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Cross-Cultural Differences in the Pathways to Internet Gaming Disorder

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ABSTRACT

Background: No research to date has examined cross-cultural differences in the pathways to internet gaming disorder (IGD). The current study aimed to address this limitation by examining the relationships between nationality (Singaporeans vs. Australians), culture orientation, gaming motivations, and IGD.

Methods: Participants were 101 Singaporeans (55.4% males) and 98 Australians (52.0% males). They completed the Culture Orientation Scale, the Motives for Online Gaming Questionnaire, and the Internet Gaming Disorder Scale-Short-Form.

Results: A series of mediational analyses showed that Singaporeans tend to be more collectivistic (both horizontally and vertically). In turn, this culture orientation motivates them to play games for social reasons, increasing the risk for IGD. In contrast, Australians tend to be more individualistic (vertically only). In turn, this culture orientation motivates them to play games for competitive reasons, increasing the risk for IGD.

Conclusion: Limitations include the use of samples from two countries only, precluding a generalization of the results. Future research directions include examining the role of game genres as a mediator in the nationality-IGD relationship.

1 | Introduction

There is a paucity of cross-cultural research in internet gaming disorder (IGD). Furthermore, despite the well-established differences in prevalence rates between Asia and the other regions (Kim et al. 2022), no research to date has examined cross-cultural differences in the pathways to IGD. This limitation precluded an understanding of how IGD could develop in different cultures. Consequently, the current study aimed to address this limitation by examining the relationships between nationality, culture orientation, gaming motivations, and IGD among Singaporeans and Australians.

2 | Internet Gaming Disorder

The *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5) defined IGD as “a pattern of excessive and prolonged Internet gaming that results in a cluster of cognitive and behavioral symptoms, including progressive loss of control over gaming, tolerance, and withdrawal symptoms, analogous to the symptoms of substance use disorders” (American Psychiatric Association 2013, p. 796). Specifically the nine criteria are: (1) preoccupation with gaming, (2) withdrawal symptoms like irritability or anxiety when unable to play games, (3) tolerance—the need to increase time spent on games, (4) unsuccessful attempts

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to reduce or stop gaming, (5) loss of interest in other activities because of gaming, (6) continued gaming despite problems, (7) deceiving family members or others about amount of gaming, (8) gaming to escape or to relive negative moods, and (9) risk or loss of a relationship, job, or educational or career opportunity because of gaming. Individuals who meet five or more criteria during the past 12 months would meet the diagnostic criteria for IGD. A recent meta-analysis found a prevalence rate of 6.3% for the Asian region, 2.7% for the European region, and 2.6% for the North American region (Kim et al. 2022).

IGD is associated with a range of negative correlates. First, IGD is positively associated with loneliness (Sarda et al. 2016; Tras 2019) and negatively associated with self-esteem (Király et al. 2014; Lemmens, Valkenburg, and Peter 2011). Second, because individuals with IGD tend to play games excessively, they tend to compromise on their sleep and studies, resulting in poorer sleep quality (Krishnan and Chew 2024) and lower academic achievement (Skoric, Teo, and Neo 2009). Third, IGD is comorbid with a range of psychopathology, including depression, anxiety, obsessive-compulsive disorder, and attention deficit hyperactivity disorder (González-Bueso et al. 2018). Finally, IGD is also associated with lower life satisfaction (Bargeron and Hormes 2017) and poorer quality of life (Beranuy et al. 2020; Lim et al. 2016). Given these relationships, researchers have sought to identify risk factors for IGD.

The risk factors are broadly categorized as either individual difference variables or gaming-related variables. Some individual difference variables include gender, the Big Five personality factors, impulsivity, and sensation seeking. For example, a meta-analysis found that males are 2.5 times more likely than females to meet the diagnostic criteria for IGD (Stevens et al. 2021). Another meta-analysis found that IGD was negatively correlated with conscientiousness, extraversion, and agreeableness, but positively correlated with neuroticism (Chew 2022). Also, two systematic reviews have found positive relationships between IGD, and impulsivity and sensation seeking (Gervasi et al. 2017; Şalvarlı and Griffiths 2019). One study examined the relative importance of these individual difference variables and concluded that impulsivity, followed by gender, were the most important predictors of IGD (Chew and Wong 2022). Next, some gaming-related variables include game genre, gaming time, and gaming motivation. For example, gamers who play massively multiplayer online role-playing games or first-person shooter games tend to have higher IGD scores than gamers of other genres (Dieris-Hirche et al. 2020; Na et al. 2017). Also, perhaps due to tolerance, individuals with IGD tend to spend more time gaming than their counterparts without IGD (Kurt et al. 2018; Rho et al. 2018). Finally, one gaming-related variable that has received a copious amount of research attention is gaming motivation.

