

## ATTACHMENT DISORGANIZATION AND DISSOCIATION IN VIRTUAL WORLDS: A STUDY ON PROBLEMATIC INTERNET USE AMONG PLAYERS OF ONLINE ROLE PLAYING GAMES

Adriano Schimmenti, Fanny Guglielmucci, Chiara Barbasio, Antonella Granieri

### Abstract

*Objective:* Internet addiction was linked both theoretically and empirically with attachment insecurity and dissociation; however, there is a lack of studies exploring the associations between attachment disorganization, dissociation, and problematic Internet use.

*Method:* In this study, an Internet-based survey administered by means of the Internet Addiction Test (IAT) was conducted among the players of an Italian Multi-User Dungeon in order to select a subsample of people who showed significant symptoms of Internet abuse. Among the 250 cases eligible for data analysis, 36 players (13.5%) scored above the IAT cut-off for a problematic Internet use. These players were contacted for a second phase of the study in which they were administered the Adult Attachment Interview and the Revised Dissociative Experience Scale.

*Results and Conclusions:* There was a high prevalence of attachment disorganization (47%) among these players; they also reported significant dissociative experiences. A mediation study showed that dissociation mediated the effect of attachment disorganization on the Internet addiction scores, thus supporting the idea that people highly involved with the Internet role-playing games can use dissociation to protect the self from memories of loss, neglect and abuse experienced in the attachment relationships.

**Key words:** Internet addiction, attachment disorganization, dissociation, Adult Attachment Interview, online role-playing games

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**Declaration of interest:** none

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### Introduction

With information and communication technologies changing our way of interacting with reality (De Kerckhove 1995, Levy 1997), new psychological symptoms involving disturbed relationships with technologies may emerge among some individuals. This can happen with technological addiction, which is defined as a behavioural dependency that involves human-machine interactions (Griffiths 1995). The diagnostic class of technological addiction has its rationale in the assumption that new technologies contain inducing and reinforcing features which may contribute to the promotion of addictive tendencies (Schimmenti and Caretti 2010, Widyanto and Griffiths 2006). Indeed, research has demonstrated that some people are more likely to be involved in a problematic use of technologies, such as Internet (Young 1998) or

mobile phones (Takao et al. 2009), and a part of these people can become addicted to a particular technology and its applications (Turkle 1995).

Internet addiction is the most studied technological addiction. Indeed, the misuse of Internet services can involve different forms of related dependence behaviours, such as an addiction to social networking, cybersex, online gambling, or web-based role-playing games (Cantelmi and Talli 2009). Empirical research has linked Internet addiction with a plethora of psychological variables, such as anxiety (Caplan 2007, Chak and Leung 2004), feeling of loneliness (Caplan 2007), shyness (Chak and Leung 2004, Scaley et al. 2002, Yuen and Lavin 2004), social withdrawal (Whang et al. 2003), mood disorders (Ha et al. 2007, Ko et al. 2008), attention deficit/hyperactivity disorder (Cho et al. 2008, Yen et al. 2009, Yoo et al. 2004), dissociation (Bernardi and Pallanti 2009, De Bernardis et al. 2009,

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Zanon et al. 2002), alexithymia (De Bernardis et al. 2009), and insecure attachment styles (Lei and Wu, 2009, Lin et al. 2011).

