Depression and Disordered Gaming: Does Culture Matter?

Depression and Disordered Gaming Bond: Does Culture matter?

Abstract

The dearth of evidence related to cultural and gender variations of established links between Internet Gaming Disorder (DG) and other psychopathologies has been highlighted. Accordingly, the present study examined the association between Depression and DG behaviors, while considering cultural perspectives of Vertical Individualism (independence and hierarchy) and gender as potentially variating factors. To achieve this, an ethnically-diverse online sample of internet gamers coming from multicultural societies (N=1032; Australia= 738; 71.5%; United States of America= 222; 21.5%; Other multicultural countries= 72; 13.3%; Mage=24 Males=503, 48.7% Females=529, 51.3%) completed the Internet Gaming Disorder Scale - Short-Form 9 (DG-SF9), the Depression, Anxiety and Stress Scale (DASS-21), and the Individualism and Collectivism Scale (ICS). Regression, moderation and moderated moderation analyses were conducted. Results demonstrated that gamers presenting concurrently with symptoms of Depression and Vertically Individualistic inclinations reported higher DG behaviours, with no significant gender differences. Subsequently, practitioners globally, and especially in multicultural societies (i.e. Australia, USA) should consider cultural differences when developing DG prevention and intervention strategies.

Keywords: Gaming; Internet; Addiction; Depression; Gender; Culture; Vertical Individualism

Introduction

The popularity of gaming as a leisure activity is growing exponentially globally, with many countries reporting a steady growth in the prevalence of gaming. Overall, approximately 2.2 billion people play videogames worldwide (Newzoo, 2017). Moreover, according to the Electronic Software Association (ESA), more than 164 million adults in the United States of America (USA) play videogames and three-quarters of all Americans have at least one gamer in their household (ESA, 2019). Similar trends have been reported in Australia as approximately 67% of all Australians play video games on a regular basis (IGEA, 2018), and in the United Kingdom as a total of 32.4 million people played videogames in 2017 (Newzoo, 2017).

Research on videogame effects has sought to examine how the interaction between mental health symptoms and online gaming may precipitate or perpetuate Disordered Gaming outcomes (DG; Petry & O'Brien, 2013; Dong & Potenza, 2014; Stavropoulos et al., 2016; Laconi et al., 2017). Moreover, previous studies suggested that judicious gaming can result in significant positive effects, including improved interpersonal skills, stimulated cognitive development, and promotion of positive affect and wellbeing (Jones et al., 2014; Laconi et al., 2017). Furthermore, gaming may bolster psychological resilience, serving as a coping mechanism against life-adversities (Stavropoulos et al., 2017).

Notwithstanding the potential positive outcomes associated to online gaming, mounting evidence suggests that DG can lead to significant impaired psychological health and wellbeing (Caplan, 2002; Porter et al., 2010; Dong & Potenza, 2014; Pontes, Stavropoulos, & Griffiths, 2019; Stavropoulos, Gomez, Mueller, Yucel & Griffiths, 2019; Stavropoulos, Gomez, & Motti, 2019; Stavropoulos, Dumble, Cokorilo, Griffiths, & Pontes,

2019). More specifically, DG may accommodate low affect, decreased occupational performance, and psychopathology (such as major depressive disorder; *American Psychiatric Association* [APA], 2013), maladaptive coping strategies, and reduced adaptation (Young & Rodgers, 1998; Stavropoulos et al., 2017; Liu et al., 2018).

Disordered Gaming

In light of the mounting evidence supporting the addictive and detrimental effects of excessive gaming, the World Health Organization (WHO, 2018) decided to recognize DG as an official mental health disorder in the latest beta draft of the International Classification of Diseases (ICD-11). According to the WHO, gaming disorder is defined as a pattern of persistent gaming behavior manifested by three main diagnostic criteria: i) *impaired control over gaming (e.g., onset, frequency, intensity, duration, termination, context)*, ii) *increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities*; and iii) *continuation or escalation of gaming despite the occurrence of negative consequences* (WHO, 2018). Moreover, DG should only be diagnosed when the behavior is of sufficient severity to result in clinically significant impairments in personal, family, social, educational, occupational or other important areas of functioning (WHO, 2018).

Despite the recent recognition of DG by the WHO (2018), the present study adopts the conceptualization of the behavior in line with Section III (Conditions of Further Study) of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*, Fifth edition; APA, 2013) for the following reasons: (i) it focuses exclusively on internet-based games, warranting internet specific terminology; (ii) adopting *DSM-5* terminology enables international comparability; and (iii) currently, *DSM-5* terminology is supported by standardized and psychometrically sound assessment scales (Lemmens, Valkenburg & Gentile, 2015; Pontes & Griffiths, 2015; Stavropoulos et al., 2018).