Although there are many conceptualizations of gaming motivations (see Chew and Ayu 2022 for an overview), one stood out for its conceptual and statistical rigor, and is often used in gaming motivation research (Demetrovics et al. 2011). According to this conceptualization, there are seven factors of gaming motivations: (a) social, (b) escape, (c) competition, (d) coping, (e) skill development, (f) fantasy, and (g) recreation. These motivations are risk factors for IGD. For example, all seven motivations are positively correlated with IGD (Laconi, Pirès, and Chabrol 2017;

Rafiemanesh et al. 2022). In terms of relative importance, escape appears to be the most importance predictor, followed by either skill development (Wu et al. 2016) or fantasy (Rafiemanesh et al. 2022). Finally, individuals with IGD tend to have higher scores on social, escape, coping, and fantasy than their counterparts without IGD (Laconi, Pirès, and Chabrol 2017).

Despite the burgeoning number of research on IGD, only a handful has examined cross-cultural differences in IGD (Stavropoulos et al. 2019). This limitation is surprising given the robust findings of higher prevalence rates in the Asian region compared to the other regions (Kim et al. 2022). It has been speculated that this difference in prevalence rates could be due to differences in levels of individualism (Chia et al. 2020). Indeed, one of the most often studied cultural dimension in IGD is the individualism–collectivism continuum (Andretta et al. 2020; O'Farrell et al. 2020; Stavropoulos et al. 2020, 2021). Individualistic cultures are distinguished from collectivistic cultures on four attributes: (a) definition of the self (independent vs. interdependent), (b) priority of goals (personal goals vs. ingroup goals), (c) type of relationships (exchange vs. communal), and (d) determinants of behavior (attitudes vs. norms) (Triandis 1995; Triandis and Gelfand 1998). This continuum has been juxtaposed with the horizontal-vertical social relationships continuum (support for equality vs. hierarchy), resulting in a typology of four factors of culture orientation: (a) horizontal individualism, (b) vertical individualism, (c) horizontal collectivism, and (d) vertical collectivism (Triandis and Gelfand 1998).

The four factors of culture orientation have been examined in IGD. For example, it was found that vertical individualism moderates the relationship between IGD and stress (Andretta et al. 2020), depression (O'Farrell et al. 2020), inattention (Stavropoulos et al. 2020). In these studies, vertical individualism increased the risk of IGD when a gamer is stressed, depressed, or has inattention. Another study used latent class analysis to examine profiles of participants on the individualism–collectivism continuum and their relationships to IGD (Stavropoulos et al. 2021). Their analysis revealed two profiles. While these two profiles had similar levels of horizontal and vertical individualism, the first profile had significantly lower levels of horizontal and vertical collectivism than the second profile. Their results showed that participants belonging to the first profile had higher IGD than their counterparts in the second profile, suggesting that collectivism is a protective factor for IGD.

While these studies are commendable for examining the role of culture orientation in IGD, two limitations should be noted (Andretta et al. 2020; O'Farrell et al. 2020; Stavropoulos et al. 2020, 2021). First, their samples were predominantly recruited from Australia and the USA. Although these are two different countries, they are relatively similar in culture orientation. For example, on a scale from 0 (collectivistic) to 100 (individualistic), Australia had a score of 90 and the USA had a score of 91 (Hofstede 2010). Second, culture orientation was conceptualized either as a moderator or a risk factor of IGD. It is seldom used as a mediator to examine cross-cultural differences in the pathways to IGD. Taken together, these limitations precluded an understanding of how IGD could develop in different cultures.

