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Internet Gaming Disorder Analysis

Christopher B. Davison, Ball State University, IN
Sherif Attallah, Ball State University, IN
Evangelia Argyriou, Ball State University, IN

Davison, Ph.D., is an Assistant Professor in the Department of Technology; Attallah, Ph.D., is an Assistant Professor in the Department of Technology; Argyriou is a graduate student in the Department of Psychology.

Abstract

The focus of this research manuscript is to explore the correlation between Internet Gaming Disorder (IGD) and student achievement. Student achievement was quantified as overall GPA. IGD was defined as the persistent and recurrent use of the Internet to play games despite negative consequences. Other student demographic factors such as age and gender were investigated. An inverse correlation between GPA and Internet gaming was discovered. Additionally, a positive relationship between gender and IGD was supported by the analysis.

Introduction

Internet gaming has become a very popular endeavor and is likely to increase in popularity in the future. In moderation, Internet gaming seems to have several positive effects, including enhanced visual short-term memory (Wilms, Petersen, & Vangkilde, 2013). However, a large number of individuals in many countries engage in uncontrolled Internet use playing games (Gentile, 2009). This uncontrollable use has been linked to detrimental effects for an individual's wellbeing (Cai et al., 2016). To keep pace with research findings that present harmful effects of Internet Gaming Disorder (IGD) on psychosocial functionality and reveal similarities of this condition with other addictions, the Diagnostic and Statistical Manual of Mental Disorders (DSM) workgroup introduced IGD as a diagnostic category in the Section III of the fifth edition of the manual as a disorder warranting additional study before its inclusion in the main manual (American Psychiatric Association [APA], 2013; Lehenbauer-Baum & Fohringer, 2017; Petry & O'Brien, 2013).

IGD's onset is usually at a young age (King & Delfabbro, 2016) during the years of high school and it continues having harmful effects until young adulthood. Therefore, it is important to quantify the factors that trigger its appearance as well as its effects on academic performance, for which educators need to be aware. The main purpose of this study was to explore the relationship between several demographic characteristics (i.e. gender, age, and class rank) with IGD. Additionally, the relationship between IGD and academic performance, quantified as the students' GPA, was investigated. The findings suggested that gender has a significant effect on IGD presenting symptomatology, and IGD in turn is significantly correlated and inversely related to the students' GPA.

Literature Review

IGD is characterized by persistent and recurrent use of the Internet to play games; often referred to as online gaming. This preoccupation with Internet gaming results in clinically significant impairment or distress (APA, 2013). The symptoms that the DSM workgroup proposed to serve as criteria for the diagnosis of the disorder are similar to a great extent with those characterizing other addictions (APA, 2013). Similar to drug and alcohol addiction, individuals with IGD report intense craving for gaming behaviors as well as loss of control over such behaviors which impedes them from ceasing playing regardless of the negative consequences (Dworak, Schierl, Bruns, & Strüder, 2007). Individuals with IGD are demonstrated to exhibit tolerance as shown by the graded elevation in the frequency and time spent on the computer playing games (Dong & Potenza, 2014). Additionally, these people with IGD report reduced social relationships and high levels of loneliness (Griffiths, Davies, & Chappell, 2004). Often, IGD is presented with comorbid disorders of the internalizing or externalizing spectrum (Müller et al., 2015; Petry & O'Brien, 2013).

Although research on the detrimental effects of IGD has provided valuable results that call for the importance of undertaking intervention steps, there is still ground for research on its demographic predictors and correlates. Identifying groups of high risk for the development of IGD is of high significance to, and can lead to the development of, prevention efforts targeting these groups. Several potential correlates of IGD are gender, age, and student's GPA.

There is some previous research examining the relationship between gender and age, and IGD. However, these studies provided mixed results. Muller et al. (2015) studied several socio-economic predictors of regular gaming behavior and IGD in a representative sample of European adolescents. They found that men were more likely to be diagnosed with IGD, a finding which was consistent with other previous studies (Desai, Krishnan-Sarin, Cavallo, & Potenza, 2010; Gentile et al., 2011; Mentzoni et al., 2011; Rehbein, Kliem, Baier, Mößle, & Petry, 2015). However, Rehbein et al. (2010), examining risk factors of problematic video gaming in German adolescents, found no effect of gender when this association was controlled for other predictors. In the studies reporting statistically significant effects, some found a small difference between genders whereas others found a larger difference (Petry, Rehbein, Ko, & O'Brien, 2015). For example, in a USA sample the prevalence of IGD among men was 5.9% whereas that of women was 3.0% (Desai et al., 2010). In another study, again using a US sample, Gentile (2009) found a considerably larger differences, with 11.9 % of men and a smaller percentage (2.9%) of women assessed with IGD.