Thus, according to the *DSM-5* (APA, 2013), DG is defined as Internet Gaming Disorder and constitutes a persistent, ongoing engagement with internet-based games, causing functional impairment and distress (Petry & O'Brien, 2013; Pontes et al., 2014; Griffiths, Kuss & Pontes, 2016; Laconi et al., 2017). In this context, a positive DG diagnosis requires the endorsement of at least five of the following criteria: (i) evident preoccupation with gaming; (ii) withdrawal symptoms in the absence of gaming; (iii) tolerance, or need to increase time spent gaming; (iv) failed gaming abstinence attempts; (v) ceasing one's other usual hobbies due to gaming; (vi) continued gaming despite its negative impacts; (vii) deception to significant others about gaming intensity; (8) using gaming as a coping mechanism (e.g to escape or relieve distress); and (9ix) compromising one's occupation, significant relationships, or future opportunities due to gaming habits (APA, 2013).

Interestingly, there is blurred evidence on the global, gender-specific, and culture-specific prevalence of DG (Laconi et al., 2018; Fam, 2018), and global prevalence estimates of DG have been found to range between 3.4-6.0% of users, with some countries reporting as high as 10.0%, respectively (Widyanto & McMurran, 2004; Hoeft et al., 2008; Pontes et al., 2014; Lemmens, Valkenburg & Gentile, 2015; Nazlıgül et al., 2018). Prevalence estimates vary significantly according to diagnostic criteria and conceptual definitions of the construct (Laconi et al., 2017).

Although adult populations (especially those aged between 30-35 years) comprise the majority of internet gamers, younger individuals remain the most vulnerable group, primarily due to developmental factors (i.e. increased impulse and achievement and gratification needs; Stavropoulos et al., 2016; Burleigh et al., 2017; Laconi et al., 2017; Fam, 2018). Given the expanding popularity of gaming, Section III of the *DSM-5* (APA, 2013) has highlighted the importance of understanding interactions between DG and other precipitating and

perpetuating factors. Consequently, in-depth examination of associated DG contributing factors is warranted.

Gaming Genres & Drives

For instance, game genres and motivation have been found to be key risk factors for DG. Demetrovics and colleagues suggested that socialization, escapism, competition, coping with difficulties, developing skills, fantasy, and recreation constitute the main game-motivation domains (Demetrovics et al., 2011). Following the same line and aiming to identify higher and more inclusive gaming motivation domains, Yee, Ducheneaut, and Nelson (2012) psychometrically supported that the various game-motivations could be included into 3 higher-level categories referring to achievement, socialization, and immersion. On another note, adopting the perspective of self-determination theory, Lafrenière, Verner-Filion and Vallerand (2012) supported that gaming motivation is explained by intrinsic motivation, integrated, identified, introjected, and external regulation, as well as amotivation related needs and drives.

Nevertheless, different game genres constitute broad categories of games that promote distinctly different experiences and may invite different motives. Although there is no clear consensus on a universal genre typology, these can indicatively include shooters (e.g Call of Duty), Multiplayer Online Battle Arena (MOBA) (e.g League of Legends) and strategy-games (e.g Tetris), among others. Genres incorporate different structural characteristics and in-game mechanisms (such as reward stimulation and hierarchical ranks) that moderate emotional and cognitive processes by targeting gamer's motivations (Chaplan, Williams & Yee, 2009; Liu & Peng, 2009; Elliot et al., 2012; Müller et al., 2015). Primary excessive

gaming drives have been identified, including: (i) achievement and/or competition; (ii) socializing and/or belonging; and (iii) game immersion and/or identification with one's virtual character (Hoeft et al., 2008; Müller et al., 2015). These motivations may elicit cognitive and emotional compensatory processes wherein the user may aim to substitute real-life deficits (i.e. achievement; Morcos et al., 2019). Research has found that of various gaming genres, the Massively-Multiplayer Online Role-Playing Game (MMORPG) genre employs mechanisms appealing to these motives most profoundly (i.e. achievement, socialization, and identity motives; Müller et al., 2015; Laconi et al., 2017; Burleigh et al., 2017). In considering the moderating impact on emotion and cognition, the MMORPG genre is assumed to pose greater DG risk to users predisposed to mood disorder symptoms, and especially depression (Stavropoulos et al., 2018; Morcos et al., 2019). Therefore, the present study focuses on the MMORPG genre, while investigating the association between depressive and DG symptoms.

Depression & Disordered Gaming

In addition to game genre and motivation, significant comorbidities have been supported between DG and other psychopathologies (Woelfling et al., 2008; Mihara & Higuchi, 2017; Pearcy et al., 2017; Kim et al., 2017; Adams et al., 2018; Liu et al., 2018), while addictions (such as DG) have been assumed to accommodate mood-regulation difficulties (Müller et al., 2015). In this context, depressive symptoms, including feelings of worthlessness, helplessness and hopelessness, difficulty concentrating, physical agitation (e.g fidgeting), social isolation, and lethargic withdrawal from regular activities have been strongly associated with addiction in general, and DG in particular (APA, 2013; Burleigh et al., 2017; Liu et al., 2018). Interestingly, links between depressive and DG symptoms have been envisaged as complex, implying that symptoms of depression can initiate DG behaviors

