



RESEARCH ARTICLE

Relationship of internet gaming disorder severity with symptoms of anxiety, depression, alexithymia, and aggression among university students

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ABSTRACT

Objective: The aim of the present study was to evaluate the relationship of Internet gaming disorder severity with alexithymia and aggression among university students, while controlling for effects of anxiety and depressive symptoms.

Method: The study was conducted with an online survey among 987 volunteer university students in Ankara. Participants were evaluated by administering the Toronto Alexithymia Scale (TAS-20), the Buss-Perry Aggression Questionnaire (BPAQ), the Internet Gaming Disorder Scale–Short-Form (IGDS9-SF), and the depression and anxiety subscales of the 90-Item Symptom Checklist-Revised (SCL-90-R).

Results: Scores for the different scales mildly correlated with one other. In hierarchical linear regression analysis, both alexithymia (particularly the dimensions “difficulty identifying feelings” [DIF] and “externally-oriented thinking” [EOT]) and aggression (physical aggression) predicted the severity of Internet gaming disorder symptoms, together with severity of depressive symptoms.

Conclusion: These findings suggest that among university students, the severity of alexithymia, particularly in its dimensions DIF and EOT, is related with the severity of Internet gaming disorder, together with aggression, particularly physical aggression, and depression.

Keywords: Alexithymia, aggression, anxiety, depression, internet gaming disorder

INTRODUCTION

Among numerous activities on the Internet, including chatting, shopping, blogging, gambling, and so on, gaming has attracted the greatest attention of clinicians and investigators. Although playing video games is not

considered intrinsically pathologic or problematic, gaming can become pathological for some players “when the activity becomes dysfunctional, harming an individual’s social, occupational, family, school, and psychological functioning” (1). In general, “pathological gaming” can be described as “persistent, recurrent, and

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excessive involvement with computer or video games that cannot be controlled, despite associated problems" (2,3). Consequently, the DSM-5 included "Internet gaming disorder" (IGD) as a condition that needs further research before being fully recognized and accepted as an independent disorder in subsequent publications of the DSM (4). According to the latest definition the World Health Organization (WHO), "gaming disorder" is a pattern of gaming behavior ("digital-gaming" or "video-gaming") characterized by impaired control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities, and continuation or escalation of gaming despite the occurrence of negative consequences (5).

Alexithymia is a multifaceted personality construct that is defined as the inability to distinguish one's feelings from the accompanying bodily sensations, the inability to communicate feelings to others, and externally orientated cognitive features reflecting an absence of inner thoughts and fantasies (6). Alexithymia has been considered as an impairment not only in the identification and expression of one's feelings, but also globally in emotional processing and deficits in the regulation of emotion (6,7). Based on the hypothesis that individuals with alexithymia attempt to regulate their emotions through compulsive (8) or impulsive (9) behaviors, alexithymia has been associated with addictive disorders. Over the last few decades, the role of alexithymia in substance use disorders and behavioral addictions has garnered interest from researchers, and an increasing body of evidence suggests that alexithymia may play an important role in the etiopathogenesis of addictive disorders (10). It has been hypothesized that individuals engage in such impulsive and compulsive behaviors to avoid disturbing emotions (7). Previous studies suggested that alexithymia is related not only with substance use disorders (11,12) but also with behavioral addictions such as gambling (13), mobile phone addiction (14), and Internet addiction (IA) (15), whereas depression and/or anxiety may have important mediating effects in these relationships (16). An association between alexithymia and IA is well documented in previous studies suggesting that alexithymia may play an important role in the development of IA (9,15-25). Alexithymia was also found to be a mediator in the relationship between childhood maltreatment and IA in college students (25). Although these studies have documented associations of alexithymia with IA in young adults,

the nature of this relationship remains unclear given that alexithymia is commonly associated with anxiety and depression (21,26). Ko et al. (27) suggested in their review that IA may lead to emotional stability. Consistent with these studies, a recent review that evaluated the relationship of alexithymia and IA suggested that "the causal direction of this association is not clear because the interplay of numerous other variables that could affect the relation has not been studied" (15). A study assessing the relationship between alexithymia and IGD among adolescents found higher levels of alexithymia among regular gamers than among irregular gamers (28). While alexithymia (together with depression scores and anxiety scores) was associated with IGD among gamers, this was only valid for males but not females (29). Thus the relationship between alexithymia and IGD seems to be an important subject to evaluate.