An addiction to role-playing games on the Internet has been considered one of the most severe and impairing form of technological addiction (Cantelmi and Talli 2009, Rosegrant 2012). There are two main types of Internet role-playing games: the Multi User Dungeons (MUD) and the Massive Multiplayer Online Role-Playing Games (MMORPG). Both of them are multiplayer real-time virtual worlds (usually fantasy or science-fiction environments) that combine elements of interactive fiction and online chats, where participants can read or view descriptions of environments, other players, non-player characters and actions performed in the environment. Both MMORPGs and MUDs originated from Dungeons and Dragons and similar board role-playing games; however, now people can play online and interact with other individuals far away, in a synchronous environment where textual, graphical, and audio elements reproduce the virtual world. Although MMORPGs and MUDs are similar, the former is graphic-based and only require the creation of a character to start playing, while the latter requires much more social interaction because is chat-based, thus the environment is created by players through texting. The main purpose of these games is to explore the virtual world, interact with other players, go on adventures, complete quests, create a story by role-playing, and advance the skills of the character. Several characteristics of such games are similar to those of other video games; however, the interaction with other players is an unique aspect of online games, and it can be considered a critical key for understanding the abuse of MUDs and MMORPGs. Indeed, several video games enable a psychological identification of the player with the avatar (i.e. the virtual character), but the interaction with other players can generate a sense of belonging to the virtual community; furthermore, the possibility to create a character with the desired image, who freely interacts with other people and the virtual environment, allows individuals to play with some aspects of their own identity. It has been suggested that this possibility represents one of the most appealing aspect of virtual worlds (Griffiths et al. 2006, Hussain and Griffiths 2009, Rosegrant 2012, Yee 2006a): in virtual worlds, people can play many self-states and can interact in ways that sometimes are not expressed in the realm of reality, for instance because of feelings of shame or fear of social disapproval (Caplan et al. 2009, Yee 2006b). However, some vulnerable individuals can be progressively drawn into these virtual worlds, eventually becoming addicted to them (Liu and Peng 2009, Rosegrant 2012, Young 2009).

Within the psychoanalytic framework, an addiction to the Internet virtual worlds has been conceptualized as a way to obtain rewards and fulfill instinctual drives (Toronto 2009), as a place where reality and an illusionary world can merge (Rosegrant 2012), and even as a defensive withdrawal from the awareness of painful states of mind related to attachment trauma, realized by the the absorption into the virtual worlds (Schimmenti 2012, Schimmenti and Caretti 2010).

This latter view of virtual worlds as 'psychic pits' that allow a defensive exclusion (Bowlby 1980) of memories related to attachment trauma could be useful for the understanding of problematic Internet use. Originally, the locution 'psychic retreat' has been proposed by the psychoanalyst John Steiner (1993) for describing the feeling of omnipotence experienced in fantasies through the use of ideas that are distorted

or poorly aligned with reality: in Steiner's viewpoint, psychic retreats are developed in order to avert psychic pain, fear of loss and death, primitive aggression, anguish regarding fragmentation, and perceived psychic threats arising from contact with significant persons within the individual's life, thereby attempting to achieve a relative internal peace. Within a theoretical framework made more informed by the attachment theory, an addiction to virtual worlds has been otherwise described in terms of psychic pits (Schimmenti and Caretti 2010), a dissociative process that prevents painful feelings originated from early experiences of neglect and abuse coming to awareness (Schimmenti 2012). Accordingly, attachment-related memories of loss, neglect and abuse are defensively excluded from awareness through dissociation, because they can threaten the stability and continuity of the self: in the "psychic pit" theoretical model, the degree of player's absorption into the virtual world and detachment from reality depends on the extent of painful states of mind regarding attachment that must be kept outside the awareness.

Research has already demonstrated that the need for distraction and escape from everyday life can be a major motivation for video game play (Sherry et al. 2006, Yee 2006a, 2007); also, research has demonstrated that Internet abuse shows significant associations with insecure attachment styles (Lei and Wu 2009, Lin et al. 2011) and dissociation (Bernardi and Pallanti 2009, Craparo 2011, De Bernardis et al. 2009). However, the "psychic pit" hypothesis has not been tested before. To this purpose, the study sought to investigate the relationship between attachment representations, dissociation, and internet addiction in a sample of MUD players. Accordingly with the "psychic pit" model, it was hypothesized that Internet addiction scores of people highly involved in the MUD would be significantly predicted by attachment disorganization, and that dissociation would mediate the relationship between the attachment representations and the Internet abuse.

## Procedure

The study design included two phases. In the first phase, a web-based survey using the Internet Addiction Test (IAT; Young 1998) was conducted inside Extremelot, one of the biggest MUD in Italian language that has over 50,000 player characters.