(as relief behaviors), which could later accommodate higher depression tendencies (Ho et al., 2014; Lee et al., 2017; Liu et al., 2018; Stavropoulos et al., 2019). An individual experiencing feelings of worthlessness and low affect, for instance, may turn to internet gaming to gain a sense of self-worth and fulfilment, while finding their needs easily compensated for by features of the game itself (Stavropoulos et al., 2016; Liu et al., 2018). These align with the compensatory internet use hypothesis (Kardefelt-Winther, 2014), which proposes that gamers may counterbalance real-life experiences of distress and depression with positive experiences produced by game mechanisms. Conclusively, behavioral addictions such as DG, may on one side provide immediate relief and gratification from depressive symptoms, whilst promoting them in the longer term (Petry & O'Brien, 2013; Kaptsis et al., 2016; Kim et al., 2017).

Despite the established depression-DG association, there is a dearth of evidence assessing its potential cultural variations. This is imperative in the light of research consistently supporting that symptoms of depression and DG can be moderated by culture (and culturally dictated drives such as those for competitiveness and hierarchy; Arsenault, 2009; González & Adelantado, 2016). Research by Stavropoulos and colleagues (2019) has underscored the importance of such findings in developing culturally responsive interventions for multi-cultural countries (i.e. Australia and the USA). Consequently, the present study aims to address how the association between depression and DG may be moderated by cultural differences.

Disordered Gaming & Culture

In that line, research has assumed that different cultural aspects may accommodate different forms of psychopathology including DG (Triandis, 1996; Charlton & Danforth, 2007; Stavropoulos et al., 2016; Stavropoulos et al., 2020). Moreover, the cross-cultural assessment of excessive internet use behaviors, including gaming, has been the focus of

scholarly examination as different response patterns may apply (Kiraly et al., 2019; Laconi et al., 2018; Lopez-Fernandez et al., 2019). In that line, it has been supported that experiences of psychosocial, addictive, and psychopathological disorders differ across cultures, implicating specific cultural syndromes (Triandis, 1996; Wan & Chiou, 2006; Anderson et al., 2017).

Harry Triandis (1996) implied that cultural syndromes (i.e., shared cultural perspectives) may have significant associations with disordered behaviors and addictions using a continuum ranging from "collectivism" to "individualism". More specifically, collectivism describes one's self-perception and behavior in line with a collective (e.g the family, or societal norms), while individualism describes one's perception of self as independent and autonomous from the group (where personal interests are prioritized).

These constructs occur in horizontal or vertical variations (Singelis et al., 1995; Triandis & Gelfand, 1998). Verticality describes cultural endorsement of social hierarchy, where individual worth is measured by competitive success; while horizontality describes cultural endorsement of equality, where all individuals are considered equal (Triandis, 2018). Research has suggested that verticality may have significant associations with DG, where verticality related competitive goals and motivations interact with corresponding game modalities (such as achievement), increasing DG vulnerability (Stavropoulos et al., 2016). Similarly, individualistic features, related to independence and social disconnection aspects, may predispose addictive disorders such as DG. In that line a combined vertical-individualistic cultural orientation could predicate higher DG risk (Györkös et al., 2013; Stavropoulos et al., 2016).

Despite the rationale supporting these hypotheses, there is scarcity of empirical research validating them. This is of particular importance to multicultural populations (i.e. Australia, USA, United Kingdom, etc.), where cultural diversity implicates differences in

psychopathological risk and responsiveness to treatment (Györkös et al., 2013; Stavropoulos et al., 2016). Specifically, multicultural countries (such as the U.S.A, the U. K. and Australia) have been assumed to present with a dominant cultural orientation of a westernized vertically individualistic quality (e.g. competitiveness and hierarchy tend to be more prominent and common), while at the same time variations on these vertically individualistic tendencies exist due to the concurrent influence of other cultures (Vargas & Kemmelmeier, 2013). Therefore, one could assume that game motivations related to achievement and hierarchy, in the context of vertically individualistic tendencies, may differ across gamers from multicultural societies. Further, the extent that the effect of other DG related factors, such depressive mood could be moderated (exacerbated) by a more vertically individualistic cultural orientation remains questionable (Stavropoulos et al., 2016; Stavropoulos et al., 2019). Competitive and independence game-related motivations, potentially appealing among vertically individualistic gamers, could exacerbate DG vulnerability in the MMORPG context (Györkös et al., 2013; Stavropoulos et al., 2016). Provided the aforementioned space in the literature, the current study aspires to examine if, and to what extent, the association between depressive mood and DG behaviors can be exacerbated by higher vertically individualistic tendencies in a sample of gamers coming from multicultural societies.