3 | The Current Study

The current study aimed to address the limitations of the literature by examining the relationships between nationality, culture orientation, gaming motivations, and IGD among Singaporeans and Australians. The conceptual model is presented in Figure 1. First, Given the well-established differences in prevalence rates between Asia and the other regions (Kim et al. 2022), nationality should be related, either directly or indirectly via culture orientation and gaming motivation, to IGD. Second, with regards to culture orientation, Singaporeans tend to be collectivistic whereas Australians tend to be individualistic. Specifically, on a scale from 0 (collectivistic) to 100 (individualistic), Singapore had a score of 20 whereas Australia had a score of 90 (Hofstede 2010). Third, different culture orientations should be related to different gaming motivations. Specifically, given the interdependent definition of the self and the prioritization of ingroup goals, individuals from collectivistic cultures should be motivated by the social aspects of gaming (Demetrovics et al. 2011; Triandis 1995). In contrast, given the independent definition of the self and the prioritization of personal goals, individuals from individualistic cultures should be motivated by the competitive aspects of gaming (Demetrovics et al. 2011; Triandis 1995). Finally, both social and competition gaming motivations should predict IGD (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022).

4 | Method

4.1 | Participants

Participants were 199 Singaporeans and Australians. Among the sample, there were 101 Singaporeans (55.4% males) and their age ranged from 17 to 39 ($M = 23.31$, $SD = 4.15$). The remaining 98 were Australians (52.0% males) and their age ranged from 18 to 39 ($M = 22.70$, $SD = 4.55$).

4.2 | Instruments

4.2.1 | The Culture Orientation Scale

The Culture Orientation Scale is a 16-item instrument designed to assess four factors of culture orientation: (a) horizontal individualism, (b) vertical individualism, (c) horizontal collectivism, and (d) vertical collectivism (Triandis and Gelfand 1998). Responses are made on a 9-point Likert scale that ranges from 1 = *Never or Definitely No* to 9 = *Always or Definitely Yes*. Appropriate item scores are summed for each factor, with higher scores indicating higher levels of the respective culture

orientation. Scores for each factor range from 4 to 36. The four-factor structure of the instrument has been supported by exploratory factor analysis (Triandis and Gelfand 1998). In addition, the factors had acceptable internal consistencies that ranged from 0.73 to 0.82.

4.2.2 | The Motives for Online Gaming Questionnaire

The Motives for Online Gaming Questionnaire is a 27-item instrument designed to assess seven factors of gaming motivations: (a) social, (b) escape, (c) competition, (d) coping, (f) skill development, (g) fantasy, and (h) recreation (Demetrovics et al. 2011). Responses are made on a 5-point Likert scale that ranges from 1 = *Almost Never/Never* to 5 = *Almost Always/Always*. Appropriate item scores are summed for each factor, with higher scores indicating higher levels of the respective gaming motivation. Scores for each factor range from 4 to 20 (except for recreation which range from 3 to 15). The seven-factor structure of the instrument has been supported by exploratory and confirmatory factor analysis (Demetrovics et al. 2011). In addition, the factors had acceptable internal consistencies that ranged from 0.79 to 0.90. Given the aim of the current study, only the social and competition factors were used.

4.2.3 | The Internet Gaming Disorder Scale-Short-Form (IGDS9-SF)

The Internet Gaming Disorder Scale-Short-Form is a 9-item instrument designed to assess the nine criteria of IGD in the DSM-5: (a) preoccupation, (b) withdrawal, (c) tolerance, (d) unsuccessful attempts to stop, (e) loss of interest in other activities, (f) continued gaming despite problems, (g) deception, (h) relive negative moods, (i) loss of a relationship or job (Pontes and Griffiths 2015). Participants were asked to report on their gaming activity during the past 12 months. Responses are made on a 5-point Likert scale that ranges from 1 = *Never* to 5 = *Very Often*. The item scores are summed, with higher scores indicating high levels of gaming disorder. Scores for the instrument range from 9 to 45. The unidimensional structure of the instrument has been supported by exploratory and confirmatory factor analysis (Pontes and Griffiths 2015). In addition, the instrument had an acceptable internal consistency of 0.87.