In collaboration with the webmaster of this fantasy game, an invitation message to participate in a Internet survey was placed on the noticeboard of the MUD; the message also explained the objective of this research. On the basis of the aims of the study, and the possibility that even occasional players may participate to the survey, the inclusion criteria were restrictive: only people aged 18 or over who played in Extremelot for at least 18 months could participate in the Internet survey. People who did not respond to the sampling criteria were deleted from the dataset, thereby yielding 250 cases that were used for subsequent analysis. The recruitment message remained in the MUD noticeboard for two months. The webmaster of the game reported that participants of the study were rather homogenous in terms of their playing of the MUD in the considered period, although there were participants whose gameplay sessions usually lasted for longer time. Individual data were not available for confidentiality reasons.

In the second phase, participants whose IAT scores

resulted above the Italian cut-off (50 or above) for a problematic Internet use were contacted while playing Extremelot or by e-mail for a subsequent face-to-face interview scheduled for the annual Extremelot meeting in Rome (May 2010). All these subjects agreed to participate in the second phase of the study, where they were administered the Adult Attachment Interview (AAI; George et al. 1985) and the Revised Dissociative Experience Scale (DES-II; Carlson and Putnam 1993).

Confidentiality was assured, and all the participants were told they could omit any information they do not wish to give and may also withdraw from the study at any time; all the participants provided informed consent. The measures used in this study were scored according to their predetermined criteria. With respect to the coding of the AAI, two of the authors (AS and CB) participated to the AAI official training and obtained the full reliability for the scoring of this measure. These two coders independently scored the AAI transcripts, and obtained full agreement (100%) in the classification of the participants into the AAI categories.

## Participants

Four hundred and four players responded to the message on the Extremelot noticeboard, but only 250 participants (167 males, 66.8%; 83 females, 33.2%) met the inclusion criteria for the first phase of the study. Among these, 36 participants (13.5% of the sample) screened positive for a problematic Internet use (IAT score of 50 or above). The sociodemographic characteristics of this subsample of MUD players are consistent with those detected in several studies on addiction to online role-playing games (Caplan et al. 2009, Liu and Peng 2009, Yee 2006a, 2007). Almost the entire subsample comprised students (35 participants, 97.2%), with a mean age of 23 years ( $SD=3.7$ ; range=18–32) and a medium-high level of education ( $M=14.1$  years,  $SD=1.91$ ). These subjects reported an average gameplay of about 3 hours a day. Most of the subjects in this subsample were males (22, 61.1%).

## Measures

The IAT (Young 1998) is a 20-item self-report measure that assesses Internet usage in terms of the degree of preoccupation, inability to control use, extent of hiding or lying about online use, and continued online use despite negative consequences of behaviour. The IAT has demonstrated good internal consistency and concurrent validity (Widyanto and McMurren 2004) and is one of the most widely used measures in Internet addiction research (Ha et al. 2006). It includes questions such as “How often do you find that you stay on-line longer than you intended?”, “How often do you fear that life without the Internet would be boring, empty, and joyless?”, or “How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?” Translations of the IAT have been developed in a number of other languages, including Italian (Ferraro et al. 2007). In this research, IAT scores of 50 or above were considered to indicate lack of control and misuse of the Internet, while scores of 80 or over indicated a severe Internet addiction. These cut-off scores were used consistently with previous research on the psychometric properties of the Italian translation of the IAT (Cantelmi et al. 2000, Milani et al. 2009, Ferraro et al. 2007). The Cronbach’s alpha reliability coefficient of the IAT was 0.91 in the

first phase of the study, and 0.82 in the second phase.