Disordered Gaming, Gender & Depression

Aside from broader cultural dimensions, research has identified individual factors, such as gender, as concurrently implicated in DG and depression vulnerability (Burleigh et al., 2017; Adams et al., 2018). Understanding the distinct influences of gender variations has been repetitively emphasized in developing effective interventions. Specifically, gender differences are reflected in motives underpinning gaming engagement (Müller et al., 2015). Males are typically driven by competition and achievement, while females by social relationships (Taymur et al., 2016; Laconi et al., 2017). In that line, it can be assumed that

gender experiences can vary across different cultural orientations, with more individualistic cultures pertaining less distinct gender roles and drives than more collectivist cultures. Specifically, in more collectivistic cultures drives of achievement and hierarchy are mostly enhanced in males compared to females, who are usually more driven by social and relationship needs (Anderson et al., 2017; Laconi et al., 2017).

Accompanying these, depression and DG are both known to manifest differently across genders (Chumbley & Griffiths, 2006; Stavropoulos et al., 2016; Anderson et al., 2017). Females are twice as likely as males to experience depression (APA, 2013), in contrast with DG, where males present more vulnerable (Liu et al., 2018). Based on previous research, it can be assumed that gender may additionally influence (moderate) the moderation effect of a more vertically individualistic cultural orientation on the association between depressive and DG behaviors. For instance, males experiencing lack of purpose and achievement (in the context of a more depressive mood), may utilize internet games to compensate for it at different levels, depending on the extent of their vertically individualistic cultural orientation (Griffiths et al., 2004; Hoeft et al., 2008). Contrastingly, females experiencing isolation (in the context of depressive mood) may also compensate with excessive engagement in social aspects of the game at different levels, depending on their level of vertically individualistic cultural orientation (that encourages independence; Müller et al., 2015).

However, the specific effect that broader cultural dimensions, and especially vertical-individualism, may have on such gender related game-motivations has yet to be understood empirically. This is important as literature has suggested that in more vertically-individualistic cultures, combined motivations of achievement and competition may be exacerbated in male gamers (Beard & Wickham, 2016; Stavropoulos et al., 2019). In this context, differences in gender motivations may culturally vary the established link between

depression and DG symptoms (Laconi et al., 2017; Stavropoulos et al., 2019). Thus, to shed light on these complex relationships, the present study considers the moderating effect of gender on the potential moderating effect of higher vertically individualistic tendencies on the association between depressive mood and DG behaviors.

Conceptualising DG risk

To conceptualise and explain its findings, the present study adopts an integrative framework. Contemporary research and extant empirical findings have emphasised that DG symptoms can be explained by the dynamic interplay between various elements related to the gamer, his surrounding and the game itself (Valkenburg & Peter, 2013; Masten, 2014; Petry & O'Brien, 2013). Indicatively, Stavropoulos (et al., 2016) advocates an integrated model encompassing individual, contextual and game related factors to conceptualise pathological gaming behaviour on a continuum from minimum to maximum risk. This model posits that individual (e.g socio-demographic, psychopathologies and developmental factors) and real-contextual factors (e.g. family climate, community culture) may accommodate ("push towards") pathological gaming, while game factors (such as features of the game itself) may "pull" (invite) the individual (Stavropoulos et al., 2016). While the interactions between these push and pull mechanisms are reflected in previous theoretical models, researchers have highlighted that concurrent presentations of cultural and gender differences have yet to be investigated (Pearcy et al., 2017; Laconi et al., 2017).

The present study

Based on the review of the literature conducted, the present study aims to examine the contribution of gender in the established association between depression and DG from a specific cultural perspective examining a population of gamers recruited from multicultural societies. Accordingly, it considers a more vertically-individualistic cultural orientation as a factor that may moderate the relationship between depression and DG. Finally, in order to

ascertain distinctions between gender experiences of the depression-DG association across variable levels of vertical individualism, the present study considers gender as an additional moderator of DG risk. Therefore, in order to achieve the aforementioned aims, the following hypotheses were developed (see *Figure 1*):

H_1: Gamers with higher depressive symptoms will score significantly higher on DG symptoms.

H_2: The association between depressive and DG symptoms will vary significantly according to levels of Vertical Individualism reported.

H_3: The interaction between depressive and DG symptoms, and vertical individualism may vary according to the gender of the gamer.

-Figure 1-

Method

Participants

Eligible participants for the present study involved adults over the age of 17, with residency in Australia, the USA, the UK, Canada and New Zealand and familiarity with gaming applications (N=1032 M_{age}=24, SD_{age}=7, Males=503 (48.7%), Females=529 (51.3%). The estimated maximum sampling error (at the 95% confidence interval) for 1032 participants is 3.11%, which satisfies Hill's (1998) recommended acceptance level of +/- 4%, respectively. Further sociodemographic and internet gaming information can be found in Table 1.

-Table 1-

Measures

Demographic (such as age and gender) and internet use questions (such as time spent gaming) were presented to participants prior to the primary self-report scales (of depressive and DG symptoms, and cultural orientation).

Internet Gaming Disorder Scale - Short Form 9 (DGS-SF9). The DGS-SF9 (Pontes & Griffiths, 2015) measures the severity of Internet Gaming Disorder (DG) symptoms (reflecting diagnostic criteria outlined in the *DSM-5*; APA, 2013). Each item follows a 5-point Likert scale ranging from 1 (*Never*) to 5 (*Very often*), indicating severity of gaming behaviours (e.g "Do you play to temporarily escape or relieve a negative mood?"). The total score is derived from the summation of all item responses and ranges from 9 to 45, with higher scores indicating more severe symptoms. The instrument retains high internal reliability across Australia and the USA (Cronbach's alpha=0.92 & 0.90, respectively; Stavropoulos et al., 2018a) as well as in the present study (Cronbach's alpha=.87).