The relationship of IGD with age has also been explored in the literature. Adolescence has been shown to increase the risk for IGD, and as age increases the presence of IGD seems to decline (Petry et al., 2015). For example, in Festl, Scharrow, and Quandt's (2013) study, adolescents were twice as likely to be diagnosed with IGD as adults over 20 years old. Haagsma, Pieterse, and Peters's (2012) study produced similar results with young men being more often diagnosed with IGD than older adult men.

It is well-documented that IGD has detrimental effects on a person's psychosocial functionality, which is associated with an excessive use of Internet games even with the knowledge that it negatively impacts this person's life (APA, 2013; Petry & O'Brien, 2013). This can often interfere with occupational and academic performance (Eichenbaum et al., 2015). A central characteristic of individuals suffering from this disorder is the impaired cognitive control which negatively influences decision making (Yuan et al., 2016). Therefore, it is possible that the impairment of cognitive control abilities of individuals with IGD deter them from stopping this gaming behavior (Stadler et al., 2016). This can be destructive for their academic performance and can potentially impact their GPA in a negative fashion.

In most studies exploring IGD, a categorical approach is adopted using an IGD and a healthy control group. However, literature in the field of psychopathology has shown that categorical approaches of conceptualizing mental illness have limitations (Krueger & Markon, 2006; Widiger & Samuel, 2005). One of these limitations is the arbitrary imposition of boundaries between mental health and illness, when in reality, mental disorders should be represented as dimensional variations on domains of functioning (Krueger & Markon, 2006). In this study a dimensional measure (ranking scheme on a 5-point Likert scale of nine questions) of IGD was used to address this limitation.

Research Questions

The following research questions guided this research article:

1. Is there any correlation between gender and IGD within the sampled student population (i.e., graduate and undergraduate students in one large, Indiana, research (doctoral-granting) and teaching university)?
2. Is there any correlation between age and IGD within the sampled student population?
3. Is there any correlation between class rank and IGD within the sampled student population?
4. Is there any correlation between IGD and student GPA within the sampled student population?

Methodology

In this section the study design and methodology will be explored. The creation of the survey instrument will be explained as well as the validity and reliability testing of the instrument. The data acquisition process will then be explained. Finally, the statistical analysis will be presented and explained.

Subjects, participation, and IRB

The survey population consisted of 20,503 graduate and undergraduate students, over the age of 18, at one large Indiana research (doctoral-granting) and teaching university. The participant recruitment was conducted via several campus mass-emails over the course of 2016. The entire population was invited to participate. The response rate of participation was .7 percent, with 141 students electing to participate in the survey. This study was cleared through the Ball State University IRB office and the study procedures were cleared as "Exempt" under federal regulations. The assigned protocol number is: 892545-1.

Measuring instrument: Design and procedure

Data was obtained through the utilization of an online questionnaire. Students were invited to participate through several campus mass-emails over the course of 2016 (April through August). The questionnaire was created in Qualtrics and hosted online in their system. The instrument was closed in August and the data was then downloaded into the R software for statistical analysis.

Internet Gaming Disorder

The Internet Gaming Disorder Scale – Short Form (IGDS9-SF) was used to measure IGD (Pontes & Griffiths, 2015). IGDS9-SF is a psychometric scale containing questions regarding the nine proposed criteria from the DSM-5 for the diagnosis of this disorder.

The purpose of this scale is to evaluate the severity of IGD and its harmful effects. More specifically, it examines gaming activity, occurring online or/and offline for the last 12 months. Participants are asked to respond to the degree of agreement to each item, on a 7-point Likert scale from 1 (never) to 7 (very often). The final score is calculated by summing the answers and can range from 9 to 45.

Demographic characteristics

The survey included questions relating to age, gender, GPA, and class rank.

Validity and reliability

IGDS9-SF has demonstrated good psychometric properties (Pontes & Griffiths, 2015). Specifically, the internal consistency of the scale was high (Cronbach's alpha = 0.87). Additionally, confirmatory factor analysis confirmed a single-factor structure of IGD.

