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The Relationship Between Obsessive-Compulsive Disorder and Gaming Disorder

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ABSTRACT

The relationship between the obsessive-compulsive disorder and the gaming disorder is investigated. A total of 345 undergraduates completed a survey that included demographic information, responses to the obsession-compulsive inventory-revised scale and the internet gaming disorder test. While initial findings showed the obsessive-compulsive disorder can predict the gaming disorder, deeper probe carried the potential of changing how this relationship is conceptualized. Only the checking subtype predicted the internet gaming disorder within the disordered gaming group. A corollary to this finding is that symptoms of the checking subtype of the compulsions component can predict having gaming disorder. Also, there was a significant strong association between a counting symptom and the internet gaming disorder scores of the disordered gaming group. This study indicated that the identified significant impact of the obsessive-compulsive disorder on the gaming disorder is rooted in shared mental functions by a gamer.

KEYWORDS

Compulsions, Disorder Symptoms, Internet Gaming Disorder, Obsessions, Obsessive-Compulsive Disorder, University Students

INTRODUCTION

The progressive increase in Internet usage has led to the growth of new research in the field of psychology (Wang, Long, Liu, & Liu, 2019), particularly with regards to gaming disorder. Gaming disorder has emerged as a subject area due to changes in behavior, cognition, and emotion, in individuals (Wichstrøm, Stenseng, Belsky, von Soest, & Hygen, 2019), particularly in adolescents and young adults (Mihara & Higuchi, 2017). The American Psychiatric Association (APA) recognizes Internet Gaming Disorder (IGD) as a behavioral addiction that leads to clinically significant impairment or distress (Kim et al., 2018; Paulus, Ohmann, Von Gontard, & Popow, 2018; Wang et al., 2017) but considers it a "tentative disorder" that requires further research (American Psychiatric Association, 2013; Wichstrøm et al., 2019). Similarly, the World Health Organization (WHO) includes Gaming Disorder in the International Classification of Diseases document (ICD-11) under "disorders due to

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addictive behaviors" and states that it results in marked distress or significant impairment (World Health Organization, 2021).

Both the ICD-11 and the DSM-5 provide matching definitions of gaming disorder, with some common diagnostic criteria (Griffiths, Kuss, Lopez-Fernandez, & Pontes, 2017; Jo et al., 2019). According to ICD-11, to be officially diagnosed with gaming disorder, the gamer must display three symptoms: "(a) an impaired control over gaming, (b) an increasing priority given to gaming, and (c) a continuation or escalation of gaming despite the occurrence of negative consequences". According to the DSM-5, the gamer must exhibit at least five of nine symptoms, over a minimum period of 12 months (Lopez-Fernandez, 2015; Sevelko et al., 2018; Zajac, Ginley, Chang, & Petry, 2017). In addition to the ICD-11 symptoms, the diagnostic criteria of the DSM-5 include (d) loss of interest in activities other than gaming, (e) tolerance, in terms of the need to spend increasing amount of time gaming, (f) withdrawal symptoms when internet gaming is withheld, (g) deception of others regarding the amount of time spent on gaming, (h) escapism: use of gaming to escape real-life issues or relieve distress, and (i) jeopardy or loss of interpersonal relationships, jobs, or educational commitments (American Psychiatric Association, 2013; Hawi, 2019; Petry et al., 2014; Wang et al., 2017).

Additionally, gaming disorder (GD) symptoms tend to appear alongside symptoms of other psychological disorders such as major depressive disorder, social phobia, attention-deficit/hyperactivity disorder, conduct disorder, generalized anxiety disorder, and obsessive-compulsive disorder (OCD) (Kim et al., 2018; Liu et al., 2018; Wichstrøm et al., 2019, Han, Kim, Bae, Renshaw, & Anderson, 2017; Kim, Lee, et al., 2017; Kim, Lim, et al., 2017; Pearcy, McEvoy, & Roberts, 2017; Sevelko et al., 2018; Zajac et al., 2017).

