	High	99	6.00	1.86			
UF10 - online friendship	Low	112	1.75	1.11	22.386a**	H>L, p = .000	0.94
	Moderate	111	2.23	1.46		H>M, p = .000	0.54
	High	99	3.10	1.76		M>L, p = .018	0.37

a Significant Levene Test, with Brown-Forsythe correction. * p < .05; ** p < 0.01

Data from table 5 showed that:

a) High anxiety and dependence is accompanied with a more frequent use of Facebook [F(2,321) = 16.585, p = .000]; post-hoc Scheffé showed higher values for the High group compared with the Moderate (p = .000, d = 0.82) and Low groups (p = .055, d = 0.55);

b) E-mailing use (UF2) only presented statistical significant differences between the Moderate group and the Low group (M = 3.84, SD = 2.09), [F(2,321) = 4.684, p = .010], with the adolescents with moderate Internet anxiety and dependence showing a more frequent use of emailing (p = .010, d = 0.42);

c) For Media sharing/Internet searching significant differences [F(2,321) = 8.717; p = .000], were found between the Moderate and Low groups (p = .000, d = 0.72), and between the High and Low groups (p = .002, d = 0.25), with the Moderate and High groups showing a higher usage of media sharing/Internet searching than the Low group;

d) In smartphone usage factor the same tendency just described for Media sharing/Internet searching factor was verified, i.e., significant differences were obtained [F(2,321) = 13.759; p = .000] between the Moderate and groups (p = .000, d = 0.82, and between the High and Low groups (p = .000, d = 0.72), with the Moderate and High groups showing higher values than the Low group;

e) For picture and video recording [F(2,321) = 7.701; p = .000], values of the High group were higher than those of the Low group (p = .001, d = 0.55);

f) In video gaming values [F(2,321) = 3.782; p = .024], values were higher for the High group when compared with the Low group (p = .001, d = 0.39);

g) The information searching factor presented significant differences [F(2,321) = 8.726, p = .000] between the High and Low groups (p = .000, d = 0.58), and between the Moderate and Low groups (p = .037, d = 0.34), with the High and Moderate groups showing higher values than the Low group;

h) The media searching factor revealed statistically significant differences [F(2,321) = 4.638, p = .010] between the Moderate and Low groups (p = .035, d = 0.33), and between the High and Low groups (p = .032, d = 0.37), with the Moderate and High groups showing a higher usage of media searching than Low group;

i) The online friendship factor presented statistically significant differences between the three groups [F(2,321) = 22.386, p = .000]. Those of the High group had higher values than those of the Low (p = .000, d = 0.94) and Moderate groups (p = .000, d = 0.54). Also, the Moderate group values were higher than those of the Low group (p = .018, d = 0.37).

Summing up, individuals with high Internet anxiety/dependence had significantly higher averages in Facebook usage, media sharing/Internet searching, Smartphone usage, Picture and video recording, Video gaming, Information searching, Media searching and Online friendship. The Watching TV factor did not present significant differences in the three groups, and e-mailing only differentiated the moderate group from the low group.

The severity of Internet anxiety/dependence was associated with different levels of Internet usage in 9 of the 10 factors of the MTUAS-PY. Adolescents with higher anxiety/dependence tend to have higher values on the usage scales of MTUAS-PY, and the effect sizes were generally moderate.

6.5. Anxiety and dependence and other attitudes regarding MTU

After comparing MTUAS-PY factors regarding usage for the low, moderate and high Internet anxiety/dependence groups, we compared data regarding the MTUAS-PY Internet attitudes (Table 6).

Table 6. Means, standard deviations and ANOVA of the MTUAS-PY attitudes factors, according to the categories of Internet anxiety/addiction

