



## RESEARCH ARTICLE

# Relationship of Internet gaming disorder symptom severity with non-suicidal self-injury among young adults

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### ABSTRACT

**Objective:** The aim of the present study was to evaluate the relationship of Internet gaming disorder (IGD) symptom severity with non-suicidal self-injury (NSSI) while controlling the effects of depression, anxiety and neuroticism among young adults.

**Method:** The present study was conducted as a cross-sectional online self-report survey. The data were collected from 1010 volunteer Turkish university students in Ankara, persons who were in the e-mail database of a company located in Istanbul that organizes e-sports tournaments (ESL Turkey Amateur e-sport players), and Turkish gamers from gaming forums. Participants were evaluated by administering the IGD Scale-Short Form (IGDS-SF), the neuroticism dimension of the Eysenck Personality Questionnaire Revised-Abbreviated Form, the Beck Anxiety Inventory, and the Beck Depression Inventory.

**Results:** Age and gender did not differ between participants with NSSI (n=207, 20.5%) and those without NSSI (n=803, 79.5%). IGDS9-SF, depression, anxiety, and neuroticism scores were higher among individuals with NSSI. In logistic regression analysis, severity of IGD predicted the presence of NSSI, together with depression, anxiety, and neuroticism.

**Conclusion:** These findings suggest that the severity of IGD in young adults is related with the presence of NSSI, together with depression, anxiety, and neuroticism. Thus, early detection and treatment of these risk factors is important for reducing self-injurious behavior in this age group.

**Keywords:** Anxiety, depression, Internet gaming disorder, neuroticism, non-suicidal self-injury

## INTRODUCTION

Non-suicidal self-injury (NSSI) behavior is an act performed by a person towards him- or herself that is physically violent, intentional and purposeful, but not suicidal (1-3). NSSI typically starts in adolescence and involves numerous episodes and a variety of methods,

including cutting, burning, slapping, picking, and bone breaking (4). Individuals with NSSI report a range of motivations, including self-punishment, tension reduction, mood improvement, and distraction from intolerable affects, all of which might be at least a partial explanation for NSSI (2,5). The rate of NSSI was found to be 21.4% among Turkish high-school students (6).

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Regardless of methods and motivations of self-injury, NSSI is a pervasive public health problem and evidently poses a severe threat to the safety and well-being of affected individuals (7). Following decades of progressive increase in the incidence of NSSI among adolescents and young adults, as well as growing scientific interest, the disorder was listed as a condition for further study (Section III) in the DSM-5 (8,9).

Social learning and imitation play an important role in the initiation of self-injurious behaviors, and seeing these behaviors in school, on television, or on the Internet is a risk factor for committing NSSI (9,10). Lam et al. (11) suggested that Internet addiction is detrimental to mental health and increases the risk of NSSI among adolescents. Consistent with this observation, when controlled for gender, family factors, exposure to suicidal thoughts in real life, depression, alcohol/tobacco use, concurrent suicidality, and perceived social support, both internet addiction and exposure to suicidal thoughts on the internet were significantly related to an increased risk of NSSI (12). A systematic review suggested a relationship between internet use and NSSI; NSSI was associated particularly with internet addiction, high levels of internet use, and visiting websites related to self-injury or suicide (13).

The Internet is commonly used for constructive reasons such as seeking support and for coping strategies (14), and online interactions are essential for otherwise isolated adolescents to find social support (15). Thus, the information available on the Internet could be useful for helping or treating individuals at risk, reducing isolation, encouraging recovery, and reducing the urge to commit self-injury (9,10,16). However, it might also help normalize NSSI, increase its acceptance and lead to social reinforcement, or reduce its stigmatization (9,14,15,17), thus keeping affected individuals from disclosure or seeking professional help (14). Furthermore, established adolescent self-injurers and youths exploring possible identities might take up behaviors that can be lethal (15). Finally, a recent review suggested that users of social networks may emulate self-injurious practices promoted through interactions by messages or shared videos, thus increasing the risk for individuals to engage in self-injurious behavior (18). In this regard, adolescents at risk of self-harm or suicide may at the same time benefit from Internet use and be subjected to an increased risk (14).