4.3 | Procedure

Participants completed the study online via Qualtrics. Upon providing informed consent, participants completed the Culture Orientation Scale (Triandis and Gelfand 1998), the Motives for Online Gaming Questionnaire (Demetrovics et al. 2011), and the Internet Gaming Disorder Scale-Short-Form (Pontes and Griffiths 2015). The instruments were administered in a randomized order to control for fatigue and order effects. Finally, participants completed a demographic form that asks for demographic information (age and gender). Data collection took place over 3 months from April 2022 to June 2022. This procedure was approved by the university's Human Research Ethics Committee (Approval number: H8690).

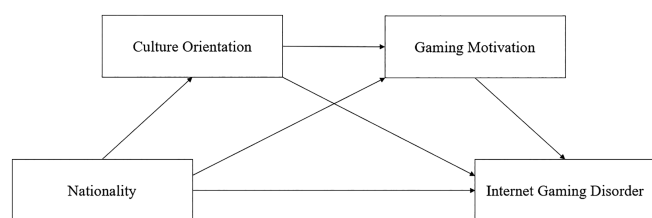


FIGURE 1 | Conceptual Model of the Current Study.

4.4 | Data Analysis

First, the data was analyzed using Pearson correlation analyses to explore the relationships between the variables. Subsequently, eight serial mediation models were specified (four factors of culture orientation x two factors of gaming motivations). These models were examined using PROCESS Model 6 with 5000 bootstrap re-samples (Hayes 2017). Models 1 to 4 examined the four factors of culture orientation with social gaming motivation whereas Models 5 to 8 examined the four factors of culture orientation with competition gaming motivation. Specifically, the factors of cultural orientation (i.e., horizontal individualism, vertical individualism, horizontal collectivism, vertical collectivism) as MV_1 (indirect effect = a_1b_1) and the factors of motives for online gaming (i.e., social and competition) as MV_2 (indirect effect = a_2b_2). Consequently, the dependency of MV_2 on MV_1 (d_{21}) was also estimated (indirect effect of $MV_1 \rightarrow MV_2 = a_1d_{21}b_2$). The sequential mediation model partitions the total effect of the IV on the DV not only into its direct (c') and indirect effects (i.e., a_1b_1 for MV_1 and a_2b_2 for MV_2) but also the sequential indirect effect ($MV_1 \rightarrow MV_2 = a_1d_{21}b_2$). The analysis provides a test of the indirect effects of each mediator (controlling for influences of the other mediator) as well the sequential mediation. When indirect effect (IE) in the 95% CIs bootstrap re-sampling excluding zero, we would then consider the mediation path to be significant (Hayes 2017).

5 | Results

The descriptives and bivariate correlations of the variables are presented in Table 1. Overall, nationality was correlated with the factors of culture orientation except for horizontal individualism. Furthermore, horizontal and vertical collectivism were positively correlated with social gaming motivation whereas horizontal and vertical individualism were positively correlated with compete gaming motivation. Finally, vertical individualism, social and compete gaming motivation were positively

correlated with IGD. The descriptives of the variables among Singaporeans and Australians are presented in Table 2. A series of independent t -tests showed that Singaporeans had significantly higher horizontal collectivism, $t(197) = 6.13$, $p < 0.001$ and vertical collectivism, $t(197) = 4.08$, $p < 0.001$, but significantly lower vertical individualism, $t(197) = 2.03$, $p = 0.022$ and compete gaming motivation, $t(197) = 3.72$, $p < 0.001$, than Australians.