	Anxiety/dependence	N	M	SD	F(2,321)	Post hoc	Cohen d
AF2 - preference for task switching	Low	112	2.23	0.79	6.093**	H>L, p = .003	0.49
	Moderate	111	2.41	0.88			
	High	99	2.63	0.83			
AF3 - positive attitude	Low	112	4.00	0.50	26.355**	M>L, p = .000	0.74
	Moderate	111	4.35	0.44		H>L, p = .000	0.90
	High	99	4.46	0.52			
AF4 - negative attitude	Low	112	3.11	0.79	0.593a	-	-
	Moderate	111	3.04	0.72			
	High	99	3.17	0.94			

a Significant Levene Test, with Brown-Forsythe correction. ** p < 0.01

Data showed statistically significant differences for preference for task switching and for positive attitudes towards the Internet, and no differences for negative attitudes towards the Internet. Regarding AF2 - preference for task switching there were significant differences [F(2,321) = 6.093, p = .003] between the High and Low group (p = .003, d = 0.49), with the former presenting higher values. For AF3 - positive attitudes, significant differences were found [F(2,321) = 26.355, p = .000] between the High and Low group (p = 000, d = 0.74), with a moderate effect size, and between the Low group and Moderate group (p = .000, d = 0.90) with a high effect size.

In conclusion, individuals with high scores of Internet anxiety and dependence had a more positive attitude towards the Internet and more frequently performed a simultaneous execution of multiple tasks when compared with adolescents with low scores on Internet anxiety and dependence. Subjects with moderate levels of Internet anxiety and dependence also presented a more positive attitude towards Internet than those with low Internet anxiety and dependence.

7. Discussion

Considering the aims of the present study, the authors examined the relationships established between the specific attitude of anxiety/dependence toward information technologies (score from MTUAS-PY - Attitudes

scales), the different usage forms of the information and communication technologies (obtained from the MTUAS-PY- Usage scales) and personality dimensions (obtained from the TIPI).

Gender differences were observed in relation to four MTUAS-PY Usage scores in the present sample (higher usage frequency of Facebook, e-mail, and picture and video recording by females and higher usage frequency of the video games and multitasking by males). Males and females significantly differed in their MTUAS-PY on Attitudes towards multitasking (higher value for males) and negative attitudes towards ICT technologies (higher values from females).

Those findings concerning the technology and media usage by gender are consistent with other studies that showed that girls tend to favor conversations and prefer socializing while boys prefer gaming (e.g. Hinostroza, et al., 2014).

Concerning the age of the sample, no differences were found between the three categorized groups divided by their scores on anxiety/dependency towards ICT technology. Again, dissimilarly with the literature, age was not an important factor for anxiety/dependence. For Internet addiction, some studies (Demetrovics et al.; Morrison & Gore; Ni, Yan, Chen & Liu; Smahel, Brown & Blinka, cit in Pontes, Patrão & Griffiths, 2014), revealed age as an important factor, with younger people displaying higher levels of dependency than older people.

As mentioned by Pontes, Patrão and Griffiths (2014) a possible explanation for different studies' outcomes may be the fact that most of the studies come from different countries where cultural effects may be playing an important role in terms of social representations of the Internet itself and its misuse. Furthermore, in terms of methodology, our study has a younger sample (the age ranged between 12 and 18 years) than the studies above mentioned (whose samples were composed by college students and young adults), which may account for some of the discrepancies regarding age.

Our data showed that higher levels of anxiety/dependence were associated with more frequent usage in 8 of 10 dimensions (Facebook usage, media sharing/Internet searching, smartphone usage, picture and video recording, video gaming, information searching, media searching, and online friendship) and with preference for task switching and a more positive attitude towards ICT. Therefore, the level of anxiety/dependence can be an overall differentiator of intense Internet use. The relevance of this finding is better understood if paired with the important problems associated with a heavy use of the Internet. High levels of Internet use are associated with decline in mental health (De Leo & Wulfert, 2013; Shapira, et al. 2000; Young, 1988) and with stress (Mark, Wang & Niiya, 2014).

Further investigations on disparities of use and attitudes towards Internet must consider the importance of establishing criteria/cut-off scores for problematic behavior and analyze the relation between anxiety/ dependence and measures of problematic Internet use.