Psychopathological comorbidities often have a neurological basis, as shared brain parts can manifest different psychological disorders (Han et al., 2017). For example, Han et al. (2017) found that GD can affect brain connectivity, which can increase the risk of comorbidity with other psychopathologies that share a similar brain connectivity (Han et al., 2017). This is why, OCD may occur with GD. As a result, researchers have studied and compared the brain bases of GD and OCD and have found that the classification of GD as a behavioral addiction needs to be re-evaluated more accurately, by conducting extensive research studies on the relationship between GD and OCD. Kim et al. (2017; 2018) found that both of their GD and OCD samples exhibited impairment in inhibitory control functions accompanied by cognitive inflexibility. This finding is associated with features of repetitive compulsive behaviors, a crucial diagnostic criterion in OCD. The common brain basis for the repeated unsuccessful efforts to inhibit a particular behavior such as gaming in GD and compulsions such as checking and cleaning in OCD results in impaired behavior in both disorders. Impairments in executive control abilities lead to poor control over urges and desires, resulting in excessive gaming that further disturbs executive control abilities (Dong & Potenza, 2014). Wang et al. (2017b) showed that subjects with GD have deficit in decision-making and impulsive control, which are associated with brain dysfunction. Further evidence is required regarding the relationship between the phenomenological symptoms of the disorder themselves (Kim et al., 2018; Starcevic & Aboujaoude, 2017; van Rooij et al., 2018). Therefore, the aim of the present study is to examine the co-occurrence rate of OCD and GD and the relationship between the dimensions of OCD (compulsion, obsession) and GD. The first hypothesis of the present study states that gamers identified with Obsessive-Compulsive Disorder are more likely to experience Gaming Disorder. It is well known that the presence of one mental health condition, increases the likelihood of comorbidity. Accordingly, investigating the relationship between GD and OCD will contribute to the literature in a field that requires further research, to help scientists better understand the connection between the two disorders. The second hypothesis is that there is a significant difference in Obsessive-Compulsive Disorder (OCD) scores between males and females. We predict that the mean OCD scores of male participants will differ significantly from the mean OCD scores of female participants. The third hypothesis is that there is a significant relationship between the dimensions of Obsessive-Compulsive Disorder (OCD) (compulsion and obsession) and Gaming Disorder (GD). We predict that individuals with

higher levels of OCD symptoms, both in terms of compulsion and obsession, will be more likely to exhibit higher severity of Gaming Disorder. By examining the association between these two sets of symptoms, we aim to elucidate potential connections and shared characteristics between OCD and GD. The results of this investigation will provide valuable insights into the interplay of compulsive and obsessive behaviors with problematic gaming tendencies, contributing to a better understanding of the relationship between these psychological disorders.

METHOD

This study was conducted at an English language university at the undergraduate level. Participants were recruited through an email sent to all students via the university email system. The email informed students that a survey was available on the University's student portal called the Student Information System. The email was sent on [date] and the survey was accessible to students from [start date] to [end date]. The sampling approach utilized in this study resulted in a convenience sample, where students who voluntarily chose to participate formed the sample. A total of 3246 students received the email invitation and had the opportunity to access the survey. The response rate for this study was 10.6%, with 345 students completing the survey out of the total number of students who received the invitation. Before proceeding with the survey, participants were presented with a consent form that explained the purpose of the study. The consent form also provided assurances regarding the protection of confidentiality and anonymity during data collection, storage, and reporting processes.

Ethical considerations were taken into account, and this study received approval from the Institutional Research Board to ensure compliance with ethical guidelines and protect the rights and well-being of the participants. The collected data were handled with utmost care. Measures were implemented to ensure the security and confidentiality of the data. All collected data were stored in a secure, password-protected database accessible only to the research team. Any identifying information was anonymized and kept separate from the survey responses. Data analysis was performed in aggregate, ensuring that individual responses could not be identified. Upon completion of the survey, participants were extended gratitude for their valuable contributions to the study.

Of the 345 participants, 69.6% were male. The mean age of participants was 19.9 years (SD = 2.1). The mean GPA was 2.8 (SD = .6). The average time spent gaming on weekdays was 1.9 hrs/day (SD = 2.3), and on weekends was 3.6 hrs/day (SD = 3.3).

The survey was in English which is the language of instruction at the university. It was composed of demographic information and two scales. The demographic information section included gender, age, and an item on the average number of hours the respondent plays video games per day. The two scales were the Obsession-Compulsive Inventory-Revised (OCI-R) and the Internet Gaming Disorder Test (IGD-20) which are both psychometrically validated instruments.

The IGD-20 Test (Pontes, Kiraly, Demetrovics, & Griffiths, 2014) includes 20 items that are in congruence with the DSM-5 criteria for GD, and incorporates the theoretical framework of the components model of addiction that includes salience, mood modification, tolerance, withdrawal, conflict and relapse (Griffiths, 2005). It is a self-report test that examines online/offline gaming activities occurring over a 12-month period, based on persistent and recurrent gaming. All items are rated on a five-point Likert scale: 1 "Strongly disagree", 2 "Disagree", 3 "Neither agree or disagree", 4 "Agree", and 5 "Strongly agree". Responses should be summed to determine the presence of gaming disorder. This instrument has shown good psychometric properties in a number of studies (Fuster, Carbonell, Pontes, & Griffiths, 2016; Hawi & Samaha, 2017) . The cut-off score of 71, recommended by Pontes et al. (2014), was employed for the present study. Scores at or above 71 indicate the presence of gaming disorder. The higher the score above 71 indicates a higher level of gaming disorder. While the mean IGD score for the study's sample was 41.83 (SD = 14.35), Cronbach's Alpha was .91, indicating a very strong internal consistency.