In Models 1 to 4 (see Figure 2), results showed there were complete sequential mediations when the relationship from nationality to horizontal collectivism, $B = -4.70$, $t = -6.13$, $p < 0.001$, 95% CIs = -6.22 to -3.19 , via social gaming motivation, $B = 0.22$, $t = 4.48$, $p < 0.001$, 95% CIs = 0.12 to 0.31 , on IGD, $B = 0.90$, $t = 7.89$, $p < 0.001$, 95% CIs = 0.68 to 1.13 , was significant, $IE = -0.92$, 95% CIs = -1.43 to -0.48 , and the relationship from nationality to vertical collectivism, $B = -3.70$, $t = -4.08$, $p < 0.001$, 95% CIs = -5.49 to -1.91 via social gaming motivation, $B = 0.14$, $t = 3.32$, $p = 0.001$, 95% CIs = 0.06 to 0.22 , on IGD, $B = 0.84$, $t = 7.38$, $p < 0.001$, 95% CIs = 0.61 to 1.06 , was significant, $IE = -0.43$, 95% CIs = -0.82 to -0.14 . The relationship between nationality and IGD was only partially mediated by vertical individualism as MV_1 , path a1 (nationality to vertical individualism), $B = 2.16$, $t = 2.03$, $p = 0.04$, 95% CIs = 0.07 to 4.26 ; path b1 (vertical individualism to IGD), $B = 0.21$, $t = 3.84$, $p < 0.001$, 95% CIs = 0.10 to 0.32 , $IE = 0.46$, 95% CIs = 0.02 to 1.05 , excluding the path via social gaming motivation (MV_2), $B = -0.01$, $t = -0.20$, $p = 0.84$, 95% CIs = -0.08 to 0.07 , $IE = -0.01$, 95% CIs = -0.19 to 0.20 . There was no mediation when horizontal individualism was MV_1 , $ps > 0.05$, all IEs' 95% CIs including zero in the mediation paths.

In Model 5 to 8 (see Figure 3), results showed there was a complete sequential mediation when the relationship from nationality to vertical individualism, $B = 2.16$, $t = 2.04$, $p = 0.04$, 95% CIs = 0.07 to 4.26 , via compete gaming motivation, $B = 0.32$, $t = 9.31$, $p < 0.001$, 95% CIs = 0.25 to 0.39 , on IGD, $B = 0.42$, $t = 3.33$, $p = 0.001$, 95% CIs = 0.17 to 0.67 , was significant, $IE = -0.29$, 95%

TABLE 1 | Descriptives and bivariate correlations between nationality, internet gaming disorder, horizontal and vertical individualism, horizontal and vertical collectivism, social and competition gaming motivation.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----------------|----------|---------|---------|---------|---------|---------|---------|-------|
| (1) Nationality | — | | | | | | | |
| (2) IGD | 0.75 | — | | | | | | |
| (3) Ind. Hor | 0.118 | -0.119 | — | | | | | |
| (4) Ind. Ver | 0.143* | 0.235** | 0.419** | — | | | | |
| (5) Col. Hor | -0.400** | -0.17 | 0.141* | -0.120 | — | | | |
| (6) Col. Ver | -0.279** | 0.062 | 0.242** | 0.114 | 0.588** | — | | |
| (7) Social | -0.117 | 0.460** | -0.097 | -0.031 | 0.324** | 0.253** | — | |
| (8) Compete | 0.256** | 0.322** | 0.250** | 0.566** | -0.110 | 0.092 | 0.278** | — |
| <i>M</i> | — | 20.86 | 28.84 | 22.73 | 26.38 | 25.04 | 10.38 | 13.02 |
| <i>SD</i> | — | 6.75 | 5.51 | 7.56 | 5.89 | 6.65 | 3.87 | 4.48 |

Note: $N = 199$; Nationality was coded as 1 = Singaporeans and 2 = Australians.

Abbreviations: IGD = internet gaming disorder; Ind. Hor. = horizontal individualism; Ind. Ver = vertical individualism; Col. Hor. = horizontal collectivism; Col. Ver. = vertical collectivism; Social = social gaming motivation; Compete = competition gaming motivation.

* $p < 0.05$.

** $p < 0.01$.

TABLE 2 | Mean and standard deviations of internet gaming disorder, horizontal and vertical individualism, horizontal and vertical collectivism, social and competition gaming motivation among Singaporeans and Australians.

| Variables | Singaporeans (n = 101) | | Australians (n = 98) | | p |
|--------------------------------|------------------------|-------------|----------------------|-------------|-------------------|
| | M | SD | M | SD | |
| Internet gaming disorder | 20.37 | 7.46 | 21.38 | 5.93 | 0.29 |
| Horizontal individualism | 28.21 | 5.42 | 29.50 | 5.54 | 0.10 |
| Vertical individualism | 21.66 | 7.45 | 23.83 | 7.55 | 0.04 |
| Horizontal collectivism | 28.69 | 4.99 | 23.99 | 5.82 | < 0.001 |
| Vertical collectivism | 26.86 | 6.67 | 23.16 | 6.11 | < 0.001 |
| Social | 10.82 | 4.27 | 9.92 | 3.38 | 0.10 |
| Compete | 11.89 | 4.57 | 14.18 | 4.10 | < 0.001 |

Note: N = 199; Social = Social Gaming Motivation; Compete = Competition Gaming Motivation; Significant differences between Singaporeans and Australians are bolded.