Depression Anxiety Stress Scale (DASS-21). The DASS-21 measures the severity of Depression, Anxiety, and Stress symptoms (Lovibond & Lovibond, 1995). The instrument has 21 items; each with seven assessing Depression (e.g "I couldn't seem to experience any positive feeling at all"), Anxiety (e.g "I felt I was close to panic"), and Stress (e.g "I found it hard to wind down"). Each item follows a 4-point Likert scale ranging from 1 (*Never*) to 4 (*Almost always*). Only items indicating symptoms of Depression were used in the present study. Relevant item response values are accumulated to indicate total scores for each category (with scores ranging between 0 and 21 for Depression). Cut-off scores are provided, indicating symptom severity (Normal = 0-4, Mild = 5-6, Moderate = 7-10, Severe = 11-13, and Extremely severe = 14+). Internal reliability in the present study was high (DASS Cronbach's alpha=.91; Depression items Cronbach's alpha=.89).

Individualism and Collectivism Scale / Culture Orientation Scale (ICS). The ICS measures cultural orientation across dimensions of Vertical Individualism, Vertical Collectivism, Horizontal Individualism, and Horizontal Collectivism (Triandis & Gelfland, 1998). The instrument has 16 items; with four assessing Vertical Individualism (e.g "Winning is everything"), four assessing Vertical Collectivism (e.g "Parents and children

must stay together as much as possible"), four assessing Horizontal Individualism (e.g "I often do 'my own thing'"), and four assessing Horizontal Collectivism (e.g "To me, pleasure is spending time with others"). Each item follows a 9-point scale ranging from 1 (*Never or Definitely no*), to 9 (*Always or Definitely yes*). Scores for each dimension are produced by accumulating their relevant item points (ranging from 4 to 36). Higher scores indicate stronger ideological alignment with the content of each dimension. Internal reliability for the present study was also high (Cronbach's alpha=.71 for Vertical Individualism; .69 for Vertical Collectivism; .57 for Horizontal Individualism; and .86 for Horizontal Collectivism).

Procedure

This project was approved by the institution's Human Research Ethics Committee of prior to commencing in December 2018. Criteria for eligible participants included a minimum age of 18, residency in Australia, the USA, the UK, Canada and New Zealand and internet gaming experience. Sampling methods entailed sharing the online survey across media platforms (e.g Facebook), through advertisement flyers, and virtual chat-rooms (e.g Discord). Given this study's interest in gamer populations, independent distribution of the research link was encouraged in online gaming communities. Responses were collected through *SurveyGizmo*, where participants first engaged with the Plain Language Information Statement (PLIS). This notified them of the voluntary nature of the study, the anonymous storage of data, and required the digital provision of informed consent prior to continuation with the survey. Withdrawal was permitted prior to submitting a completed survey without penalties.

Statistical Analyses

To assess the predictive association between Depression (DASS scores) and DG behaviour (H_1), a two-step hierarchical linear regression analysis was conducted using the IBM Statistical Package for the Social Sciences (SPSS, 25th edition). Age and Gender

(dummy coded 0 = females, 1 = males) were inserted as independent variables to control for potential confounding effects ($Step_1$), with Depression inserted as an independent variable ($Step_2$). To ascertain and solidify results, bootstrapping at the optimum level of 5000 resamples was applied (Hayes, 2013).

Based on Model 1 of the Process macro (by Hayes, 2013), a moderation analysis was then conducted to assess the potentially exacerbating effect of the gamer's levels of Vertical Individualism on the Depression-DG association *(H_2)*. Age and Gender functioned as covariates to account for their potentially confounding effects. Depression was used as the independent (predictor) variable, with DG scores as the dependent (outcome) variable, and measured levels of the cultural dimension of Vertical Individualism as the moderating variable.

To assess H_3, a moderated moderation analysis was conducted. Model 3 of the Process macro (Hayes, 2013) was applied to investigate whether the interactive effect between symptoms of Depression, Vertical Individualism, and DG behaviour, varied according to the Gender of the gamer. Age was simultaneously controlled for any potentially confounding effect. For this model, Depression was the predictor variable, with DG as the outcome variable, Vertical Individualism as the moderator variable, and Gender as the moderating moderator variable. Lastly, the Johnson-Neyman (J-N) technique was applied to indicate specific levels of significance (i.e points of transition) of the moderating effects in both Model 1 and Model 3 on DG behaviour (Preacher, Rucker, & Hayes, 2007).