The OCI-R (Foa et al., 2002) is a revised short version of the Obsessive-Compulsive Inventory (OCI) (Foa, Kozak, Salkovskis, Coles, & Amir, 1998). It is a self-report diagnostic tool for identifying individuals with OCD. The OCI-R comprises 18 items assessing six common Obsessive-Compulsive Disorder symptoms (Foa et al., 2002). These include checking, ordering, neutralizing, washing, obsessing, and hoarding. All items are rated on a five-point Likert scale: 0 "Not at all", 1 "A little", 2 "Moderately", 3 "A lot", and 4 "Extremely". The scale score is calculated by adding the item scores with a possible range of 0-72. An OCI-R total score of up to 15 indicate the presence of mild symptoms, 16–27 moderate symptoms, and scores of 28 or greater severe symptoms. The mean OCD score for participants was 25.24 (SD = 11.65). High scores indicate the individual is bothered by the OCD symptoms. Contemporary psychometric evaluations of the OCI-R suggest it to be a reliable and valid measure (Opakunle, Aloba, Akinsulore, Opakunle, & Fatoye, 2018; Wootton et al., 2015). Cronbach's Alpha for OCI-R in the present study was .87, indicating a good internal consistency.

The collected data were analyzed using IBM SPSS 25. Regression analysis was performed to assess the ability of OCD symptoms to predict presence of gaming disorder. In all the simple linear regression analyses, a preliminary analysis was first conducted to ensure that all assumptions of normality, linearity, multicollinearity and homoscedasticity were met. To investigate whether there exists a significant difference in OCD scores between males and females, an independent-samples *T*-Test was employed. A *T*-Test is widely recognized statistical test designed to compare means between two independent groups. By analyzing OCD scores from both male and female participants, we aimed to assess potential variations in OCD severity across genders and to ascertain whether any observed differences are statistically significant (Kim, 2019). The application of the *T*-Test in this study will enable us to discern whether gender plays a significant role in influencing OCD symptomatology, contributing valuable insights to the field of mental health research.

RESULTS

In this sample, only 4.4% met the criteria for IGD. The mean age for the disordered gaming group (DGG) was 20.6 years (*SD* = 1.75), and 92.9% were male. Surprisingly, 42.4% of the sample met the criteria for OCD. While within the males' group, the presence of OCD was 41.6%, within the females' group it was 44.6%. An independent-samples *T*-Test showed no significant difference in OCD scores for males (*M*=25.0, *SD*=12.2) and females (*M*=25.8, *SD*=10.1; *t*(348)=-.5, *p*=.613). The mean ages of the OCD group and the non-OCD group were both 19.9 years. Moreover, 7.4% of the OCD group, and 2.2% of the non-OCD group were identified with GD.

Within the DGG, 71.4% (no females) had OCD. While the average number of hours they spent gaming on university days was 3.3 (*SD* = 1.2), it increased to 8.0 hours (*SD* = 4.3) on other days. Their average number of sleep hours was 6.2 (*SD* = 1.3) and 70% of them live with nocturnal awakening to continue playing.

Table 1 shows the means and standard deviations for each of the 20 IGD scale items. The distribution of the IGD items' averages was highly positively skewed (1.37). No item had an average representing 'Agree' or 'Strongly agree' which were associated with values of 4 and 5, respectively. Item 5 had the highest average (value of 3.05) representing 'Neither agree or disagree'. Two items had averages that were above the midpoint between 'Disagree' (value of 2) and 'Neither agree or disagree' (value of 3). The item that had the highest mean was "I play games in order to feel better." (*M*=3.05). The item with the second highest mean was "I know my main daily activity (i.e., occupation, education, homemaker, etc.) has been negatively affected by my gaming." (*M*=2.67). The item that had the lowest mean was "I have lied to my family members because the amount of gaming I do." (*M*=1.71). The item that had the second lowest mean was "I often think that a whole day is not enough to do everything I need to do in-game." (*M*=1.79).

Table 2 shows the means and standard deviations for each of the 18 OCD scale items. The distribution of the OCD items' averages was weakly positively skewed (0.39). No item had an average representing 'Moderately', 'A lot', and 'Extremely' which were associated with values of 2, 3 and

Table 1. Summary Statistics for the IGD scale: Item means and standard deviations

Item Content	*M*	*SD*
1. I often lose sleep because of long gaming sessions	2.14	1.27
2. I usually think about my next gaming session when I am not playing.	2.27	1.25
3. I think gaming has become the most time-consuming activity in my life.	2.00	1.16
4. I play games to help me cope with any bad feelings I might have.	2.42	1.28
5. I never play games in order to feel better. (Reversed)	3.05	1.30
6. I play games to forget about whatever's bothering me.	2.57	1.29
7. I have significantly increased the amount of time I play games over last year.	2.09	1.23
8. I need to spend increasing amounts of time engaged in playing games.	2.01	1.03
9. I often think that a whole day is not enough to do everything I need to do in-game.	1.79	1.04
10. When I am not gaming, I feel more irritable.	1.81	0.93
11. I feel sad if I am not able to play games.	2.00	1.16
12. I tend to get anxious if I can't play games for any reason.	1.94	1.05
13. I have lost interest in other hobbies because of my gaming.	1.81	1.13
14. I have lied to my family members because the amount of gaming I do.	1.71	1.04
15. I know my main daily activity (i.e., occupation, education, homemaker, etc.) has not been negatively affected by my gaming. (Reversed)	2.67	1.40
16. I think my gaming has jeopardised the relationship with my partner.	1.82	.97
17. I believe my gaming is negatively impacting on important areas of my life.	2.07	1.61
18. I would like to cut down my gaming time but it's difficult to do.	2.06	1.11
19. I do not think I could stop gaming.	2.18	1.30
20. I often try to play games less but find I cannot.	1.87	1.04