The DES-II (Carlson and Putnam 1993) is a 28-item self-report measure of psychological dissociation that is designed to be used as a screening instrument for dissociative disorders and to help determine the contribution of dissociation to psychiatric disorders. It encompasses experiences of amnesia, depersonalization, derealisation, and absorption. The DES-II is widely used in research worldwide; it has demonstrated good psychometric properties, such as adequate split-half reliability and test-retest reliability as well as good convergent and discriminant validity (Carlson and Putnam 1993, Carlson et al. 1993, Dubester and Braun 1995). The Italian translation of the DES-II used in this study (Schimmenti et al. 2010) showed good internal consistency, good test-retest reliability and good convergent validity in a mixed clinical and non-clinical sample of over 600 subjects. In order to complete the DES-II, the individuals are asked to circle a number showing what percentage of the time a particular dissociative experience happens to them. The questionnaire includes items such as “Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something as if they were looking at another person”, “Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them,” or “Some people sometimes feels as if they are looking at the world through a fog so that people or objects appear far away or unclear.” Scores of 30 or above suggest a positive screening for dissociative disorders (Carlson and Putnam 1993, Dubester and Braun 1995). The Cronbach’s alpha coefficient of the DES-II in this study was 0.85.

The AAI (George et al. 1985) is a semi-structured interview regarding childhood attachment relationships and the meanings that an individual currently ascribes to past experiences; the interviewees are also asked about loss of loved ones and other traumatic experiences. The AAI is scored from a transcript using scales that reflect the descriptions of childhood experiences with each parent (loving, rejecting, neglecting, involving/role reversing, pressuring to achieve), and the interviewee’s discourse styles (coherence of transcript and mind, idealization, lack of recall, anger, derogation, fear of loss, metacognitive monitoring, passivity of speech). In the AAI, the language and discourse styles are considered to reflect the state of mind with respect to attachment: adults are classified as insecure on the basis of the lack of coherence, that is, they fail to integrate memories of experience with assessments of the meaning of experience. Thus, the AAI provides researchers with a standardized method to assess adult mental representations of childhood attachment experiences. Scale scores are used to assign the individual to either of three categories: F (Free), Ds (Dismissing), or E (Entangled). Individuals classified as F are secure and autonomous; they maintain a balanced view of early relationships, value attachment relationships, and view attachment-related experiences as influential in development. Insecure individuals may be classified as Ds or E. Adults classified as Ds deny or devalue the impact of early attachment relationships, have difficulty in recalling specific events, often idealize childhood experiences, and usually describe an early history of rejection. Adults classified as E display confusion about past experiences, and their current relationships with parents are marked by active anger or passivity. Individuals may be also classified as U/d (Unresolved/disorganised) in addition to a major

classification. The U/d classification indicates the attachment disorganization, thus is given precedence over the secure (F) and insecure (Ds or E) classification in the assessment of mental representations regarding attachment. The U/d individuals report attachment-related trauma that have not been resolved or reconciled, as revealed by lapses in the monitoring of discourse, speech, and behaviours when discussing a loss or an abuse. The stability, reliability, and validity of the AAI has been demonstrated in several studies (Bakermans-Kranenburg and van Ijzendoorn 1993, Crowell et al. 1996, van Ijzendoorn 1995, van Ijzendoorn and Bakermans-Kranenburg 2008). In this study, there was full agreement (100%) between the two AAI coders on the participants' AAI classifications.

## Statistical Analysis

Descriptive statistics for the IAT were computed for the two phases of the study, in order to determine the prevalence and severity of problematic Internet use among the participants.

For the second phase of the study (that exclusively involved people who screened positive for a problematic Internet use), descriptive statistics were also computed for the AAI and the DES-II. Differences in the IAT scores of participants with AAI organised (F, Ds, E) and disorganised (U/d) states of mind regarding attachment were calculated through t-test for independent samples, and Mann-Whitney's U test was used to test each pair of differences.