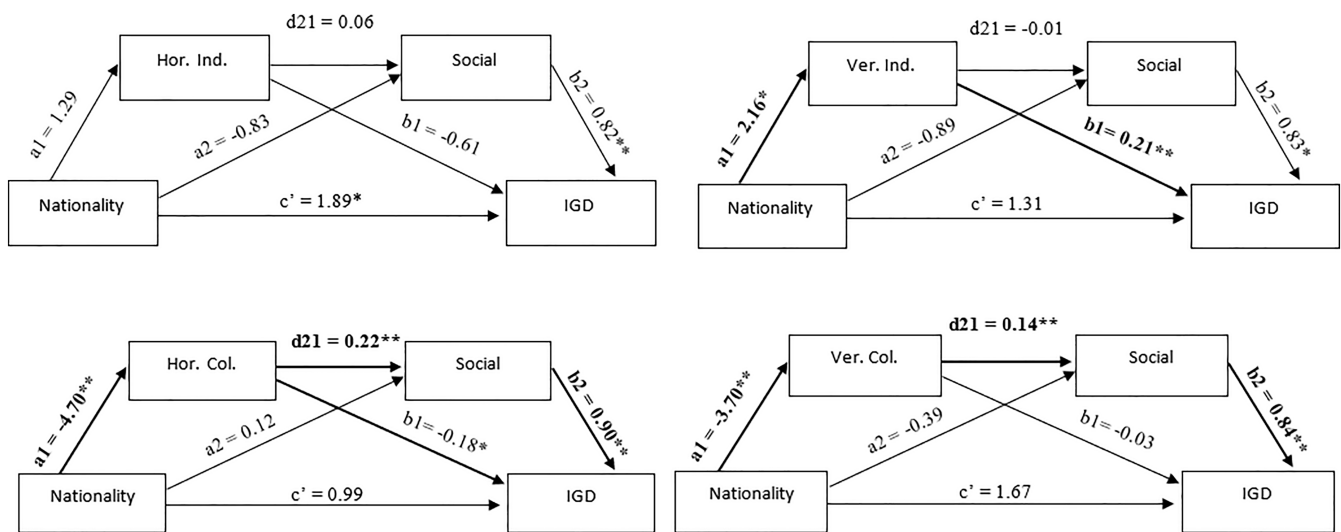


FIGURE 2 | Sequential Mediation Models 1 to 4. In each path diagram, the coefficients a_1 and a_2 are the simple (zero-order) effects of the IV on MV_1 and MV_2 , respectively. The coefficient d_{21} represents the sequential effect of MV_1 on MV_2 , controlling for the IV, and coefficients b_1 , b_2 , and c' represent the partialled influences of MV_1 , MV_2 , and the IV on the DV when the IV and both mediators are used to predict the DV. Bold paths representing significant mediation models (* $p=0.05$; ** $p<0.01$).