Results

Before proceeding with the main models, the effect of the country of origin of the gamers (participants) was assessed with three successive analysis of variance (ANOVA) in relation to the continuous variables involved in the current models. Specifically, IGD total

score, depression and vertical individualism were inserted as continuous dependent variables in three different ANOVAs, with the country of origin (1= Australia; 2= USA; 3= Other [Canada, UK, New Zealand]) inserted as the independent variable. Findings indicated no insignificant differences (at the .001 level) and small or negligible effect sizes in regards to the country of origin considering IGD total score (F= 2.08, p=.125, H=.004), depression (F=6.200, p=.002, H=.012) and vertical individualism (F=.573, p=.564, H=.001).

To assess H_1, a cross-sectional analysis was conducted. The slope of the two-step hierarchical regression model (Step 1 inserting age and gender as controls, Step 2 inserting depression scores as the predictor) was statistically significant ($F_{(1, 960)}$ = 87.41, p<.001), accounting for 21% of variance in DG (R^2=.21). Depression exclusively explained 19.9% of variance in DG ($F_{change(1, 960)}$=243.3, p<.001, R^2_{change}=.20). Each point of increase in depression scores resulted in an increase in DG by .56 (b=.56, p<.001).

Furthermore, ordinary least squares regression moderation analysis was conducted to assess H_2 (Hayes, 2013), measuring whether the associated levels of risk between depression and DG were exacerbated by levels of vertical individualism. Specifically, depression scores were input as the central predictor (D), with vertical individualism levels as the moderator (M), and their interacting effect (D x M) as further predictors (see Model 1 by Hayes, 2013). Age and gender were also inserted as covariates/controls (see equation below).

$$DG = a + b_1(Depression) + b_2(Vertical\ Individualism) + b_3(Gender) + b_4(Age) + b_5(Depression \times Vertical\ Individualism)$$

The results obtained for this analysis suggested that 28% of variance in DG behavior was accounted for by the full moderation model (R^2=.281), with the regression slope being significant ($F_{(5, 958)}$=74.74, p>.001). Depression and vertical individualism were found to interact significantly, exacerbating DG behaviors (b^3=0.20, $t_{(958)}$=2.87, p=.004, LLCI=.004,

ULCI=.025). This indicates that DG scores increase when the gamer presents simultaneously with higher depression and higher vertical individualism (see *Figure 2*). The Johnson-Neyman technique was also applied to identify variations in this exacerbating association (Preacher, Rucker & Hayes, 2013), demonstrating no significant transition points.

-Figure 2-

In order to assess H_3, a moderated moderation analysis was conducted (following Model 3 of methodology recommended by Hayes, 2013), examining whether the interacting effect between depression (D) and vertical individualism (M) on DG behavior varied according to gender (G). The following equation summarizes this model:

$$DG = a + b_1(Depression) + b_2(Vertical\ Individualism) + b_3(Gender) + b_4(Age) + b_5(Depression \times Vertical\ Individualism) + b_6(Depression \times Gender) + b_7(Vertical\ Individualism \times Gender) + b_8(Depression \times Vertical\ Individualism \times Gender)$$

The overall model explained 28.4% of DG variance (R^2=.28; See Table 2), with a significant slope in the full regression model ($F_{(8, 955)}$=50.97, p<.001). Notably, the three-way interaction coefficient between depression, vertical individualism and gender indicated a non-significant exacerbating effect with DG (b=-.016, t=-1.62, p=.105). The separate two-way interactions between depression and gender, and vertical individualism and gender were also non-significant (p=.338 and .149, respectively; see Table 2). These findings indicate that when present, the effect of the interaction between depression and vertical individualism does not significantly differ across genders in relation to DG behaviors. The Johnson-Neyman technique (Preacher, Rucker & Hayes, 2013) was applied to further explain this interaction, and demonstrated no significant differences.

-Table 2-

Discussion

The present study identified a scarcity in research investigating how gender and cultural orientation, alongside their interplay (within multicultural context/ societies), may influence the relationship between depression and DG (Arsenault, 2009; Griffiths et al., 2015; González & Adelantado, 2016; Stavropoulos et al., 2019). Accordingly, hierarchical linear regression, moderation and moderated moderation analyses were employed on a normative online sample of gamers coming from multicultural societies to examine these associations (Stavropoulos et al., 206; Hayes, 2017). Overall, the results obtained supported previous literature, providing further support to the notion that higher depressive symptoms precipitate DG risk. Further, an exacerbating influence of vertical individualism on this association was revealed, such that more vertically-individualistic gamers experiencing symptoms of depression presented at greater risk of DG with no significant gender differences. These results have significant implications for clinical practice, where cultural orientation ought to be considered when introducing prevention and intervention strategies for those experiencing comorbid symptoms of depression and DG. Additionally, the findings obtained invite future research on the associations revealed, where the use of clinical samples and qualitative research methods is recommended.