The association between IAT scores and DES-II scores were computed using Pearson's *r* correlation; also, Fisher's exact test were used to determine whether Internet addiction (IAT scores of 80 or above) was associated with pathological dissociation (DES-II scores of 30 or above). Finally, to examine whether dissociation mediated the relationship between attachment representations and Internet addiction, we used traditional methods of testing mediation, including Baron and Kenny's four-step approach to mediation (Baron and Kenny 1986) and the Sobel test (Sobel 1982). Then, given that these traditional methods can be biased when used with small samples (Preacher and Hayes 2004) and can increase Type-I error rate (MacKinnon et al. 2002), we also employed a bootstrapping method with bias-corrected confidence intervals to further interrogate the significance of these mediation effects. In the present study, 2000 bootstrapping samples were derived. Statistical analyses were undertaken using the SPSS 16 program (SPSS Inc. 2007) with the Indirect SPSS script by Preacher and Hayes (2008).

## Results

The IAT mean score in the entire sample resulted quite high ( $M=42.2$ ;  $SD=10.9$ , range=31–87) when compared with normal population scores – e.g. the study by De Bernardis and colleagues (2009) with 312 undergraduate students from Italy reported a mean score for the IAT of about 30.

The IAT mean score of the 36 participants who were selected for the second phase of the study was 65.9 ( $SD = 9.9$ ); five of them (13.9%) obtained a score of 80 or above, which is considered a severe Internet addiction according to the interpretation criteria of the IAT. Slight differences were detected in the IAT scores of this subsample in relation to gender ( $t=1.97$ ,  $df=34$ ,  $p=0.06$ ), with males scoring slightly higher ( $M=68.4$ ,  $SD=10.5$ ) than females ( $M=62.1$ ,  $SD=7.5$ ); all the

participants who reported a severe addiction to the Internet (IAT scores of 80 or above) were males. No differences were detected in relation to age or level of education.

This subsample scored quite high even at the DES-II ( $M=23.5$ ,  $DS=11.1$ ), when considering that samples from normal population usually score approximately 10 (Dubester and Braun 1995, Schimmenti et al. 2010). Moreover, 9 of the 36 participants (25%) scored over 30 at the DES-II, thus screening positive for dissociative disorders. No differences were detected in the DES-II scores in relation to gender, age, or education.

The AAI transcripts analysis revealed a very high prevalence of insecure and unresolved/disorganised states of mind regarding attachment, with only three participants (8.3%) classified as F according to the AAI thresholds and criteria. Almost half of the sample (17 participants, 47.2%) were categorised as U/d with respect to loss or abuse; Ds states of mind were the major classification for 12 cases (33.3%), while 4 cases (11.1%) were classified as E. AAI states of mind were not associated with gender, age, or education.

Most of the Ds transcripts showed an active derogation of attachment, or they were marked by a strong idealization of parental figures not supported by specific memories. The E transcripts were related to an excessive, angry, and non-collaborative discussion of current parental behaviour perceived as offensive. The U/d states of mind were clearly related to abusive and frightening parental behaviours and/or to unresolved mourning for the death of an attachment figure during childhood or early adolescence. Except for one case, all secondary classifications for the U/d participants were insecure. The attachment memories that emerged from these U/d transcripts were characterized by frightening/frightened caregivers—who were often unresponsive, emotional neglecting, and abusing. In these transcripts, it was frequently reported that the father was physically aggressive towards the child and other members of the family (the mother in most instances). When the U/d classifications were derived only from unresolved loss, the death of beloved ones frequently occurred in early adolescence and usually involved parental substitutes (such as uncles and grandparents) who were perceived as protective and supportive for children who were neglected or rejected by their biological parents. These U/d transcripts contained a large number of unfinished sentences, prolonged silences (in one case, over two minutes), disbelief about the loss (some of the participants talked about the dead person as if he or she was still alive) and, occasionally, unreasonable guilt for the death. In the process of coding some U transcripts, there were cases where the abuse and mourning have developed into very painful and dysregulated affective states; that was likely to be at the origin of certain extreme responses reported in the interviews, such as suicide attempts or self-injury behaviors.