Our results also showed that personality and Internet anxiety and dependency were significantly associated, but only in some personality dimensions. Similarly with previous studies (Papasttylianou, 2013; Samarein et al., 2013), more emotionally instable (neurotic) adolescents scored higher on Internet anxiety and dependence, although in these studies the samples were composed not by adolescents but by college students. Kuss, et al. (2013) also found that higher levels of neuroticism associated with more frequent online shopping were related with Internet addiction. We can hypothesize that emotionally instable adolescents, who are prone to negative affectivity, like anxiety and depression, may use the Internet to relieve these symptoms, for example by searching for information to reduce ambiguity that is usually related to anxiety or by searching for sources for online help. Regarding consciousness, adolescents who scored higher in this dimension presented lower levels of Internet anxiety and dependence, consistent with the findings of other studies with adolescents or youth (Kuss, Van Rooij, Shorter, Griffiths, & Van de Mheen, 2013; Samarein et al., 2013). It seems that more conscious individuals may be more careful with their Internet use, displaying less problematic Internet use. In the present study, extraversion, openness to experience, and agreeableness showed no relationship with Internet anxiety and dependence. Other studies, with adolescents or college students, showed positive relationships for agreeableness, (Kuss, Griffiths & Binder, 2013; Servidio, 2014) and openness, (Öztürk, et al. 2015; Papastylianou, 2013; Servidio, 2014), and contradicting associations for extraversion, that is, either positive, among adolescents (Öztürk, et al. 2015; Kuss, Van Rooij, Shorter, Griffiths, & Van de Mheen, 2013) or negative relations, in college students (Samarein, et al. 2013; Servidio, 2014).

Regarding the literature reviewed on the relationship between personality and Internet use or PIU, we would like to emphasize that some studies had problems related to small and not balanced samples. Although there are already some large-scale studies (e.g., Kuss, Griffiths & Binder, 2013; Kuss, Van Rooij, Shorter, Griffiths, & Van de Mheen, 2013), others have rather small samples (e.g., Samarein, 2013; Tan and Yang, 2012). Additionally, one of the studies reviewed included mainly young males (Tan & Yang, 2012) and others mainly young females (Papastylianou, 2013). These sample problems, and the heterogeneity of subjects' age could have influenced some contradictory results found. In our study, there is a slightly higher number of girls, and although the variable Internet anxiety and dependence was not associated with gender, consciousness was (girls had higher scores than boys). Gender could have influenced the association obtained between

consciousness and Internet addiction, and it will be important to make separate analysis for both genders in order to replicate this finding. Culture influences regarding Internet usage may also help to explain some differences between the studies reviewed and between these studies and our own. Regarding other dimensions, like extraversion and openness to experiences, we expected that there would be a significant association to Internet anxiety and dependence, because individuals with these personality characteristics usually seek stimulation from sources outside of themselves and seem to be attracted to a range of features that Internet offers. Nevertheless, no significant associations were found.

Specifically, our findings indicate that the adolescents that are more anxious, moody, easily upset or stressed and less calm and self-confident (emotional instability dimension of personality) have higher values of anxiety and dependence to Internet. Probably these individuals are more likely to go online to relax and find support and comfort, gaining confidence while online and modulating their negative moods. Additionally, the Internet environment allows an anonymity and greater control, which is usually aimed at by anxious individuals.

We also found that more disorganized, careless and impulsive and less self-discipline, and responsible adolescents (consciousness dimension of personality) tend to be more problematic in terms of anxiety and dependence to Internet. Less consciousness adolescents may be less careful in online usage.

All in all, online activities do not require the same problem solving and interactional skills compared to real life and may therefore attract individuals with these personality traits that may be less adapted to school work and social interaction in real life leading them to use the Internet more.

Gradually, adolescents with these personality characteristics may became more drawn to their online activity, using it as a mean to escape from real life struggles, like modulating emotions and be involved in work in a dependable and responsible way, and increasing emotional instability and lack of self-discipline and organization. With time, these individuals would have an increased risk to be involved in a compulsive use of the Internet and to have negative outcomes such as lowered academic achievement, missing school and avoiding social interactions face to face.

In future studies, we intend to study the associations between personality, Internet usage and attitudes, and other symptoms of PIU. Additionally, we would like to explore not only the importance of personality in determining behavior on the Internet and attitudes towards new technologies, but also the impact of this interaction on net users' well-being.

According to our results, personality traits of emotional instability and lack of consciousness may be risk factors for Internet anxiety and dependence. These results suggest that parents and teachers should pay more attention to youth who show characteristics of these personality traits, helping them to lower the risk to become addicted to the Internet.