A relationship between aggression and IA has been reported both among adolescents (30) and university students (31). Similarly, previous studies found a strong association between aggressive behaviors and more frequent use of the computer and the Internet (32) or IA (30,33-35). Ko et al. (36) reported that although Internet use may reduce distress by providing immediate rewards and opportunities to engage in different activities, excessive use is an important risk factor for aggression. Comparing male patients with IA to others with alcohol use disorder, Hwang et al. (37) suggested that these two groups share common characteristics that may lead to aggression, indicating that strategies to reduce aggression in patients with IA are necessary. Hahn and Kim (38) suggested the possibility of neurobiological commonality between aggression and IA. A more recent study revealed a linear association between aggression and IA and suggested that anxiety and depression had partial or full mediating effects on the ability of aggression to predict IA (39).

Social learning theory, the cognitive neo-association model, and social cognitions have all been utilized to explain this association between IA and aggression (40). These theories have mostly focused on how adolescents changed after they watched violent content in the media. Now, however, the development of modern technologies has made it possible for users not only to view media passively, but allows them to participate interactively, as is the case in video games (30). Consistent with these observations, previous studies suggested a relationship between IGD and aggression among both adolescents (30,41) and university students (42). Furthermore, gamers who

played for longer periods of time or gamers with IGD showed higher scores on aggression than did regular gamers (42-44). Online gaming, communicational Internet use, and playing first-person shooters were predictive of aggression and delinquency among adolescents (45). Finally, a follow-up study found that aggression contributes to a worse prognosis among those with IGD (46).

The novelty of the present study is being the first research to evaluate the effects of both alexithymia and aggression together on IGD symptom severity. Since these variables are all related with negative affect such as depression and anxiety, we also controlled for these variables. We hypothesized that both severity of alexithymia and aggression may still be related with severity of IGD even after controlling for these variables.

METHOD

Subjects and Procedure

The present study was conducted with a cross-sectional online self-report survey among volunteer university students in Ankara. A website was prepared for online participation. Approval from the Ethics Committee of Cankaya University received on April 12, 2018 under number 80281877-050.99.

The students were asked to complete the form on the website anonymously. Informed consent was given by the students online before proceeding to answer the study questions. Exclusion criterion was if forms were not filled in appropriately. In order to control for duplicate data entry, we checked the participants' e-mail addresses and user names and we also checked their Internet Protocol (IP) addresses. A total of 987 participants were included in the study.

Measures

Toronto Alexithymia Scale (TAS-20): The prevalence of alexithymia was screened using the 20-item version of the Toronto Alexithymia Scale (TAS-20) (47,48), Turkish version, which had been validated for Turkish populations previously (49). Each TAS-20 item was rated on a five-point Likert-type scale between 1 and 5, producing total scores ranging from 20 to 100. The three dimensions of the TAS-20 are: 1- difficulty in identifying feelings (DIF), 2- difficulty in describing feelings (DDF), and 3- externally-oriented thinking (EOT). The total scores of the TAS-20 were categorized according to the recommendations by Gulec et al. (49); thus a score ≥ 61 indicated alexithymia and < 61 the absence of alexithymia. Cronbach's alpha for the total

TAS-20 scale was 0.77, and the coefficients for the three subscales (factors DIF, DDF, and EOT) were 0.80, 0.57, and 0.63, respectively.

Internet Gaming Disorder Scale-Short-Form (IGDS9-SF): The IGDS9-SF assesses the symptoms and severity of IGD and its detrimental effects by examining online and/or offline gaming activities occurring over a 12-month period (50). The scale comprises nine items corresponding to the nine core criteria defined by the DSM-5. They are scored on a five-point Likert scale ranging from 1 (never) to 5 (very often), and high scores on the scale translate to higher level of gaming disorder. In the present study, the Turkish version of the IGDS9-SF was used (51).