Participants classified into the U/d category reported more Internet addiction symptoms than participants with organised states of mind (F, Ds, or E):  $t=3.80$ ,  $df=34$ ,  $p=0.001$  (see **table 1**). More specifically, U/d subjects showed higher IAT scores than people with F ( $U=6.50$ ;  $z=2.01$ ;  $p=0.044$ ) and Ds ( $U=42$ ;  $z=2.66$ ;  $p=0.008$ ) states of mind; despite a difference of almost ten points in the mean scores of IAT was observed between U/d and E classifications, the comparison of medians through Mann-Whitney's U test did not show significant difference between these two states of mind ( $t=17.00$ ;  $z=1.52$ ;  $p=0.144$ ).

The DES-II scores were highly correlated with the IAT scores ( $r = .62$ ;  $p<0.001$ ). There was a significant

**Table 1.** States of mind regarding attachment and IAT mean scores of MUD abusers (n=36)

AAI States of mind	N (%)	IAT scores	(SD)	Range
<i>Ds (Dismissing)</i>	12 (33.3%)	61.08	(8.81)	51-78
<i>F (Free)</i>	3 (8.3%)	58.67	(4.04)	55-63
<i>E (Entangled)</i>	4 (11.1%)	62.25	(7.93)	57-74
<i>U/d (Unresolved/disorganised)</i>	17 (47.2%)	71.59	(9.01)	54-87

Note. AAI: Adult Attachment Interview; IAT: Internet Addiction Test

association between the most severe symptoms of Internet addictions (IAT scores of 80 or above) and the pathological dissociation (DES-II scores of 30 or above): among the 9 participants who screened positive for dissociative disorders there were five who showed a severe Internet addiction in the IAT (Fisher's exact test  $p < 0.001$ ).

In this study, the "psychic pit" hypothesis of dissociation mediating the effect of attachment disorganization on internet addiction scores was tested. The U/d states of mind significantly related to IAT scores (Beta=0.55,  $p=0.001$ ) and, similarly, they related to the DES-II scores (Beta=0.53,  $p=0.001$ ), controlling for other AAI states of mind; next, we verified that DES-II scores were positively associated with IAT scores (Beta=0.62,  $p < 0.001$ ), and the resulting relationship between U/d states of mind and IAT scores became nonsignificant (Beta=.03,  $p=ns$ ) after controlling for DES-II scores (Sobel test=2.27,  $p=.02$ ). Findings from the bootstrapping analyses showed that the total indirect effect of U/d states of mind on IAT scores through DES-II scores was significant (95% confidence interval: 1.85–9.50). Therefore, results of mediation analyses suggest that dissociation can serve an important role in linking unresolved states of mind and problematic Internet use.

## Discussion

The first phase of the study showed that adults who played on the Extremelot MUD are involved with the Internet at a normal degree. A part of them also presented some symptoms of Internet addiction; nonetheless, only a small proportion of these players developed a problematic Internet use.

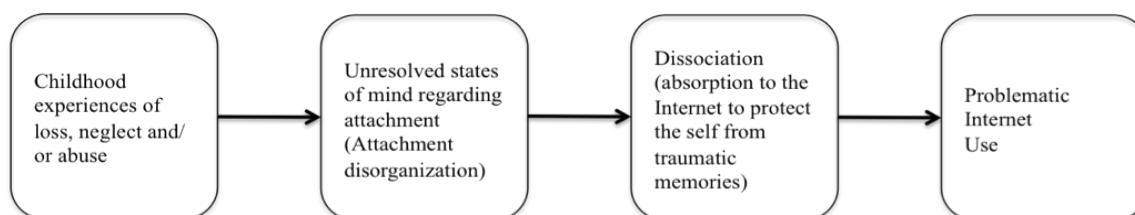
Thus, it is possible that high scores on the Internet Addiction Test in this sample resulted from a condition of broader psychological vulnerability: a large majority of the people who screened positive for problematic Internet use showed insecure or unresolved states of mind regarding attachment, and they presented also moderate scores on dissociation.

Moreover, the U/d participants showed the

highest scores in the IAT, suggesting that attachment disorganization relates to the severity of Internet addiction symptoms. These findings have important diagnostic implications: indeed, the U/d states of mind are considered a prototype of maladaptive strategy to cope with negative emotions deriving from childhood interpersonal trauma (van Ijzendoorn et al. 1999, Schore 1994); furthermore, it has been suggested that the experiences of loss, abuse or neglect during childhood are usually kept away from awareness through dissociation, in order to protect the attachment system (Ogawa et al. 1997, Liotti 2006, Main and Morgan 1996).