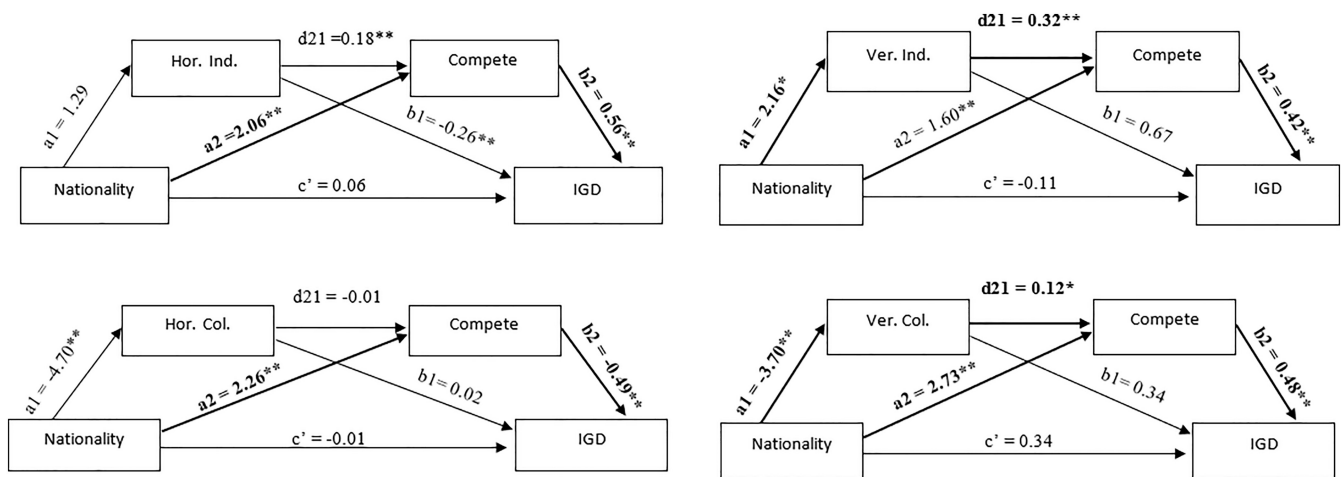


FIGURE 3 | Sequential mediation models 5 to 8. The coefficients are interpretable in the same ways as in Figure 2. Bold paths representing significant mediation models (* $p=0.05$; ** $p<0.01$).

CIs=0.01 to 0.73, and the relationship from nationality to vertical collectivism, $B = -3.70$, $t = -4.08$, $p < 0.001$, 95% CIs = -5.49 to -1.91 via compete gaming motivation, $B = 0.12$, $t = 2.50$, $p = 0.013$, 95% CIs = 0.03 to 0.21, on IGD, $B = 0.48$, $t = 4.46$, $p < 0.001$, 95% CIs = 0.27 to 0.69, was also significant, $IE = -0.21$, 95% CIs = -0.49 to -0.03 . In addition, all partial mediation paths from nationality to compete (as MV_2) to IGD were significant, $ps < 0.05$, all IEs' 95% CIs excluding zero in the mediation paths.

6 | Discussion

The goal of the present study was to examine the relationships between nationality, culture orientation, gaming motivations, and IGD. Specifically, a series of serial mediation models were conceptualized to examine the indirect effects of four culture orientations and two gaming motivations between nationality (Singaporeans and Australians) and IGD.

Results revealed sequential mediation effects of collectivism and social motivation on the nationality-IGD link. In line with expectation, Singaporeans tended to be more collectivistic than individualistic compared to Australians, regardless of horizontal or vertical orientations. This was consistent with past research (Hofstede 2010), and also supported the cultural distinction between Singapore and Australia. Next, both horizontal and vertical collectivism then positively predicted the social aspect of gaming, which was congruent with past studies (Demetrovics et al. 2011; Triandis 1995). It appears that individuals from collectivistic cultures prioritize social interaction and collaboration with other people, and this notion extends to the realm of video gaming. Finally, social gaming motivation was positively associated with IGD. This was unsurprising given past research that reported social gaming motivation as a risk factor for gaming addiction (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022). More importantly, the mediation models implied that collectivism and social gaming motivation are underlying mechanisms that sequentially linked nationality and IGD.

The expectation that Australians would be more individualistic was partially supported. Nationality predicted vertical, but not horizontal individualism. Namely, Australians were more likely to align with vertical, but not horizontal individualism. This could be due to participants' knowledge that the present study revolved around video games, and thereafter potentially affected how they perceived the culture orientation scale. A key difference between vertical and horizontal individualism is the desire to be different and unique (i.e., vertical) or not striving to be special (i.e., horizontal; Triandis and Gelfand 1998). Video games often allow players to be the protagonist of a narrative, or to create an avatar with ideal and special qualities (Trepte and Reinecke 2010). Participants could have applied this context when completing the culture orientation scale, resulting in a potential skew towards the vertical domain. Regardless, findings suggested that focusing on the vertical-horizontal axis can provide additional insights, as opposed to reporting aggregated collectivistic-individualistic scores, which could potentially underestimate or overestimate results (Hofstede 2010).

