The impact of sensation seeking on the relationship between attention deficit/hyperactivity symptoms and severity of Internet addiction risk

Ercan Dalbudak [a,*], Cuneyt Evren [b], Secil Aldemir [a], Ibrahim Taymur [c], Bilge Evren [d], Merve Topcu [a]

[a] Department of Psychiatry, Faculty of Medicine, Turgut Ozal University, Ankara, Turkey
[b] Bakirkoy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, Alcohol and Drug Research, Treatment and Training Center (AMATEM), Istanbul, Turkey
[c] Department of Psychiatry, Ministry of Health, Sevket Yılmaz Research and Training Hospital, Bursa, Turkey
[d] Baltalimani State Hospital for Muskuloskeletal Disorders, Department of Psychiatry, Istanbul, Turkey

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ABSTRACT

The aim of this study was to investigate the relationship of attention deficit/hyperactivity symptoms (ADHS) with severity of Internet addiction risk (SIAR), while controlling the effects of variables such as depression, anxiety, anger, sensation seeking and lack of assertiveness among university students. Cross-sectional online self-report survey was conducted in two universities among a representative sample of 582 Turkish university students. The students were assessed through the Addiction Profile Index Internet Addiction Form Screening Version (BAPINT-SV), the Psychological Screening Test for Adolescents (PSTA) and the Adult Attention deficit/hyperactivity disorder Self-Report Scale (ASRS). The participants were classified into the two groups as those with high risk of Internet addiction (HRIA) (11%) and those with low risk of Internet addiction (IA) (89%). The mean age was lower in the group with HRIA, whereas depression, anxiety, sensation seeking, anger, lack of assertiveness and ADHS scores were higher in this group. Lastly, a hierarchical regression analysis suggested that severity of sensation seeking and ADHS, particularly attention deficiency, predicted SIAR. The severity of sensation seeking and ADHS, particularly attention deficit symptoms, are important for SIAR. Awareness of sensation seeking among those with high ADHS may be important in prevention and management of IA among university students.

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1. Introduction

Excessive use of the Internet may lead to Internet addiction (IA), which may result as a wide range of dysfunction in daily routine and in taking responsibilities (Yen et al., 2007). The lack of a standardized definition and diagnostic instruments that show adequate reliability and validity across countries are significant limitations in evaluating of IA. Despite this limitation, IA was considered as a new psychiatric disorder in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), although it was not defined in DSM-5. Nevertheless, although the phenomenon has been previously called with different terms (Ko et al., 2012), the literature findings have been started to make consensus on the term IA (Young and Rogers, 1998; Yen et al., 2007; Dalbudak et al., 2013a, 2013b, 2014a; Dalbudak and Evren, 2014b). On the other hand, a number of studies have been conducted to describe the underlying mechanism of the phenomenon, but further research is still required.

1.1. Internet addiction and sensation seeking

Studies have suggested that individuals who have higher scores on novelty seeking (Dalbudak et al., 2013a) and/or sensation seeking (Lin and Tsai, 2002; Shi et al., 2011) would also be more likely to have IA due to the free nature of the Internet. Zuckerman (1979) defined the concept of sensation seeking as a trait comprised of individuals' need for novel and complex sensations and experiences, and voluntary social and physical risk taking for the sake of the experience. Individuals may seek sensation via drug use, sexuality, aggression, extreme sports, Internet and computer use (Zuckerman, 1979; Lin and Tsai, 2002).

1.2. Internet addiction and psychological symptoms

Although IA has been accepted as a differentiated psychopathology (Fu et al., 2010), it has been reported that IA is also highly

* Correspondence to: Bestepe mah. Meric Sok., Kardes Apt. 25/28 Bestepe, 06330 Yenimahalle, Ankara, Turkey. Tel.: +90 312 2035555; GSM: +90 505 6478616; fax: +90 312 2213670.
E-mail addresses: edalbudak@hotmail.com, dr.dalbudak@gmail.com (E. Dalbudak).

comorbid with psychological symptoms (Yang et al., 2005; Ko et al., 2012; Carli et al., 2013; Dalbudak et al., 2013b). Previous studies suggested that IA is associated with attention deficit/hyperactivity symptoms (ADHS) (Yen et al., 2007; Carli et al., 2013; Dalbudak and Evren, 2014b), low self-esteem (Kim and Davis, 2009), shyness (Treuer et al., 2001), anger expression (Hwang et al., 2014), hostility (Yen et al., 2007), depressive symptoms (Young and Rogers, 1998; Treuer et al., 2001), impulsivity (Cao et al., 2007; Dalbudak et al., 2013b) and obsessive–compulsive symptoms (Jang et al., 2008; Carli et al., 2013, Dalbudak et al. 2013b). Finally, according to a meta-analysis (Ho et al., 2014), IA is associated with alcohol abuse, ADHS, depression and anxiety.

To our knowledge, the relationship between IA and assertiveness has not been studied directly yet. Assertiveness is characterized as "the proper expression of any emotion other than anxiety toward another person" and is commonly conceptualized within social skills (Furnham, 1979). Moreover, previous studies suggested that low extravert personality trait is closely associated with severity of Internet addiction risk (SIAR) (Yan et al., 2014; Dalbudak and Evren, 2014b) and addictive behaviors (Feldman and Eysenck, 1986; Eysenck, 1997). Assertiveness is a manifestation of being extravert (Carver and White, 1994). It is also known that individuals with IA have lower social skills in real world and high comorbidity of social anxiety (Yen et al., 2014). Therefore, directly studying the relationship between IA and assertiveness may have an important role for further understanding of the concepts (Naragon-Gainey et al., 2013).