Depression and Disordered Gaming Bond

The present study provided findings indicating that gamers experiencing elevated symptoms of depression would report increased DG behaviors (H_1). This supports a substantial body of literature emphasizing the risk posited by symptoms of depression in developing addictive behaviors, particularly those of DG (Müller et al., 2015; Taymur et al., 2016; Burleigh et al., 2017; Adams et al., 2018; Liu et al., 2018; Stavropoulos et al., 2019). Specifically, gamers presenting with symptoms of depression may be at significantly higher risk of developing symptoms of DG than other gamers. This is in line with the suggestion that

individual factors may contribute to DG behaviors advocated by the integrative theoretical framework adopted (Stavropoulos et al., 2016).

Specifically, this finding could be interpreted by past literature suggesting that the depression and DG association is based on cognitive and emotional processes perpetuated by excessive internet gaming (Yen et al., 2009). Interestingly, the *compensatory internet use hypothesis* (Kardefelt-Winther, 2014), explains how gamers may counterbalance real-life experiences of distress and depression with positive experiences promoted by game mechanisms (such as reward-stimulation and social connection). Gamer experiencing low affect and helplessness, for instance, may utilize internet games for their motivational appeal to immersion and achievement, thus providing them with relief of their off-line depression. When utilized excessively, however, this compensatory process may result into a maladaptive emotional regulation strategy, leading to DG (Kardefelt-Winther, 2014; Stavropoulos et al., 2016; Taymur et al., 2016; Morcos et al., 2019; Stavropoulos et al., 2019.

Conversely, research has suggested that excessive internet gaming behavior places gamers at higher risk for real-life dysfunction (e.g the loss of one's job) that would in turn precipitate and/or perpetuate symptoms of depression (Griffiths, Kuss & Pontes, 2016; Adams et al., 2018; Stavropoulos et al., 2018). These interactions advocate bi-directional and cyclical associations, whereby symptoms of depression and DG can not only initiate and maintain one another but may also occur concurrently to exacerbate one another's severity (Stavropoulos, Kuss, Griffiths & Motti-Stefanidi, 2016; Liu et al., 2018). In this context, the findings of the present study encourage the development of clinical intervention strategies that target internet gaming behavior functioning as a maladaptive emotion regulation strategy to alleviate symptoms of Depression.

The Significance of Culture in the Depression-DG Bond

Furthermore, the findings of this study also indicated that gamers report increased symptoms of DG when presenting concurrently with higher symptoms of depression and higher levels of vertical individualism (H_2). In this context, gamers experiencing symptoms of depression, who might be more vertically-individualistically orientated may find themselves at a significantly higher risk of developing symptoms of DG. This finding supports a significant body of literature advocating the influence of cultural orientation on the associations between psychopathologies and addictive behaviors in general, and in particular DG (Singelis et al., 1995; Györkös et al., 2013; Winkler et al., 2013; Taymur et al., 2016; Stavropoulos, Anderson, et al., 2018; Stavropoulos, Griffiths et al., 2018). Specifically, employing the integrative internet abuse framework, suggested by Stavropoulos et al. (2016), a more vertically individualistic orientation may foster and host achievement, competition, and ranking drives that when matched by mechanisms of the game could render the gamer more vulnerable to DG (Singelis et al., 1995; Györkös et al., 2013; Stavropoulos, Anderson, et al., 2018). Indeed, vertically individualistic cultural orientation endorses behaviors related to self-driven achievement, an innate cultural value that is strongly reflected in the motivational appeal of the MMORPG genre. Interestingly, research has assumed that such overlaps may result in DG behaviors (Taymur et al., 2016; Laconi et al., 2017; Pearcy et al., 2017; Stavropoulos, Anderson, et al., 2018). Such links could become strengthened alongside concurrent gamer-related psychopathological features that may 'push' to a digital escape (i.e symptoms of depression). In this context, depressed gamers, who are concurrently more vertically-individualistically directed may be at higher risk of developing DG than gamers presenting with equal levels of depression and lower vertically-individualistic inclinations (i.e., achievement, competitiveness and ranking). In developing prevention and intervention strategies, these findings encourage practitioners to consider in their case formulations and treatment plans cognitions and behaviors that may reflect more vertically individualistic

tendencies, that could exacerbate DG risk effects, such as symptoms of Depression (Griffiths, Kuss & Pontes, 2016).

The Gender Effect

With regards to the findings related to H_3, the present study found no significant gender differences in the interaction between vertical individualism, symptoms of depression on DG behaviors. This finding contradicts existing literature describing the influence of gender on DG behaviors (Singelis et al., 1995; Chumbley & Griffiths, 2006; Yen et al., 2009; Anderson et al., 2017; Beard et al., 2017). Regarding the broad associations between gender differences and internet gaming motivations (aside of cultural orientation differences), research has in general emphasized that males are typically driven by achievement and immersion, while females are typically driven by social relationships (Györkös et al., 2013; Burleigh et al., 2017; Adams et al., 2018; Stavropoulos, Anderson, et al., 2018; Stavropoulos, Griffiths, et al., 2018). However, gender-based motivations have been found to vary across cultures, as indicated by cross-cultural research (Beard & Wickham, 2016; Stavropoulos, Anderson, et al., 2018). Nevertheless, gamers from westernized multicultural societies were examined here. In such societies vertically individualistic tendencies related to the dominant culture could neutralize such gender-differences, as both males and females tend to adopt motivations of achievement and ranking, which could therefore explain the results obtained (Beard & Wickham, 2016; Stavropoulos et al., 2018; Stavropoulos et al., 2019).

