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The relationship of Internet addiction severity with Attention Deficit Hyperactivity Disorder symptoms in Turkish University students; impact of personality traits, depression and anxiety

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Abstract

Aim: The aim of this study was to investigate the relationship of Internet addiction (IA) with Attention Deficit Hyperactivity Disorder (ADHD) symptoms while controlling the effect of personality traits, depression and anxiety symptoms in Turkish university students.
Methods: A total of 271 university students participated in the present study. The students were assessed through the Internet Addiction Scale (IAS), the Wender Utah Rating Short Scale (WURS-25), the Turkish version of the Adult ADHD Self-Report Scale (ASRS), the Eysenck Personality Questionnaire Revised Abbreviated Form (EPQR-A), the Beck Depression Inventory (BDI) and the Beck Anxiety Inventory (BAI).
Results: According to IAS, participants were separated into three groups, namely, moderate/high, mild and without IA groups. The rates of groups were 19.9% (n = 54), 38.7% (n = 105) and 41.3% (n = 112), respectively. Correlation analyses revealed that the severity of IAS is positively correlated with WURS-25, ASRS (total, inattention and hyperactivity/impulsivity subscales), neuroticism personality trait, depression and anxiety scores, whereas it is negatively correlated with extraversion personality trait. Hierarchical regression analysis indicated that depression and anxiety symptoms, introversion and neuroticism personality traits and the severity of ADHD symptoms (particularly hyperactivity/impulsivity symptoms) are the predictors for IAS score, respectively.
Conclusions: The severity of ADHD symptoms has predicted the severity of IA even after controlling the effect of personality traits, depression and anxiety symptoms among Turkish university students. University students with severe ADHD symptoms, particularly hyperactivity/impulsivity symptoms may be considered as a risk group for IA.
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1. Introduction

1.1. Internet addiction (IA)

Although the Internet has become one of the most important information resources for university students, excessive Internet use can be defined as uncontrolled and harmful use of the Internet, in other words, IA [1]. The previous studies indicated that the rates of IA among adolescents and young people ranged from 2.4% to 37.9% in Asia, whereas researches on similar age groups in Europe showed that the rates of IA ranged between 3.1% and 18.3% [2]. The variations in these results could be due to different methodologies, cultural reasons, sample or scale selection. Nevertheless, according to IAS, incidence rate of the IA among Turkish university students ranged between 7.2% [1] and 12.26% [3]. Two recent reviews suggested that there is a relationship between IA and psychological symptoms/disorders particularly attention deficit hyperactivity disorder (ADHD), depression, anxiety, impulsivity and hostility [4,5].

1.2. IA and ADHD

Although ADHD is a childhood-onset psychiatric disorder, around two-thirds of the patients with childhood ADHD may still have ADHD symptoms during their adulthood [6–8], about 15% still meet the DSM-IV criteria for the full ADHD syndrome, and the rest meet the criteria

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for the DSM-IV diagnosis of "ADHD in partial remission" [7]. As a result, it is now widely accepted that ADHD is a frequent chronic condition with a lifelong perspective, and adult ADHD is a reliable and valid diagnosis.

Ramos-Quiroga et al. [9] indicated that the presentation of ADHD symptoms can change from adolescence to adulthood with less overt hyperactivity but ongoing attentional problems, disorganization and symptoms of emotional dysregulation like mood swings, temper outbursts, and irritability. These symptoms may overlap with behavioral addiction (i.e. IA), which is one of the most common comorbid diagnosis with ADHD. Some symptoms such as "being easily bored" and "having an aversion for delayed reward" reported in ADHD [10,11], may also commonly be seen among university students with IA. Yoo et al. [12] suggested that the children with ADHD had higher IA scores compared with the non-ADHD group. In a systematic review, Carli et al. [5] have reported that symptoms of ADHD appeared to have the most significant and consistent correlation with IA. The comorbidity of these two disorders may indicate the causal relationship among them or common etiology shared by them. Nevertheless, evaluating factors related with this comorbidity may shed a light on treatment of resistant IA.

1.3. IA, Depression and Anxiety

Similar with ADHD [12–15], major depressive disorder [13], depressive and anxiety symptoms [4,5,16] are also found to be related with IA. Although, these relationships are not as strong as the relationship between IA and ADHD [5], since they are commonly related with IA [16–18], they were suggested to be important factors to evaluate when considering IA [1,17,19]. Moreover, personality traits can be related with negative affect such as depression and anxiety symptoms.

1.4. IA and Personality

Personality is a special focus within IA research [20]. One of the main reasons for the focus on personality is the potential link between personality traits like neuroticism and a predisposition for psychopathology ranging from addiction [21], including IA [1,20], to depression and anxiety symptoms [22], which are also closely related with IA [4,5,13,16].

Dalbudak et al. [1] suggested that among Turkish university students exhibiting high novelty seeking scores, together with low self-directness and cooperativeness scores are closely associated with IA. According to previous studies that used Eysenck Personality Questionnaire (EPQ), there was the relationship between IA and personality traits. That is, these studies suggested a relationship between introversion personality trait and IA [23–25]. Moreover, among university students, high neuroticism/stability and psychoticism/socialization scores, and low lie scores predicted IA [24]. Finally, Yan et al. [25] suggested neuroticism as a potential

predictor of IA among college students. Nevertheless, these studies did not control depression or anxiety symptoms when evaluating the relationship between IA and personality traits. It is important to consider depression and anxiety when evaluating this relationship, because similar with IA, neuroticism personality trait is also characterized by high levels of negative affect.

Although there are some studies that evaluated the relationship between IA and ADHD, this is the first study to control variables such as personality traits, depression and anxiety while evaluating this relationship. We hypothesized that severity of ADHD symptoms may still be related with severity of IA even after controlling these variables.

2. Methods

The study was conducted with volunteers from Turgut Ozal University in Ankara between January and May in 2013. Written informed consent was obtained from the students after the study protocol was thoroughly explained.

2.1. Participants

A total of 300 university students were randomly selected from Turgut Ozal University. The inclusion criteria were Internet use for communicative purposes on a regular basis and willingness to participate in the study. The exclusion criteria were rejection to participation, demanding any fee and incomplete participation to the study. According to these criteria 29 university students were excluded from the study. Thus, the study was conducted with 271 university students (110 males and 161 females).

2.2. Assessments

All the students were assessed by using a semi-structured socio-demographic form and the questionnaires were completed by students in a classroom setting via paper-and-pencil format.

2.2.1. Internet addiction scale (IAS)

IAS was developed by Nichols and Nichi [26] to measure the severity of IA and tested on a group of 233 college students. The Cronbach's α of the IAS was 0.95, and the explained variance was 46.50%. The IAS is scored by summing the Likert responses across the 31 items. In a reliability and validity study of the Turkish version of the IAS [3], the Cronbach's α value was 0.93 in 253 university students. In the present study Cronbach's α was 0.92.

Kayri and Gunuc [3] suggested the classification of scores into 5 groups: 30–60, 61–70, 71–80, 81–89 and >90. They also suggested that those who score 90 or higher should be considered as addicted to the Internet and that those who score between 81 and 89 should be considered as at high risk of IA. Durkee et al. [2] suggested that to better reflect the taxonomy of Internet users, IA should be assessed as a non-dichotomous categorical variable. Thus, in the present