Both horizontal and vertical individualism were positively related to competition gaming motivation. Individualistic

people emphasize the self and prioritize ingroup achievements (Triandis 1995). This was in line with the conceptualization of competition, where players focus on ingroup goals (e.g., "I like to win"; Demetrovics et al. 2011). This competitive motivation then predicted gaming addiction, which was compatible with past findings (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022). In sum, the nationality-IGD link was serially mediated by vertical individualism, followed by competition.

Surprisingly, vertical collectivism also predicted competition gaming motivation. This could be due to the vertical dimension exerting a larger influence on competition, compared to collectivism. Acknowledging that a hierarchy exists could push one to be more competitive to advance one's standing. From a video gaming perspective, some games contain competitive elements that sort players into different skill brackets, where players compete against others within the same tier, with the overarching goal of reaching a higher skilled bracket. This hierarchical structure could lead to higher levels of competitiveness. For instance, in the popular genre of Massive Online Battle Arena (MOBA) games, competition is highly valued (Johnson, Nacke, and Wyeth 2015). This desire to climb the skill ladder could reflect an individual need for achievement. Simultaneously, most MOBAs typically involve working with others towards a common goal—matches usually consist of two opposing teams with five players each (Mora-Cantallos and Sicilia 2018). Taken together, our findings suggest that the need to climb the skill ladder could overshadow the value of collectivism. More research is needed to examine this claim.

The current study represented the first attempt to examine cross-cultural differences in the pathways to IGD and could hold important clinical implications. While culture orientation can be difficult to manipulate or change, treatment efforts may be more suited to target cognitive/emotional factors, such as the motivational aspects of why gamers indulge in gaming. Knowing specific risk factors (i.e., social for collectivistic cultures, competition for individualistic cultures) could allow practitioners to better tailor treatment efforts to specific cultures. For instance, individuals with high social motivations may reflect the belief that gaming is the only way to form social relationships (Wang and Cheng 2022). Thus, clinicians practicing in Asia (or collectivistic cultures) could focus on improving clients' social skills in real world interactions, such that it alleviates the need to rely on a video game for meaningful social relationships. This is perhaps even more crucial in Asia, given the higher prevalence rates of IGD, compared to other regions (Kim et al. 2022).

The use of mediational models also allowed for further insight. The present study suggested that collectivism may not necessarily be a protective factor against IGD (Stavropoulos et al. 2021). One should also consider the role of gaming motivation. For example, both vertical and horizontal collectivism led to higher social motivation for gaming, which ultimately predicted IGD. From this view, it appeared that collectivism was a risk factor for IGD instead.

Limitations should be considered. Firstly, only two countries were examined in the current study, thus caution should be exercised when generalizing findings to other countries. Secondly, the sample in the present study represented a

stereotypical collectivistic (i.e., Singaporeans) and individualistic (i.e., Australians) culture. Individuals from other countries with less pronounced differences in culture dimensions could obfuscate the associations between culture dimension and gaming motivation factors. Thirdly, rapid globalization in today's world can affect local culture (Ullah and Ho 2021), which may then impact cultural dimensions. As such, the individualistic-collectivistic continuum should not be viewed as a static construct, but instead one that is always evolving. Regardless, given the paucity of cross-cultural research in IGD, our findings add to the literature by elucidating the distinction between an Eastern and Western culture, and how they affect gaming motivation and IGD.

Future research directions might include investigating the role of game genre as an additional mediator in the nationality-IGD relationship. Research has found that genre of games can affect IGD scores (e.g., Dieris-Hirche et al. 2020), as well as other work pointing out that certain genres tend to be more relevant to specific gaming motivations. For instance, a preference for first person shooter games was highly related to competitive motivations for gaming (Kuss 2013). Accordingly, a more comprehensive model that includes game genre can deepen understanding of the pathways that lead to IGD.

While past research has investigated the individual pathways to IGD, the present study provides first evidence of cross-cultural differences in the lead up to IGD, focusing on the contributions of culture dimensions and gaming motivations. Collectivism (both vertical and horizontal) was activated by nationality to enhance social gaming motivation, leading to IGD. However, in the case of individualism, nationality only activated vertical individualism, which in turn enhanced competition as the motivational factor for IGD. By elucidating the mediational pathways leading to IGD, this not only better informs cross-cultural future research, but also treatment efforts, with the hope of reducing IGD prevalence rates.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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