4, respectively. Item 9 had the highest average (value of 1.99), almost equal to 2 which represents 'Moderately'. Item 9 was "I get upset if others change the way I have arranged things." The item with the second highest mean was "I avoid throwing things away because I am afraid I might need them later." (M=1.90). The item that had the lowest mean was "I find it difficult to touch an object when I know it has been touched by strangers or certain people." (M=.97). The item that had the second lowest mean was "I need things to be arranged in a particular order." (M=.98).

Regression analysis was conducted at the OCD scale level, its subscales obsession and compulsion, as well as their items level. Linear regression was conducted to estimate the effect of the OCD on the IGD. Indeed, it explained 8.5% of the variance in the IGD, $F(1, 344) = 29.512$, $p < .001$. In other words, for every unit increase in the OCD score, a 0.359 units increase in the IGD score is predicted. Given that OCD is a psychological condition that involves two kinds of symptoms, obsessions and compulsions, the next step of the analysis involved determining the impact between obsessions and compulsions on one hand and IGD on the other hand. It turned out that both kinds of symptoms had significant weak to medium overall impact on IGD. The Obsession symptom that had the highest impact on IGD was *"Aggressive or horrific thoughts"*. The latter explained 7.2% of the variance in IGD, $F(1, 344) = 24.574$, $p < .001$ (Table 3). For every unit increase in the "*Aggressive or horrific thoughts*" symptom, a 3.265 units increase in IGD score is predicted. The Compulsion subtype that had the highest impact on IGD was *"Counting"*. Linear regression showed that it explained 6.0% of the variance in IGD, $F(1, 344) = 19.773$, $p < .001$. For every unit increase in the "*Counting*" subtype, a 1.380 units increase in IGD score is predicted.

Table 2. Summary statistics for the OCD scale: Item means and standard deviations

Item Content	*M*	*SD*
1. I have saved up so many things that they get in the way.	1.38	.99
2. I check things more often than necessary.	1.86	1.11
3. I get upset if objects are not arranged properly.	1.83	1.20
4. I feel compelled to count while I am doing things.	1.36	1.16
5. I find it difficult to touch an object when I know it has been touched by strangers or certain people.	.97	1.21
6. I find it difficult to control my own thoughts.	1.37	1.19
7. I collect things I don't need.	1.07	1.11
8. I repeatedly check doors, windows, drawers, etc.	1.10	1.18
9. I get upset if others change the way I have arranged things.	1.99	1.30
10. I feel I have to repeat certain numbers.	1.10	1.13
11. I sometimes have to wash or clean myself simply because I feel contaminated.	1.39	1.25
12. I am upset by unpleasant thoughts that come into my mind against my will.	1.68	1.25
13. I avoid throwing things away because I am afraid I might need them later.	1.90	1.29
14. I repeatedly check gas and water taps and light switches after turning them off.	1.19	1.19
15. I need things to be arranged in a particular order.	1.62	1.23
16. I feel that there are good and bad numbers.	.98	1.18
17. I wash my hands more often and longer than necessary.	1.15	1.14
18. I frequently get nasty thoughts and have difficulty in getting rid of them.	1.44	1.18

Table 3. Regression analysis of OCD on IGD

OCD	IGD		
Obsessions	R^2	*F*	β
Aggressive or horrific thoughts	7.2	24.574***	.269***
Thoughts about contamination	4.8	16.108***	.220***
Worry about losing control	4.8	16.108***	.220***
Need for order or symmetry	2.4	7.818**	.155**
Overall	6.9	23.249***	.263***
Compulsions			
Counting	6.0	19.773***	.245***
Washing	5.5	18.408***	.234***
Checking	4.7	15.564***	.216***
Hoarding	3.1	10.286**	.177**
Overall	7.5	24.812***	.273***

Note. * $P < .05$, ** $P < .01$, *** $P < .001$

Next, the relationships between the two kinds of OCD symptoms on one hand, and participants in the DGG were probed. None of the obsession symptoms had an impact on IGD scores of the DGG

(Table 4). The overall compulsions' score positively correlated with the DGG was notably high ($r = .631, p < .05$) (Table 4). Further probe into the type of compulsions that correlate with IGD within the DGG showed that only the Checking subtype had a significantly positive high correlation with IGD score ($r = .649, p < .05$) (Figure 1). A simple linear regression showed that "*Checking*" explained 42.2% of the variance in IGD, $F(1, 12) = 8.7, p < .05$. For every unit increase in the "*Checking*" subtype, a 1.017 units increase in IGD score is predicted.