1.3. Internet addiction and attention deficit/hyperactivity symptoms (ADHS)

Attention deficit/hyperactivity disorder (ADHD) is a chronic neurobiological and childhood-onset disorder persisting into adolescence and adulthood (Ramos-Quiroga et al., 2013). Comorbidity of ADHS with other psychopathologies has been well-established in the literature. ADHS is commonly found in psychopathologies such as depression, anxiety, oppositional defiance, conduct disorder, substance use disorders (Herguner and Herguner, 2012; Klassen et al., 2012; de la Barra et al., 2013) and last but not least IA (Dalbudak and Evren, 2014b). Both IA and ADHS may lead to academic problems, including lower school performance and higher drop-out rates (Fredriksen et al., 2014), risky behaviors (Wolraich et al., 2005) and relational problems (Yen et al., 2014). Recently interest of researchers in studying underlying mechanisms of the relationship between ADHS and IA have increased (Carli et al., 2013; Dalbudak and Evren, 2014b; Ho et al., 2014). It was suggested that Internet serves by instant feedback and reward to the nature of ADHS in which individuals are easily getting bored and "having an aversion for delayed reward" (Ko et al., 2012). In addition, it is known that impaired inhibition is seen among those with ADHS due to abnormal brain activity (Weiss et al., 2011). In this case, impaired inhibition may lead difficulty in controlling the Internet use and increase the vulnerability of IA (Yen et al., 2014). Moreover, it is possible to predict risk of IA two years before the diagnosis of IA by detecting early ADHS (Ko et al., 2009).

Among various forms of psychological problems, depression and anxiety are salient in individuals with IA (Ko et al., 2012). Yen et al. (2014) suggested that prevention and intervention programs for IA in adolescents with ADHS should take anxiety, depression, and self-esteem into consideration. This study revealed that higher physical symptoms, lower harm avoidance and higher somatic discomfort/retarded activity were found to be significantly associated with more severe IA symptoms (Yen et al., 2014). Thus, studies focusing on IA must include depression and anxiety in their analyses.

Beside limited findings accounting for the associations between anxiety, depression, ADHS and sensation-seeking with SIAR, studies evaluating the effect of variables such as lack of assertiveness and anger on IA are also lacking in the literature. Although associations of these variables with IA are not well known, addiction potential can be predicted by aggression and assertiveness among university students (Hajihasani et al., 2014). Since literature findings emphasize the similarities in terms of personality, temperament, and emotion upon IA and alcohol addiction (Dalbudak et al., 2013a; Hwang et al., 2014), studying the relationship between IA and these variables may have importance. So far only one study conducted in Turkey evaluated the association between severity of ADHS and IA, while controlling the effect of personality traits, depression and anxiety symptoms among Turkish university students (Dalbudak and Evren, 2014b). However, this study did not consider variables such as sensation-seeking, lack of assertiveness and anger, and also was not conducted online. To our knowledge, the present study is the first online survey carried out in Turkish university students. After considering the previous literature, the current study hypothesized that even after controlling psychological symptoms, ADHS would predict SIAR and the sensation seeking may mediate this relationship. Therefore, the aim of the present study is to investigate the relationship of SIAR with psychological variables (depression, anxiety, anger, sensation seeking and lack of assertiveness) and ADHS among university students in Ankara/Turkey.

2. Methods

2.1. Participants and procedure

Cross-sectional online self-report survey was conducted in two universities in Ankara. A website was prepared for online participation. Approval from the Ethical Committee of the Turgut Ozal University was taken. The study was carried out between February and July 2013. The students were asked to fill out the form on the website anonymously. Informed consent was approved by students online before continuing with further questions. Exclusion criteria were unfilled forms. Due to exclusion criteria 582 students were included in the study, out of 803 randomly selected students from two universities.

2.2. Measures

The questionnaire administered online in the study, which covered socio-demographic data, was similar with the questionnaire used formerly in Turkey (Ogel et al., 2001, 2003, 2006). The participants also filled the Adult ADHD Self-Report Scale (ASRS); the Psychological Screening Test for Adolescents (PSTA) and the Addiction Profile Index Internet Addiction Form Screening Version (BAPINT-SV) was also used to determine high and low risk addiction groups.

2.2.1. The Addiction Profile Index Internet Addiction Form Screening Version (BAPINT-SV)

BAPINT-SV includes 2 of the 18 questions of BAPINT, which is a self-rating scale that evaluates the risk of IA (Ogel et al., 2012a). Chang and Man Law (2008) categorized Internet use into four macro-areas: compulsive internet use, excessive time spent online and failure to control it; withdrawal symptoms when being restricted from internet use; using the internet for social comfort; and negative social, academic or work consequences related to internet use. Two of these four areas were evaluated with BAPINT-SV with Likert-type answers; 1-Spending time on the Internet within the last 3 months (a-Never, b-1–5 times a week or less, c-up to 3 h 59 min a day, d-4 to 5 h 59 min a day, e- 6 h or more a day) and 2-Does spending time on the Internet effect your life negatively? (a-Never, b-Very little effect, c-Partial effect, d-It effects, e-Too much effect). Correlation of BAPINT-SV with BAPINT is high ($r=0.82$, $p < 0.001$) (Ogel et al., 2012b). BAPINT-SV is validated among adolescents and university students and when point 4 is taken as a cut-off point sensitivity was found as 0.72, whereas specificity as 0.83 (PPV:97.5, NPV:75.7) (Ogel et al., 2012a). Cronbach's α for BAPINT-SV was 0.76 in the present study. Finally, BAPTINT-SV is used in a published study (Evren et al., 2014a).

2.2.2. The Psychological Screening Test for Adolescents (PSTA)

The Psychological Screening Test for Adolescents (PSTA) was developed by adaptation of the Examination and Assessment Form for Juvenile Offenders (ARDEF), which