The term “digital self-injury” is defined as “online communication and activity that leads to, supports, or exacerbates, non-suicidal yet intentional harm or

impairment of an individual’s physical wellbeing” (19). Among the correlates of being involved in digital self-harm, sexual orientation, experience with school bullying and cyberbullying, drug use, participation in various forms of adolescent deviance, and depressive symptoms were found to be statistically significant (20). Predictors for the emergence and cessation of youths perpetrating cyberbullying and victimization included online game use, exposure to violence in media, Internet risk behaviors, and cyber/school bullying experiences (21). An association was found between being exposed to violent online games and perpetrating cyberbullying as well as being a perpetrator-and-victim (22). Communication channels created by the Internet offer ways of cyberbullying peers, which, as well as internet use in general, was found to correlate with an increased risk of NSSI, suicidal ideation, and depression (14). Internet exposure and violent methods of NSSI have also been found to correlate (14). A recent meta-analysis showed that persons who had experienced cybervictimization were 2.4 times as likely to self-injury as non-victims, (23). An extreme form of cyber-bullying is the Blue Whale Challenge, which includes a series of tasks causing self-injury. These challenges are circulated in the guise of a social media game; participants receive a link through chat groups inviting them to participate in the activity, which does not require installing an application or entering an online game environment (24). Thus, digital self-injury is a new problem that demands additional scholarly attention (20).

NSSI and internet gaming belong to a number of mental health disorders thought to involve the same pleasure responses, neurotransmitters, and brain regions as do substance use disorders (25). Along with NSSI, the APA also included Internet gaming disorder (IGD) in Section III of the DSM-5 as a “condition that needs further research before being fully recognized and accepted as an independent disorder in subsequent revisions of the DSM” (26). According to the DSM-5, IGD is clinically characterized by a “persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress” (8). More specifically, the nine IGD criteria include “preoccupation with Internet games, withdrawal symptoms, tolerance, unsuccessful attempts to control participation in Internet games, loss of interest in previous hobbies, continued excessive use of Internet games, deceiving family members, use of Internet games to escape, and losing a significant relationship, job or education, or career opportunity” (8). We only found one study that compared gamers

and non-gamers in a sample of students with pathological Internet use, finding similarly increased risks for NSSI in gamers and non-gamers (27). Thus, it is important to evaluate the relationship of NSSI and severity of IGD symptoms among young adults.

The aim of the present study was to evaluate the relationship of IGD symptoms with NSSI. Both NSSI and IGD are included in Section III of the DSM-5, and both include items implying that these conditions are, at least partially, serving as a way of coping with negative feelings (i.e. IGD: “use Internet games to escape,” NSSI: “to obtain relief from a negative feeling or cognitive state”). Indeed, severity of anxiety, depression (28) and neuroticism (29) are all related with NSSI. Similarly, IGD is related with anxiety, depression, and neuroticism (30). Accordingly, we also wanted to control the effects of depression, anxiety, and neuroticism on the relationship of NSSI and severity of IGD symptoms among young adults.

## METHOD

### Subjects and Procedure

The present study was conducted as a cross-sectional online self-report survey. The data were collected from volunteer Turkish university students in Ankara, individuals included in the e-mail database of an Istanbul-based company that organizes e-sports tournaments (ESL Turkey Amateur e-sport players), and Turkish gamers found on gaming forums. A website was prepared for online participation. Approval from the Ethics Committee of Cankaya University was received. The institutional review board approved the study on April 12, 2018 under number 80281877-050.99.

The students were asked to fill in a form on the website anonymously. Informed consent was given by the students online before answering any further questions. Exclusion criteria were unfilled forms. In order to control for duplicate data entries, we checked the e-mail addresses and user names as well as the participants' Internet Protocol addresses. In total, 1010 participants were included in the study. Among these, 606 were female (60%) and 404 were male (40%).

Participants were divided into two groups according to the presence of lifetime NSSI ( $n=207$ , 20.5%) and the absence of NSSI ( $n=803$ , 79.5%). Among the 207 participants with lifetime NSSI, 92 (44.4%) reported that the most commonly used method of self-injury was “cutting or scratching arms or other parts of the body”, 11 (5.3%) reported it to be “burning oneself with a

cigarette or by other means,” and 126 (60.9%) reported “hitting the head, fist, or other body parts on hard places.”

### Measures

The questionnaire included a question asking about a lifetime history of NSSI. Self-injury was defined as “deliberate self-injury to body tissue without the intent to die.” The SHB question was “Do you injure yourself intentionally? (never/at least once).” The question also included the most commonly used methods of self-injury in parentheses (cutting, burning, hitting oneself, inserting sharp objects into body orifices, and pulling out body hair) (31). The same questionnaire had been used in our previous study conducted among high school students (7).

**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 (32). The scale comprises nine items corresponding to the nine core criteria defined by the DSM-5. They are answered on a five-point Likert-type scale ranging from (1) never to (5) very often; high scores on the scale indicate a higher level of gaming disorder. In the present study, the Turkish version of the IGDS9-SF was used (33).

**Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI):** Symptoms and severity of depression were evaluated using BDI (34), Turkish version (35), and symptoms and severity of anxiety were evaluated by BAI (36), Turkish version (37). Both scales have been validated for Turkish populations. Cronbach's alphas in the present study were 0.90 for BDI and 0.93 for BAI.