Thus, attachment trauma is likely to create a severe condition of psychological vulnerability that has been linked (both theoretically and empirically) with the development of internalizing and externalizing disorders (van Ijzendoorn and Bakermans-Kranenburg 2008, van Ijzendoorn et al. 1999, Lyons-Ruth et al. 1997). This developmental pathway of attachment trauma is consistent with the findings of this study, where U/d states of mind showed a predictive association with the dissociative symptoms, which in turn explained the degree of Internet addiction.

In line with the "psychic pit" model on the developmental origins of Internet addiction, it is possible to assume that in the subsample of MUD players who showed a problematic Internet use the attachment disorganization has led the participants to seek a retreat in virtual worlds for regulating the painful feelings that originated in the child-caregivers relationship. As Caldji and colleagues (1998) stated, from a neurobiological perspective, "maternal care during infancy serves to 'program' behavioural responses to stress" (p. 5335). In other words, child abuse and neglect create a psychic vulnerability that constitutes a prototype of emotional stress responses in adulthood, for example, when an individual is exposed to environmental stressors such as separation, loss, breakdown of affective relationships, and so on (Schore 1994). It is then possible that an addiction to virtual worlds can represent a "psychic pit in which feelings, states of mind and piece of one's own self are buried and lost in oblivion" (Schimmenti and Caretti 2010, p.



**Figure 1.** The "psychic pit" model on the developmental roots of problematic Internet use

127), for individuals with attachment disorganization. The “psychic pit” model for problematic Internet use is summarized in **figure 1**.

Hence, while it can be normal for a person to use the Internet in order to temporarily shelter the self from some unpleasant feelings, it is possible that some of the participants recruited for the second phase of the study have found a way to manage their disorganised states of mind through the misuse of virtual worlds and a total immersion in the alternative reality. With regard to this, the findings of the second phase of the study confirmed that dissociation can play a crucial role in problematic Internet use: the mediation analyses showed that the U/d states of mind were a significant predictor of the IAT scores, and that dissociative experiences mediated the effect of attachment disorganization on the IAT scores. It is then likely that some people use the virtual worlds as a way for protecting the self from traumatic memories of loss, neglect and/or abuse deriving from adverse childhood experiences and their related feelings of hopelessness and helplessness (Schimmenti 2012, Schimmenti and Caretti 2010).

Findings of the study also suggest that virtual worlds may represent a symbolic environment where people with attachment disorganization try to overcome the childhood trauma. This idea applies to several AAI transcripts. For example, in the case of a young man whose character in the game was a dreadful and unemotional warrior showing no pity for enemies and even friends: as a child, this player was constantly belittled, humiliated, and physically abused by his father. In such a case, the withdrawal into the Extremelot MUD allowed this player to have a positive self-esteem by identifying with his avatar (the warrior can be considered here, in psychoanalytic terms, as a projection of the Ego Ideal that embodies some desired qualities: this can allow the individual to restore a sense of security and strength in the self). Another example is about a young woman who has been sexually abused in her adolescence. In the game, she is a magic healer who is very able to restore health and give stronger powers to herself and her friends during the most difficult battles. Within a psychodynamic perspective, it is possible to connect her use of magic powers in the game to the desire of a magical repair for the wounded parts of her self.

In summary, the study suggest that sometimes the abuse of virtual worlds can be conceived in terms of a dissociative process, where the over-involvement with the game, the detachment from reality and the psychological absorption in the alternative reality constitute a defensive strategy to exclude the overwhelming memories and states of mind related to attachment trauma.