The aforementioned results necessitated the investigation of each item pertaining to checking, and whether possibly another item of other compulsions is correlated with IGD scores of the disordered gaming group (DGG). Among the checking subtype, only "*I repeatedly check doors, windows, drawers, etc…*" significantly positively highly impacted the IGD scores of the DGG (Table 5, Figure 1). Linear regression showed that it explained 59.4% of the variance in IGD, $F(1, 12) = 17.5, p < .001$. For every unit increase in the "*I repeatedly check doors, windows, drawers, etc.*" symptom, a 3.017 units increase in IGD score is predicted.

Another behavior from counting "*I feel that there are good and bad numbers*", highly impacted with IGD scores of the DGG (Table 5, Figure 1). Linear regression showed that it explained 37.8% of the variance in IGD, $F(1, 12) = 7.3, p < .05$. For every unit increase in the "*I feel that there are good and bad numbers*" symptom, a 2.991 units increase in IGD score is predicted.

Further investigation of the checking subtype behavior "*I repeatedly check doors, windows, drawers, etc...*" in relation to IGD showed a significantly positive strong correlation with IGD's tolerance item "*I often think that a whole day is not enough to do everything I need to do in game*", $r = .545, p < .05$. Indeed, linear regression showed that "*I repeatedly check doors, windows, drawers, etc...*" explained 29.7% of the variance in the tolerance item, $F(1, 12) = 5.1, p < .05$. For every unit increase in the "*I repeatedly check doors, windows, drawers, etc...*" symptom, a .500 units increase in the tolerance item is predicted (Figure 2). Also, the behavior "*I repeatedly check doors, windows, drawers, etc...*" showed a significantly positive strong correlation with IGD's Relapse item "*I do not think I could stop gaming*", $r = .630, p < .05$. Indeed, linear regression showed that "*I repeatedly check doors, windows, drawers, etc...*" explained 50.1% of the variance in the "*I do not think I could stop gaming*" item, $F(1, 12) = 12.0, p < .005$. For every unit increase in the "*I repeatedly check doors, windows, drawers, etc...*" symptom, a .388 units increase in the Relapse item is predicted (Figure

Table 4. Regression analysis of OCD on IGD within the DGG

OCD	IGD		
Obsessions	R^2	F	β
Aggressive or horrific thoughts	2.3	.288	-.153
Thoughts about contamination	22.2	3.434	.472
Worry about losing control	4.0	.495	-.199
Need for order or symmetry	1.4	.171	.119
Overall	2.5	.304	.157
Compulsions			
Counting	22.4	3.466	.473
Washing	7.1	.913	.266
Checking	42.2	8.746*	.649*
Hoarding	22.5	4.098	.505
Overall	39.8	7.920*	.631*

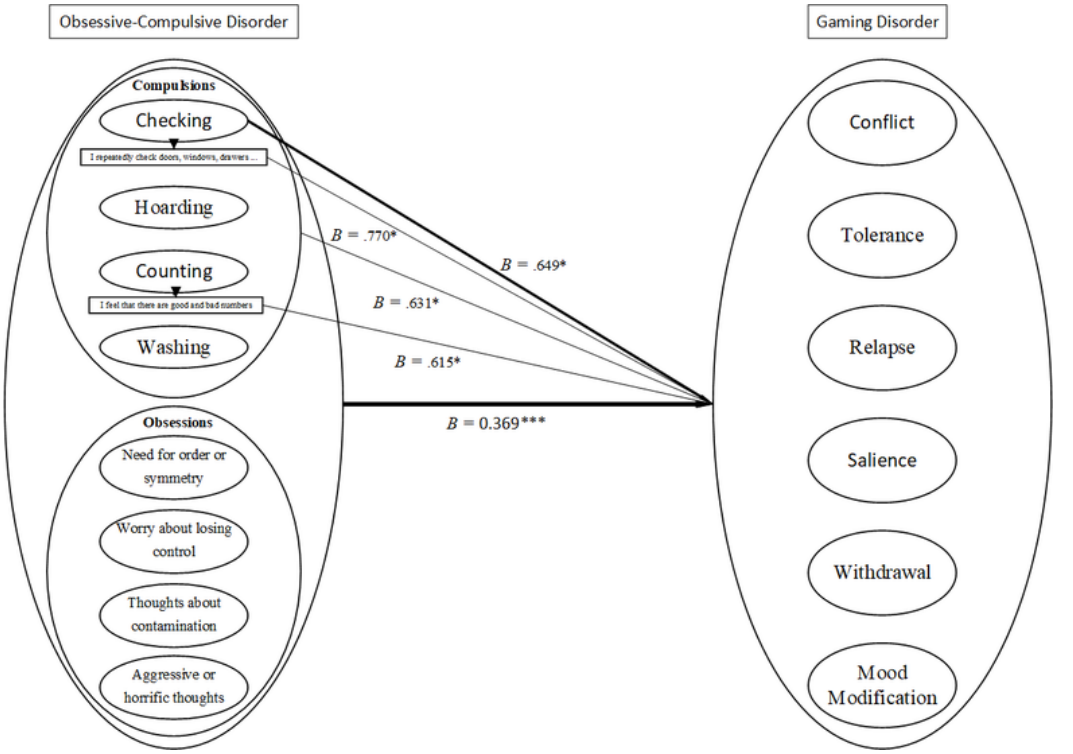
Note. * $P < .05$, ** $P < .01$, *** $P < .001$