These results have other implications for prevention and early intervention work with adolescents, with respect to anxiety and dependence to Internet. Based on these findings, and other studies (see Young, 2015, for a revision), future research should develop treatment protocols and conduct outcome studies for effective management of this Internet anxiety and dependence.

In order to improve the efficacy of interventions on problematic use of Internet, namely anxiety and dependence to Internet, gender and characteristics of the personality must be taken in account. In line with other authors we suggest that therapy should not only address dysfunctional computer usage, but also promote lifestyle changes for life without the Internet (Hall & Parsons, 2001; Young, 2007). Cognitive Behavioral Therapy (CBT) will be an effective treatment for compulsive Internet use (Young, 2007).

There are several limitations involved in this study. The sample size is small and it is not well balanced by gender. There were more girls than boys, despite having demographically matched the three groups (low, moderate and high anxiety/dependence) by gender and age. Therefore, one must be cautious with the generalizability of results. This study is exploratory and focused on one symptom of problematic Internet use, anxiety and dependence. Further research should include larger sample sizes, well balanced in terms of gender.

Alongside personality (a distal cause), other psychosocial variables like loneliness and social anxiety (proximal antecedents) should be studied, to better understand and treat anxiety and dependence from Internet. These can be mechanisms (mediators) that transport the effect of the dimensions of personality like emotional instability, mechanisms through which personality exerts its influence (Davis, 2001). CBT can be the basis for this conceptualization and should be tested in future studies to account for a better understanding of Internet - related problematic behaviors.

Additional research should also examine the role of personality dimensions as risk, moderator or mediator variables of Internet use, abuse and dependence. The personality dimensions of the Big Five theory (Costa & McCrae, 1992, 1994), studied in the present research, correspond to enduring patterns of thoughts, feelings, and behaviors that distinguish one person from another.

Theoretically, these dispositional characteristics are conceptualized as antecedent variables, so the directionality of the relation between personality and Internet use and attitudes is not questionable. However, the exact nature of these linkages must be studied. Additionally, the effects of other variables (such as loneliness and social anxiety) in these relations, as the effect of personality in the relation to other variables (including Internet

usage, attitudes and motives) need further investigation.

The impact of personality on Internet use or misuse may be influenced by the type of activities developed on line. So we intend explore the relationships of personality dimensions with the types of use (e.g., Facebook usage communication or emailing) and attitudes regarding Internet (multitasking, positive or negative attitudes regarding Internet) in the prediction of anxiety and dependence to Internet and other PIU symptoms. Longitudinal studies will be carried out in order to clarify the links between variables like personality, loneliness, social anxiety and Internet use/attitudes and PIU.

Loneliness and social anxiety can be both mediators between personality and problematic Internet use. Furthermore, psychosocial variables like loneliness, social anxiety, social isolation, social rejection and depression can lead to PIU, and PIU can lead to further psychosocial problems, in reciprocal interactions that are established over time. Only longitudinal studies will allow the improvement of our understanding of these dynamics. Mediation analyses must be conducted to explore the mechanisms contributing to the relationship between variables of interest. Variables like gender and level of depression must be controlled, as did Papastylianou (2013).

Different instruments to assess PIU and not only Internet anxiety and dependence should be used in future studies. Another great challenge will be to refine theory-based instruments, namely based in cognitive-behavior models like the one of Davis (2001) for problematic Internet use (e.g., the Generalized Problematic Internet Use Scale, Caplan, 2002) and use them in order to test a theory that explains why Internet use appears to be problematic for some individuals and how PIU might be related to mental health.

Additional studies on the prevalence and incidence of PIU and its comorbidity with other psychiatric disorders are needed. Studies with clinical samples of youth and adults are desirable. All studies revised used subjects from general population to study the relationship of PIU and mental health disorders.

We have analyzed a wide set of Internet behaviors and attitudes, but some authors centered only on specific dimensions, like usage of social networking sites (e.g., O'Keeffe & Clarke-Pearson, 2011). With more than 35 years and staggering development (cf. the evolution of Conversation Prism between 2008 and 2014, Solis, 2014, conversationprism.com) the Web has been changing rapidly. As new applications develop, it becomes harder to define categories of usage, and this is important as it affects comparisons of studies over time. New and emerging Internet behaviors arise as the Internet evolves. Further research will be needed to confirm and further understand this phenomenon.

8. References

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