Buss-Perry Aggression Questionnaire (AQ): Trait aggression was measured by the total score of the AQ and scores for the subscales, including physical aggression (PA, nine items), verbal aggression (VA, five items), anger (AN, seven items), and hostility (HS, eight items) (52). The AQ comprises 29 items of a 5-point Likert format scored from 1 ('extremely uncharacteristic of me') to 5 ('extremely characteristic of me'). Evidence for the scale's construct validity is available elsewhere (52). The Turkish version of the AQ, which was used in the present study, has been found to be valid and reliable (53).

The 90-Item Symptom Checklist-Revised (SCL-90-R): SCL-90-R is a self-report measure used to assess psychopathologic symptoms (54). It has 90 items rated with a 5-point Likert scale (1, no problem to 5, very serious) to assess the extent to which individuals have experienced the listed symptoms in the last 7 days. These 90 items are grouped into nine subscales, although we only used the depression and anxiety subscales as being relevant to the scope of the present study. It was suggested that higher scores on the subscales indicate higher psychological distress that the individual has experienced. In the present study, the Turkish version of SCL-90-R was used (55).

Statistical Analysis

SPSS 17.0 for Windows (SPSS, 278 Chicago, IL, U.S.A.) was used for all analyses. Means and standard deviations are given for sociodemographic variables. Pearson correlation analysis was conducted between scale scores. Taking the severity of IGD symptoms as dependent variable and depression, anxiety, alexithymia and aggression as independent variables, hierarchical linear regression analysis was conducted. For all statistical analyses, p-values were two-tailed, and differences were considered significant at $p < 0.05$.

RESULTS

In Table 1, means and standard deviations are given for age and scale scores. Of the 987 participants, 567 were male (57.4%) and 420 were female (42.6%). Participants' mean age was 23.65 (Standard deviation=6.37, Minimum=14, Maximum=60) (Table 1).

Scale scores correlated with each other were mildly (coefficients between 0.25 and 0.50) to moderately (coefficients between 0.51 and 0.75) (Table 2). The IGDS score was mildly and positively correlated with Buss-Perry AQ ($r=0.32$), TAS-20 ($r=0.39$), depression ($r=0.33$), and anxiety ($r=0.32$) scores. In addition, the Buss-Perry AQ score was mildly and positively correlated with TAS-20 ($r=0.43$), depression ($r=0.41$), and anxiety ($r=0.50$) scores. Finally, the TAS-20 score was moderately and positively correlated with depression ($r=0.57$) and anxiety ($r=0.56$) scores.

Predictors of the IGD symptom severity were evaluated in stepwise linear regression analysis. The severity of depressive and anxiety symptoms were

Table 1: Sociodemographic variables and scale scores (n=987)

	Mean	SD
Age	23.65	6.37
Gender (n, %)		
Male	567	57.4
Female	420	42.6
Romantic relationship (n, %)	443	44.9
First Internet gaming was early*	750	76.0
Daily Internet gaming (n, %)		
Less than 3 hours	685	69.4
3 to 6 hours	119	20.2
6 to 9 hours	57	5.8
More than 9 hours	46	4.7
Toronto Alexithymia Scale (TAS-20)	51.50	10.95
DIF	16.22	6.01
DDF	12.94	4.00
EOT	22.33	3.74
Buss-Perry Aggression Questionnaire	46.05	18.00
Physical	12.10	6.92
Verbal	9.13	4.04
Anger	12.32	5.33
Hostility	12.51	6.60
Depression	18.85	11.05
Anxiety	10.34	8.56

*Before age 12, DDF: Difficulty describing feelings, DIF: Difficulty identifying feelings, EOT: Externally-oriented thinking, SD: Standard deviation

Table 2: Correlations between scale scores

	IGSD9-SF	Buss-Perry AQ	TAS-20
Physical aggression	0.273	0.826	0.317
Verbal aggression	0.119	0.657	0.034*
Anger	0.216	0.842	0.343
Hostility	0.333	0.778	0.545
Buss-Perry AQ	0.318	-	0.431
DIF	0.391	0.504	0.891
DDF	0.317	0.335	0.860
EOT	0.175	0.092**	0.574
TAS-20	0.390	0.431	-
Depression	0.330	0.411	0.570
Anxiety	0.323	0.495	0.560