**Eysenck Personality Questionnaire Revised Abbreviated Form (EPQR-A):** The EPQR-A includes 24 items under four personality traits (neuroticism, extraversion, psychoticism, and lying); for the purpose of the present study, we only used the “neuroticism/stability” trait to assess the stability of emotion (38). The reliability and validity of the questionnaire were supported in a Turkish university student sample (39). Kuder-Richardson alpha coefficient for the neuroticism trait was 0.65 and the test-retest reliability of the trait was 0.82.

### Statistical Analysis

SPSS Statistics for Windows, Version 17.0 (Chicago: SPSS Inc.) was used for all analyses. Gender was compared by means of the  $\chi^2$  statistics. We used

Student’s t-test to compare the groups for continuous variables. Logistic regression analysis was conducted taking the presence of lifetime NSSI as the dependent variable and severity of IGD symptoms, depression, anxiety, and neuroticism as independent variables. For all statistical analyses, p values were two-tailed, and differences were considered significant at  $p < 0.05$ .

## RESULTS

Age ( $t = 1.618, p = 0.106$ ) and gender ( $\chi^2 = 0.366, p = 0.545$ ) did not differ between participants with lifetime NSSI ( $n = 207, 20.5\%$ ) and those without NSSI ( $n = 803, 79.5\%$ ) (Table 1). Scores for IGDS9-SF ( $t = -3.893, p < 0.001$ ), depression ( $t = -8.392, p < 0.001$ ), anxiety ( $t = -7.798, p < 0.001$ ), and neuroticism ( $t = -8.955, p < 0.001$ ) were higher among individuals with NSSI than those without NSSI (Table 1).

Logistic regression analysis was conducted taking the presence of NSSI as the dependent variable. In the first step, depression, anxiety, and neuroticism were entered in the analysis as independent variables. These three variables predicted the presence of NSSI in the first step. In the second step, severity of IGD symptoms was entered in the analysis as an independent variable in addition to depression, anxiety and neuroticism. In this analysis, severity of IGD symptoms predicted the presence of NSSI, together with depression, anxiety and neuroticism (Table 2).

## DISCUSSION

The main finding of the present study is that the presence of lifetime NSSI is related with the severity of IGD symptoms, even after controlling severity of neuroticism and negative affect such as depression and

**Table 1: Comparison of scale scores according to the presence of non-suicidal self-injury**

	Non-suicidal self-injury				t	df	p
	Absent		Present				
	Mean	SD	Mean	SD			
Age	21.93	3.44	21.51	3.14	1.618	1008	0.106
Gender (n, %)					$\chi^2 = 0.366$	1	0.545
Females	478	59.5	128	61.8			
Males	325	40.5	79	38.2			
IGDS9-SF	14.79	6.50	17.07	7.79	-3.893	284.262	<0.001
Anxiety	12.07	10.94	19.50	12.55	-7.798	291.835	<0.001
Depression	34.18	9.86	41.47	11.46	-8.392	289.399	<0.001
Neuroticism	3.08	1.77	4.21	1.57	-8.955	352.802	<0.001

IGDS9-SF: Internet Gaming Disorder Scale-Short Form, SD: Standard deviation

**Table 2: Logistic regression analyses with non-suicidal self-injury as dependent variable and severity of anxiety, depression, personality dimension of neuroticism, and severity of Internet gaming disorder as independent variables**

	B	SE	Wald	df	p	Exp(B)	95% CI	
							Lower	Upper
<b>Step 1</b>								
Anxiety	0.022	0.008	6.744	1	0.009	1.022	1.005	1.039
Depression	0.028	0.010	8.162	1	0.004	1.028	1.009	1.048
Neuroticism	0.245	0.058	17.572	1	<0.001	1.277	1.139	1.432
<b>Step 2</b>								
Anxiety	0.023	0.008	7.597	1	0.006	1.023	1.007	1.040
Depression	0.023	0.010	5.125	1	0.024	1.023	1.003	1.043
Neuroticism	0.251	0.059	18.308	1	<0.001	1.286	1.146	1.443
IGDS9-SF	0.033	0.012	8.024	1	0.005	1.033	1.010	1.057

Nagelkerke R<sup>2</sup>: Step1=0.150, Step 2=0.161, IGDS9-SF: Internet Gaming Disorder Scale-Short Form, CI: Confidence interval, SE: Standard error

anxiety. This may suggest that depression, anxiety, neuroticism, and severity of IGD symptoms may increase the risk of self-injurious behaviors. An alternative explanation might be that severity of IGD symptoms and NSSI may share risk factors such as depression, anxiety, and neuroticism. Severity of anxiety, depression (28), and neuroticism (29) are all related with NSSI and IGD (30). Consistent with these results, according to DSM-5 both IGD and NSSI may be maladaptive coping mechanisms for negative affect, such as depression, anxiety, and neuroticism (8). Some individuals with symptoms of depression or anxiety and a personality trait of neuroticism may cope with negative feelings through gaming on the Internet rather than self-injurious behavior. Thus, severity of IGD symptoms may also be a partial mediator between NSSI and negative affect (depression, anxiety, and neuroticism). Unfortunately, because of the cross-sectional design, it was not possible to make conclusive statements about the temporal order between the measures of severity of IGD symptoms and NSSI.