Table 5. Regression analysis of OCD on Checking and Counting subtypes for the DGG

OCD	IGD		
Checking	R^2	F	β
I check things more often than necessary	15.5	2.199	.394
I repeatedly check doors, windows, drawers, etc.	59.4	17.532**	.770**
I repeatedly check gas and water taps and light switches after turning them off	17.6	2.569	.420
Counting			
I feel that there are good and bad numbers	37.8	7.305**	.615**
I feel compelled to count while I am doing things	.1	.011	.03
I feel I have to repeat certain numbers	23.3	3.649	.483

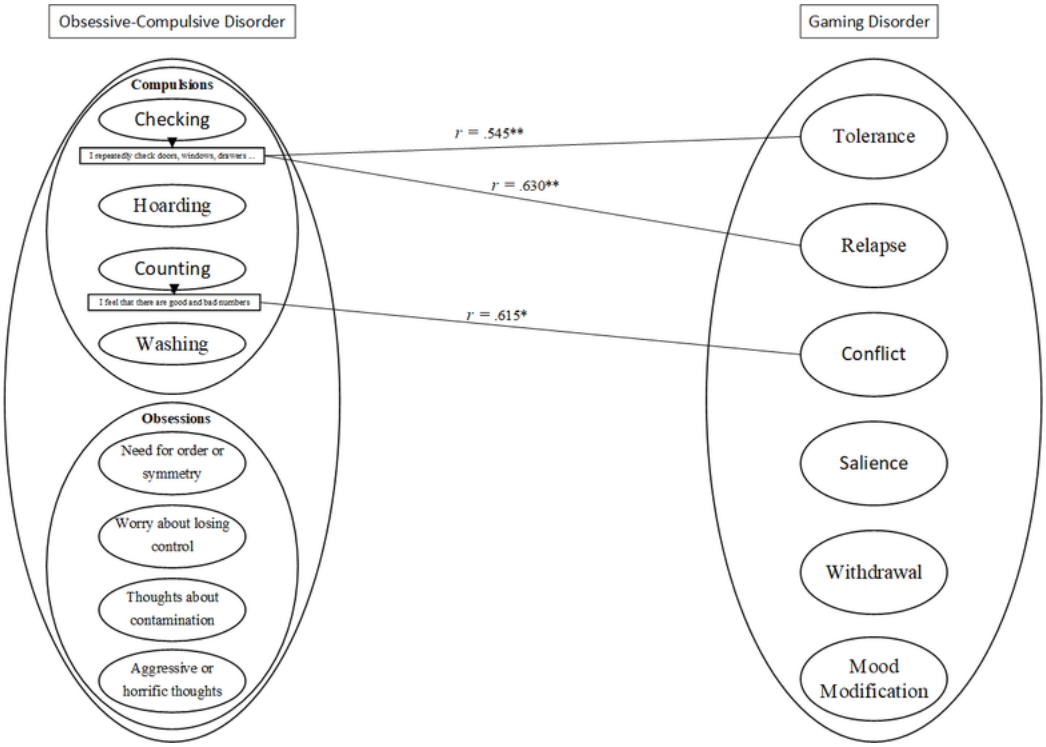
Note. * $P < .05$; ** $P < .01$; *** $P < .001$

Figure 1. Prediction Diagram: OCD and its sub-items predicting gaming disorder



2). These results strongly emphasize not only the fact that sufferers of compulsive behaviors build up tolerance against repetitive activities that they feel they must perform them, but that even if they resist doing them, they relapse and do them to get relief. A thorough analysis for similar results led to identifying another significant positive correlation of IGD with the counting subtype behavior "*I feel that there are good and bad numbers*" ($r = .615$, $p < .05$) (Table 5). This behavior had a significantly positive strong correlation with IGD's Conflict item "*I have lost interest in other hobbies because of my gaming*", $r = .566$, $p < .05$ (Figure 2). A simple linear regression showed that "*I feel that there*

Figure 2. Correlations between compulsions items and gaming disorder symptoms



are good and bad numbers" explained 32.1% of the variance in the Conflict item, $F(1, 12) = 5.7$, $p < .05$. For every unit increase in the "*I feel that there are good and bad numbers*" symptom, a .745 units increase in the Conflict item is predicted.