The study has several limitations that need to be addressed. First, it is acknowledged that self-report measures of clinical constructs can present relevant bias problems (van de Mortel 2008, Podsakoff et al. 2003). This applies to the measures of Internet addiction and dissociation used in this study, although they have widely demonstrated good psychometric properties; further studies designed for testing the “psychic pit” model should include a multimeasure assessment of Internet addiction and dissociation. Second, the screening for Internet addiction with the IAT does not allow to conclude that all the people recruited in the second phase of the study are overinvolved with the online gaming. High scores on the IAT can also derive from other problems with the Internet use; further studies on these kinds of players should include measures that directly assess the specific

“diet” (Bowman et al. 2012) in the use of online role playing games. Third, it is even difficult to conclude that attachment representations and dissociation play a causal role in the development of Internet addiction due to the cross-sectional design of the study. Findings from this study show that individuals with problematic Internet use are more likely to present indicators of attachment disorganization; however, even if the aetiological model of the psychic pits specifies otherwise, the methodology used in this study and the evidence of mediation does not allow to logically rule out a reverse causation (Pearl 2009), i.e. it is also possible that the problematic Internet use drives the attachment disorganization. Furthermore, it may also be that the predictive associations among attachment disorganization, internet addiction scores, and dissociation scores are affected by some unmeasured third variable (e.g., personality traits, current social support, shame, affect dysregulation, and so on).

Conversely, with respect to the strengths of this study, the use of the AAI is an important methodological advance. To the best of our knowledge, this is the first research ever that uses the AAI with MUD players showing a problematic Internet use. The analysis of thirty-six AAI transcripts allowed a more detailed picture of the attachment representations of these players, thereby permitting to arrive at more robust conclusions by reducing the potential limitations inherent in attachment style self-report assessments (Roisman et al. 2007, Shaver et al. 2000), such as their inability to detect the attachment disorganization and their not so good convergent validity with clinical assessment of adult attachment. However, in our opinion the most important strength of this study is that it eventually represents a move towards an empirically-supported model for problematic Internet use that is theoretically grounded on the tenets of attachment theory and psychoanalysis, thereby providing further profundity of thought to the construct of Internet addiction.

## Conclusions

A few years ago, Sherry Turkle (2004) observed that today’s computers can be conceived as “extensions of the mind’s construction of thought” (p. 19). However, this consideration has its counterparts in the construct of Internet addiction, which has been increasingly studied during the previous decade because the patients’ misuse of the Internet has become more and more prevalent in clinical practice.

Among the many forms of problematic Internet use, one is the addiction to online role-playing games. Findings from our study support the hypothesis that virtual worlds can provide a dissociative psychic retreat from the unresolved states of mind regarding attachment. There are relevant clinical implications to this aspect. For some individuals, the addiction to MUDs and MMORPGs may originate from the need to exclude traumatic attachment memories and representations from awareness. This suggests that the use of virtual worlds might also serve as a sort of self-therapy for people who have experienced attachment trauma. Virtual worlds can even represent a safe environment that allows an expression for painful feelings and dissociated states of mind, thus it is possible that playing with other people and interacting with them help these players in developing a better sense of relatedness, competence and mastery while attempting to overcome the trauma. So, clinicians can

positively use this aspect of the patient's involvement of virtual worlds for better understanding and addressing how the patient relates with other persons and copes with problems or disturbing feelings (Rosegrant 2012). However, if the patient has experienced an attachment trauma, his or her abuse of the Internet should be carefully addressed and managed by clinicians, because the emergence of traumatic memories can result in very painful states of mind. Psychotherapy with individuals who are addicted to virtual worlds should first address the question of providing a secure base, because this probably constitute a prerequisite for patients to loosen their needs for an extreme use of dissociation. Thereafter, it is likely that the clinician can be more helpful with assisting the patients' attempts of exploring and integrating in the self the painful states of mind regarding attachment that are dissociated and that express themselves in a severe abuse of the virtual worlds.

Further studies are necessary to verify the usefulness of such considerations and the validity of the "psychic pit" model. However, our findings suggest that psychoanalysis and attachment theory might strengthen the efforts of researchers and clinicians in elucidating why some people become addicted to the Internet.

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