Limitations & Further Research

Despite its strengths, there are significant potential limitations to the present study. Firstly, participants hold residence primarily in Australia and the USA, which may not be completely representative of the range of vertically individualistic variations. Secondly, the cross-sectional nature of the study compromises the clear causal direction between the associations examined. Thirdly, the exclusive use of self-report measures may have limited

the capacity of the study to reflect clinical features of DG behavior, with the reliability of responses being vulnerable to uncontrolled factors (such as participant mood, intelligence, and situational effects).

To address these potential limitations, future research should examine a broader range of countries to capture a broader range of vertically individualistic variations. Additionally, qualitative measures and longitudinal research designs are also recommended to aid estimating the reliability and accuracy of the associations revealed and to better reflect clinical features of DG across distinct segments of the global population of gamers. Finally, research should emphasize and identify protective factors associated with DG to assist the development of effective prevention and intervention strategies.

Implications and Conclusions

Considering the prevention of DG, the findings of the study suggest that gamers (particularly females) presenting with concurrent symptoms of depression and stronger vertical individualistic orientation (with strong overlapping achievement, immersion and social drives) should be prioritized within multicultural societies. Furthermore, the findings encountered suggest that clinical treatment of DG may benefit by targeting maladaptive cognitive and emotional-regulation tendencies associated with the gamer's culture and gender, particularly those of vertical individualism.

In conclusion, the present study examined how symptoms of depression may precipitate DG behaviors differently, when considering the moderating effects of vertically individualistic cultural inclinations and gender within multicultural societies. Findings demonstrated that while symptoms of depression increase DG risk, a more vertically individualistic cultural orientation could exacerbate this effect, mildly more among females than males. These emphasize the importance of understanding differences in the relationship

between depression and DG risk in relation to cultural orientation, particularly in rapidly evolving multicultural societies.

Compliance with Ethical Standards

Funding:

There was no funding

Data Availability:

Data for the current study is available upon request/contact with the corresponding author.

Conflict of Interest:

The authors of the present study do not report any conflict of interest.

Ethical Standards – Animal Rights:

All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed consent:

Informed consent was obtained from all individual participants included in the study.

Confirmation Statement:

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Table 1

Sociodemographic and Internet Use information for present study participants.

Sociodemographic variables		Total (n = 1032)
Gender	Male	503 (48.7%)
	Female	529 (51.3%)
Country	Australia	738 (71.5%)
	United States	222 (21.5%)
	Other (Canada, United Kingdom & New Zealand)	72 (13.3%)
Ethnicity	White-Caucasian background	747 (72.4%)
	Asian background	186 (18.02%)
	African background	67 (6.49%)
	Native American background	11 (1.07%)
	Indigenous Australian or Torres Strait Islander background	7 (.67%)
	Pacific Islander background	14 (1.35%)
Employment status	Other	128 (12.4%)
	Trainee	3 (.3%)
	Student	345 (33.4%)
	Part-time employment	193 (18.7%)
	Full-time employment	363 (35.2%)
Living with	Family of origin (two parents and siblings if any)	312 (30.2%)
	Mother and siblings if any (parents divorced/separated)	110 (10.7%)
	Mother and siblings if any (father passed away)	20 (1.9%)
	Father and siblings if any (parents divorced/separated)	33 (3.2.%)
	Father and siblings – if any (mother passed away)	49 (4.7%)
	With partner	259 (25.1%)
	With partner and siblings	28 (2.7%)
	Alone	97 (9.4%)
	With friends	97 (9.4%)
	Transient accommodation	18 (1.7%)
Internet use	Years using the internet (*M*)	14.53
	Hours spent online on a weekday (*M*)	3.66
	Hours spent online on a weekend day (*M*)	7.92

Note 1: Other Multicultural Countries (n=72; 13.3%) involved United Kngdom (n=7; .7%), New Zealand (n=14; 1.4%) and Canada (n=51; 4.9%).

Table 2. *Estimating DG behaviour from symptoms of Depression, levels of Vertical Individualism, Gender, and their interactions.*

	b	se	*t*	*p*	LLCI	ULCI
a: Constant/intercept	16.67	1.47	11.32	.000	13.778	19.554
b1: Depression (D)	.19	.14	1.45	.149	-.070	.461
b2: Vertical Individualism (M)	.13	.07	1.89	.160	-.005	.264
b3: Gender (G)	-2.78	1.91	-1.46	.338	-6.521	.966
b4: Age	-.06	.02	-2.47	.013	-.109	-.012
b5: D x M	.20	.01	2.94	.003	.006	.032
b6: D x G	.19	.20	.96	.338	-.196	.570
b7: M x G	.15	.10	1.44	.149	-.053	.349
b8: D x M x G	-.016	.01	-1.62	.105	-.035	.003

Notes. R^2=.28, p<.001