DISCUSSION

The prevalence rate of GD among participants (4.4%) was consistent with the range reported in other research (Gentile et al., 2017; Hawi, Samaha, & Griffiths, 2018; Pontes, Macur, & Griffiths, 2016; Rehbein, Kliem, Baier, Mößle, & Petry, 2015). In the introduction, it was mentioned that gaming disorder has emerged as a subject of interest in psychology and the prevalence rate of gaming disorder was highlighted. In the results, it is reinforced that this rate among participants is consistent with previous research. However, the prevalence rate of OCD (42.4%) was alarming. Unfortunately, as of March 2023, a thorough review of the literature led to no studies investigating the prevalence of OCD in Lebanon. In the Lebanese context, one or more factors including political instability, social fractionalization, economic crises, and religious affiliation may contribute to the high prevalence OCD rate. The OCD scores ranged from 2 to 63 (M=25.2, SD=11.6).

The disordered gaming group (DGG) consisted predominantly of males (92.9%), which is congruent with the DSM-5 statement that GD is most common in young males. Moreover, the majority (85.7%) of gamers in the DGG had OCD. It is noteworthy that one of the males identified with GD had an academic recognition of Cum Laude (Distinction). Compared to non-DGG, the daily average number of hours the DGG spent gaming was double. Also, within the DGG, the average number of hours spent gaming on weekends and holidays was double that spent on university days. The DGG had an average number of 6.2 hours with standard deviation of 1.2 hours. This indicates that not all

gamers of the DGG had enough hours of sleep as the average was below the recommended range (7 to 9 hours), and because 75% of them woke up at night to continue playing.

The high positive skewness in the distribution of the IGD items' averages (1.37) indicates that the mass of the distribution is concentrated on the left. With the average being 2.11 which is very close to the value 2 representing "Disagree", the positive skew of the averages' distribution indicates that gaming disorder among the sample participants should not be expected, and a few cases of gaming disorder could be expected. Few cases of gaming disorder should be expected because of the high positive skew, which indicates that most of the outlier scores are present on the right side of the aforementioned distribution. Hence, the positively skewed distribution of gaming disorder is desirable since there is small probability to find gamers suffering from gaming disorder in a non-clinical sample.

The small positive skewness in the distribution of the OCD items' averages (0.39) indicates that the mass of the distribution is symmetrical and concentrated around the average 1.41 which falls almost in the middle between "A little" represented by 1 and "Moderately" which is represented by 2. Given that the cutoff score is 28 or higher for severe cases, the OCD among the sample participants should be expected, but high scores of OCD should not be expected. The small positive skewness in the distribution of OCD items' averages was not sufficient to rule out the presence of OCD among the sample participants. In addition, it could be argued that the positively skewed averages are obtained because while the scale was developed primarily for clinical usage, in this study it was used in a non-clinical sample.

The fact that the majority of participants with gaming disorder (85.7%) also had OCD, makes it possible to predict that some gamers with OCD could be at risk of developing the GD. It is noteworthy that the DGG group had an average OCD score of 33.14, which is higher than the recommended cut-off of 28 for the entire scale. In the introduction, it was stated that gaming disorder symptoms tend to appear alongside symptoms of other psychological disorders, including OCD. The results supports this by revealing that the majority of participants with gaming disorder also had OCD, indicating a potential association between the two disorders. Probing deeper into the association between OCD as consisting of two components and IGD, it turned out that both obsessions and compulsions predicted the GD. This supports the conviction that OCD and GD have common characteristics which are the individual's impaired control over related activities (mentioned in the introduction) and recognition of their irrationality (Kim et al., 2018; Lee et al., 2018). Additionally, compulsions and gaming disorder have a common characteristic of repeated/continued behaviors that a person performs despite their negative impact (Kim et al., 2018). However, not all participants had GD. Therefore, it was worth studying the association between OCD and GD segregated by DGG versus non-DGG (Table 4).

The strong impact of the checking subtype of compulsions and the IGD scores of the DGG is possibly due to a transfer from performing unpleasant real world related activities to virtual world related entertaining activities where the sufferer engages in gaming to ward off distressing situations. This is evidence of the conviction mentioned in the introduction that psychological disorders can be manifested by the activity of shared brain parts.

The checking subtype of the compulsion's component included three different compulsive behaviors (Table 5). Only the common behavior "I repeatedly check doors, windows, drawers, etc." highly predicted the IGD score. A possible explanation is that doors, windows, and drawers include the intrusion of people, animals, or things, which is the case of gaming. Furthermore, results showed that "*I repeatedly check doors, windows, drawers, etc...*" explained 50.1% of the variance in the "*I do not think I could stop gaming*" item. Also, results showed that "*I repeatedly check doors, windows, drawers, etc...*" explained 29.7% of the variance in the tolerance item. Thus, impairments in executive control abilities over repetitive behaviors whether under OCD, GD, or both, have a common brain basis.