* $p>0.05$, ** $p<0.01$, for the remaining values $p<0.001$, IGSD9-SF: Internet Gaming Disorder Scale-Short-Form, TAS-20: Toronto Alexithymia Scale, DIF: Difficulty identifying feelings, DDF: Difficulty describing feelings, EOT: Externally-Oriented thinking, Buss-Perry AQ: Buss-Perry Aggression Questionnaire

entered in the analysis as independent variables in the first step. In step 2, the score of TAS-20 and in step 3 the score of Buss-Perry AQ were entered in the analysis as independent variables. Finally, in step 4 subscale scores of TAS-20 (instead of the total TAS-20 score) and the DERS subscale scores (instead of the total score of DERS) were included in the analysis as independent variables. In this stepwise linear regression analysis, both alexithymia (particularly its dimensions "difficulty describing feelings" [DDF] and "externally-oriented thinking" [EOT]) and aggression (physical aggression) predicted the severity of IGD symptoms, together with the severity of depressive symptoms (Table 3).

DISCUSSION

The main finding of the present study, which is also consistent with our hypothesis, was that the severity of both alexithymia and aggression, particularly physical aggression, were still related with the severity of IGD even after controlling for negative affect, such as depressive and anxiety symptoms. Young adults may be gaming as a means of coping with alexithymia, and gaming may provide a legal platform for physical aggression. These students would find the online gaming environment attractive, probably due to the absence of physical presence and the anonymity, and might therefore be more vulnerable to IGD (9). Internet gaming can also provide an unreal life for these students, where they can act out their fantasies without

Table 3: Predictors of Internet gaming disorder severity according to stepwise linear regression model

Model	Unstandardized Coefficients		Standardized Coefficients		t	p
	B	Std. Error	Beta			
Step 1						
Depression	0.216	0.020	0.330		10.972	<0.001
Step 2						
Depression	0.104	0.023	0.159		4.503	<0.001
Alexithymia	0.198	0.023	0.300		8.481	<0.001
Step 3						
Depression	0.079	0.023	0.120		3.352	0.001
Alexithymia	0.168	0.024	0.253		6.997	<0.001
Buss-Perry AQ	0.064	0.013	0.159		4.871	<0.001
Step 4						
Depression	0.093	0.024	0.143		3.869	<0.001
DIF	0.275	0.047	0.229		5.865	<0.001
EOT	0.168	0.057	0.087		2.939	0.003
Physical aggression	0.160	0.032	0.153		4.998	<0.001

Buss-Perry AQ: Buss-Perry Aggression Questionnaire, DIF: Difficulty identifying feelings, EOT: Externally-Oriented thinking, Variables entered in the first step: Anxiety and depression. Step 1: $F=120.374$, $df=1.985$, $p<0.001$, Adjusted $R^2=0.108$, Variables entered in the second step: Step 2: Depression and total score of Toronto alexithymia scale (TAS-20). Step 2: $F=100.486$, $df=2.984$, $p<0.001$, Adjusted $R^2=0.168$, Variables entered in the Step 3: Depression and total scores of the TAS-20 and Buss-Perry AQ. Step 4: $F=76.448$, $df=3.983$, $p<0.001$, Adjusted $R^2=0.187$, Variables entered in the Step 3b: Depression and subscales of TAS-20 and Buss-Perry AQ instead of total scores. Step 3b: $F=58.866$, $df=4.982$, $p<0.001$, Adjusted $R^2=0.190$

inhibition. In some cases, aggressive behavior is rewarded by increased scores in gaming and becomes a goal-directed conduct (30), potentially resulting in a vicious circle. Unfortunately, because of the cross-sectional design, it was not possible to make conclusive statements about the temporal order between the primary constructs of interest.