Statistical Analysis

Initially, descriptive statistics were obtained for all the variables of the study. Proper graphical tests (P-P plots) were used to evaluate the assumption of a normal distribution in IGD and GPA scores. No significant deviations from normality were observed. Consequently, any further analysis was based on parametric statistical methods that are associated with higher statistical power compared to non-parametric methods. Specifically, the bivariate associations between IGD and each demographic characteristic (i.e., gender, age, and class rank) as well IGD and GPA, were estimated using simple linear regressions. In order to estimate the association parameters of age, gender, and class rank with IGD, while adjusting for potential confounding effects, a multiple linear regression model was applied. Similarly, another multiple linear regression model was estimated to assess the association between IGD and GPA, while adjusting for potential confounders. All statistical procedures were performed using the R statistical software.

Results

Descriptive Statistics

The following descriptive statistics were obtained through analysis of the data: the IGD mean score was 18.97 with a standard deviation of 6.58. The mean GPA was 3.21 with a .69 standard deviation. The mean Age was 22.66 with a 7.27 standard deviation. Within the sample there were 74 women and 62 men. There were 117 undergraduate student respondents and 19 graduate students.

Research Question 1: Is there any correlation between gender and IGD within the sampled student population (i.e., graduate and undergraduate students in one large, Indiana, research (doctoral- granting) and teaching university)?

The results from the multivariable regression analysis showed that women had lower IGD scores on average compared to men ($b = -2.75$, $t = -2.25$, $p = 0.026$) after controlling for covariates. This indicates a statistically significant link between gender and IGD score. Women tend to have a lower score on IGDS9-SF psychometric scale testing for IGD.

Research Question 2: Is there any correlation between age and IGD within the sampled student population?

In contrast to gender and IGD, there was no evidence for a relationship between age and IGD ($b = 0.03$, $t = 0.25$, $p = 0.798$). IGD appears to occur equally across the sampled group. The age range of the surveyed population was 18 to 59.

Research Question 3: Is there any correlation between class rank and IGD within the sampled student population?

Related to the above research questions, there was no evidence for an effect of class rank on IGD. The varying undergraduate ranks did not significantly differ from the graduate rank. The observation from this evidence indicates that undergraduate and graduate students are equally impacted by IGD.

Research Question 4: Is there any correlation between IGD and student GPA within the sampled student population?

Finally, the results from the multiple regression analysis evaluating the association between IGD and GPA controlling for potential confounders is discussed. IGD was related to lower GPA ($b = -0.02$, $t = -2.19$, $p = 0.031$), while controlling for gender, age, and class rank.

Incidentally, class rank was also associated with GPA with all class ranks related to lower GPAs than the graduate rank, while other potential confounders were controlled. There was no evidence for an effect of gender ($b = 0.06$, $t = 0.44$, $p = 0.659$) or age ($b = -0.002$, $t = -0.20$, $p = 0.842$) on GPA, while controlling for other covariates.

Limitations

The data was obtained from a large at one large Indiana research (doctoral-granting) and teaching university. As the study is geographically bounded, this imposes a limitation on the generalizability of the findings.

In the methodology section, the survey method was discussed. The students were emailed and asked to participate in the school-wide survey. This methodology is known to incur self-selection and nonresponse bias. While there are several techniques for estimating and correcting nonresponse bias (Armstrong & Overton, 1977), the extrapolation method was deployed in this research study. Several “successive waves” (p. 2) of email invitations to participate in the survey were sent out to the entire population. Each wave resulted in a large spike off participants followed by a period of no survey participation.

Armstrong and Overton (1977) also suggest that “subjective estimates” of nonresponse bias is a useful tool to estimate its effect. However, a clear technique to subjectively estimate nonresponse bias appears to be elusive, however, it is intuitive to think that GPA is adversely impacted by time spent online gaming.

As the R^2 value for both linear regressions was low, no model was created. A low R^2 indicates a lack of goodness of fit. As such, there would be a large unexplained variance in any model created from the linear regressions. However, the concomitant p values were statistically significant for the indicated IGD correlations.

Conclusion

In this article, correlations between student achievement and Internet gaming were explored. The data was obtained from one large Indiana research (doctoral-granting) and teaching university. Analysis of the data revealed an inverse correlation between GPA and IGD. Furthermore, a statistically significant difference between men and women were found with regard to IGD scores. Men were found to score higher than women on the IGD scale. No association with age and IGD or class rank and IGD was found.

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