PRACTICAL IMPLICATIONS

Prevalence rates: The prevalence rate of Gaming Disorder (GD) among participants (4.4%) aligns with previous research. This suggests that the prevalence of GD in the studied population is consistent with findings from other studies. However, the alarming prevalence rate of Obsessive-Compulsive Disorder (OCD) at 42.4% is noteworthy. This indicates a high occurrence of OCD within the sample, which requires attention and further investigation.

Gender and comorbidity: The majority of participants in the Disordered Gaming Group (DGG) were males, which aligns with the understanding that GD is more common in young males. Furthermore, a significant proportion (85.7%) of gamers in the DGG also had OCD. This highlights the potential comorbidity between GD and OCD, suggesting that individuals with OCD may be at risk of developing GD.

Gaming behavior: The DGG exhibited a significantly higher average number of hours spent gaming compared to the non-DGG group. Additionally, the DGG participants reported spending double the number of hours gaming on weekends and holidays compared to university days. This indicates that individuals in the DGG may have disrupted sleep patterns due to excessive gaming, as they often woke up at night to continue playing.

Skewness of distributions: The positively skewed distribution of the Gaming Disorder (IGD) items' averages suggests that most participants in the sample do not exhibit significant signs of gaming disorder. However, a few cases of gaming disorder can be expected as outliers on the right side of the distribution. In contrast, the distribution of the OCD items' averages shows a smaller positive skewness, indicating that OCD is present in the sample, but high scores are not expected.

Association between OCD and GD: The high comorbidity between OCD and GD suggests common characteristics and impaired control over related activities. Both obsessions and compulsions in OCD predict GD, indicating shared features between the two disorders. The checking subtype of compulsions, specifically the behavior of repeatedly checking doors, windows, and drawers, strongly predicts IGD scores. This may suggest a transfer of compulsive behaviors from real-world activities to virtual gaming.

Impairments in executive control: The results highlight impairments in executive control abilities over repetitive behaviors observed in both OCD and GD. The common behavior of repeatedly checking doors, windows, and drawers, which is associated with the checking subtype of OCD, explains a significant variance in IGD scores and tolerance towards gaming. This suggests a shared neural basis for impairments in executive control across both disorders.

MANAGERIAL IMPLICATIONS

Awareness and support: University administrators and faculty should be aware of the prevalence of Gaming Disorder (GD) and Obsessive-Compulsive Disorder (OCD) among students. This awareness can help create a supportive environment that acknowledges and addresses these issues.

Campus resources: Universities should ensure the availability of resources and support services to assist students who may be experiencing gaming-related challenges or symptoms of OCD. This could include counseling services, mental health support groups, and educational programs aimed at promoting healthy gaming habits and managing OCD symptoms.

Prevention and education: It is essential for universities to implement prevention programs and educational initiatives that raise awareness about the risks associated with excessive gaming and provide information on maintaining a healthy balance. This can be integrated into orientation programs, workshops, and online resources for students.

Student well-being: Universities should prioritize student well-being by promoting a balanced lifestyle that includes physical exercise, stress management techniques, and self-care practices.

Encouraging students to participate in extracurricular activities, clubs, and organizations can help create a sense of belonging and support their overall well-being.

Collaboration with academic departments: Academic departments should collaborate with mental health professionals to develop guidelines and policies that address gaming-related issues and OCD symptoms among students. This collaboration can help identify early warning signs and provide appropriate interventions or referrals to support students' well-being and academic success (Hawi, Samaha, & Griffiths, 2019).

LIMITATIONS

The study has some limitations, including its cross-sectional design, and the fact that it only included university students. The cross-sectional design of the study does not allow for conclusions about the direction of the relationship between IGD and OCD. Therefore, longitudinal studies are needed to determine the causal relationships between the two disorders. Future research should also target adolescents from various cultures and compare results.

CONCLUSION

This study provides a thorough analysis of the relationship between OCD and IGD in a higher education context. The findings suggest that there is a generic relationship between these two disorders as gamers with OCD compulsions may engage in excessive gaming to alleviate anxiety related to their obsessions. Instead of engaging in compulsions such as repeatedly checking doors and windows which brings them no pleasure, gamers with OCD escape into excessive and non-stop gaming that flood their brain with dopamine and offer them relief from anxiety. This is an extremely important finding is a preliminary support to the proposition that gaming disorder may emerge secondary to obsessive-compulsive disorder for some gamers. Epidemiological studies are needed to enhance our understanding of this phenomenon and to guide gamers with OCD toward obtaining psychosocial support to achieve balanced and responsible gaming. The study is timely given the current interest in GD by the APA and WHO. The authors recommend that more research be conducted to determine the prevalence rates of OCD in Lebanon among all segments of the population, and the reasons behind them.

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