Consistent with previous research (27,56-60), in the present study severity of depressive symptoms was related with the severity of IGD, which may suggest that students with high depression scores may use Internet gaming to relieve these emotions (27,61,62). Individuals with high levels of alexithymia demonstrate difficulty in developing healthy and intimate social relationships because of their inability to identify and manage emotional states accurately (63,64). Alexithymia is both considered as a stable personality trait constituting a vulnerability factor for negative affect such as depressive symptoms (65) and as a defensive mechanism that is secondary to the occurrence of psychological distress (66). Thus, both high severity of IGD symptoms (61,62) and alexithymia (67,68) may be utilized to cope with or relieve depressive symptoms. Spending time with Internet gaming could be an escape from feelings that would otherwise be emotionally painful. Maladaptive and excessive Internet gaming may also result in or further amplify alexithymia (27) and depressive

symptoms (69). Although the cross-sectional design of our study does not allow for an analysis of the stability of alexithymia or the causal relationship between alexithymia and IGD, alexithymia is associated with severity of IGD symptoms in university students. Alexithymic subjects may experience a lack of emotion or a high and dysregulated emotional arousal (6). Alexithymia and emotional intelligence have a strong but inverse relationship (70) and emotional intelligence has been shown to be a protective factor for IGD (71,72), while it has been suggested that individuals with emotion dysregulation are more prone to regulate negative emotions by indulging in activities that offer immediate pleasure such as Internet gaming (73-75). In the present study, severity of alexithymia (particularly its dimensions DIF and EOT) predicted the severity of IGD symptoms. A possible explanation for this association is that alexithymic individuals may try to self-regulate emotional states through addictive behaviors (6).

It has been “suggested that Internet gaming may be a favored medium for people have difficulties in establishing relationships, because of the absence of physical presence and proximity together with the absence of the direct observation of others” (76). This may give alexithymic individuals the opportunity to regulate their emotions during social interactions in

Internet gaming better and to find a more adaptive way to deal with human relationships (23). Therefore, individuals who have difficulties identifying, expressing, and communicating emotions may overuse Internet gaming in order to regulate their emotions better and to fulfill their unmet social needs, and consequently alexithymia may result in high IGD severity (15).

The results of a previous study suggest a correlation between physical-aggressive personality and aggressive style of playing (77). Yu (78) reported that the severity of IGD symptoms showed significant positive correlation with physical aggression. Another study by Yu and Cho revealed that the group with IGD had the highest mean score of physical aggression, anxiety, and depression compared to the other types of gamer groups (79). In addition, IGD was positively associated with physical aggression. In the violent Internet gaming world, hostility can be expressed and violence perpetrated without restriction; this provides a space where adults with significant hostility can express their physical aggression in a manner likely to be prohibited in the real world (80). However, causal relationships between physical aggression and IGD should be confirmed in a prospective study.

The present study has some limitations. First, the research sample consisted of single university students; results would have been more valid if the sample were more heterogeneous regarding cultural and socioeconomic characteristics. Second, we did not gain more information about participants' sociodemographic characters. Third, participants were non-clinical individuals and all scales were self-rated. The use of self-rated measures limits the generalizability of these results. IGD is a clinical diagnosis that should be made by a clinician based on a diagnostic interview. Thus, the results of the present study should be supported by further research conducted in clinical samples. Finally, because our study is not prospective, it is unable to demonstrate any causal relationships between the primary constructs of interest.

However, at the very least these findings demonstrate that the severities of alexithymia and physical aggression were associated with the severity of IGD among young Turkish adults even after controlling for the effect of depression and anxiety symptoms. The present study may suggest that to understand IGD among university students better, clinicians must carefully evaluate alexithymia and aggression, which are potentially important components to be considered in IGD intervention programs and potential treatment targets for reducing IGD.

Contribution Categories		Author Initials
Category 1	Concept/Design	C.E., B.E., E.D.
	Data acquisition	M.T., N.K.
	Data analysis/Interpretation	C.E.
Category 2	Drafting manuscript	C.E., B.E., E.D.
	Critical revision of manuscript	C.E.
Category 3	Final approval and accountability	C.E., B.E., E.D., M.T., N.K.
Other	Technical or material support	N/A
	Supervision	N/A

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