Previous studies, including reviews, suggested a relationship of NSSI with high levels of Internet use and Internet addiction (11-13,18), whereas the only study that compared gamers and non-gamers among students suffering from pathological Internet use found no difference for the NSSI risk (27).

IGD showed strong associations with anxiety and depression (40), which are common comorbidities of IGD related to a more serious psychiatric phenomenology and a greater psychiatric burden (41). The relationship between psychological distress and IA was mediated by coping through avoidance (42). Among gaming motivations, the dimension of escaping reality and problems (escapism) significantly predicted excessive gaming and appeared as a stronger predictor than time invested in the game (43). The approach of coping with actual problems, such as stress, aggression, or anxiety through gaming, thereby managing unpleasant moods and unwanted impulses, is an important motivating factor for gaming (44). A previous study found psychiatric distress to be negatively associated with IGD directly as well as indirectly via motives of escape and competition (45). Individuals playing video games on the Internet to socialize and to gain a sense of achievement tend to be high in neuroticism (46). When individuals spent more time on social networking websites, they experienced greater psychological distress, their need for mental health support was not fulfilled, they rated their mental health as poor and had increased suicidal ideation.

Accordingly, vulnerable persons spending more time in social networks online may show an increase in self-injurious behavior and suicidal ideation (18).

Relief from negative emotions is the area most frequently mentioned among the reasons for NSSI (47). Acute negative affect has been shown to precede self-injury, while decreased negative affect and relief have been found after self-injury, with the latter being most often performed in order to alleviate negative affect; in laboratory settings, self-injury proxies reduced negative affect and arousal (47). NSSI was directly affected by depression, anxiety, and stress (48). Individuals who engaged in NSSI indicated greater use of coping behaviors for regulation of dysphoric affect, communication of distress, interpersonal influence, expression of emotions, and coping with dissociative states and self-punishment than the non-NSSI group (49,50). Individuals who had engaged in NSSI had significantly elevated levels of neuroticism (i.e. anxiousness, angry hostility, depressiveness, self-consciousness, impulsiveness, and vulnerability) (51,52). An association has been found between neuroticism and engaging in NSSI mediated by high stress levels and a characteristic pattern of depressive reaction when dealing with stressful events in life (53). Previous studies with adolescents and young adults reported NSSI to be related with more immature or maladaptive coping styles and defense mechanisms (54-56). In sum, for persons with high neuroticism whose range of coping strategies might be considered immature, NSSI could be a maladaptive way of coping with negative emotions. Anxiety, depression, and neuroticism may also be indirectly related with NSSI through online gaming, which can be either maladaptive or adaptive, as a protection from self-injurious behavior.

The strongest point of the present study is its methodology, employing an adequate sample size and a proper sampling method, whereas its main limitation was the cross-sectional nature of the study design; hence, we were only able to report associations rather than definitive temporal or causal relationships. In addition, we did not gain in-depth information about the participants' sociodemographic characteristics. Similarly, we did not obtain detailed information for NSSI other than the methods of NSSI applied. Another important limitation is that the reliance on self-reported data for the analyses, which may yield conservative estimates as a result of underreporting. Nevertheless, this is the first study to evaluate the relationship of severity of IGD with NSSI, while controlling other

variables such as personality traits of neuroticism, depression, and anxiety.

To conclude, the present study showed that the severity of IGD symptoms predicted the presence of NSSI after controlling the effects of the personality trait neuroticism, depression, and anxiety symptoms among young Turkish adults. Thus, these variables must be taken as potential risk factors for NSSI in this group. The present study may suggest that to understand the problem of NSSI among university students better, clinicians must also carefully evaluate symptoms of anxiety, depression, and the personality trait of neuroticism in addition to online gaming, which is an important factor in itself. Early detection and treatment of these risk factors is important for a reduction of self-injurious behavior. Furthermore, the implementation of therapies to strengthen coping mechanisms could be an important intervention method for NSSI. Finally, the generalizability of the findings of the present study to homogeneous populations of patients with IGD requires further study.

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

**Ethics Committee Approval:** Approval from the Ethics Committee of Cankaya University was received. (Date: April 12, 2018, Number: 80281877-050.99)

**Informed Consent:** Written informed consent was obtained from the patients.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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