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Gaming motivations as moderators and mediators of the gender-internet gaming disorder link

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ABSTRACT

Research has shown that males are at higher risk for internet gaming disorder (IGD) than females (i.e. the gender-IGD link). However, few studies have examined the boundary conditions or processes that underlie the gender-IGD link. Consequently, the current study aimed to extend on the existing research by examining gaming motivations as moderators and mediators of the gender-IGD link. Participants were a representative sample of 1001 Singaporean young adults (50.15% females; 74.43% Chinese, 13.29% Malays, 9.29% Indians, and 3.00% Others). They completed instruments that assess IGD and gaming motivations (social, escape, competition, coping, skill development, fantasy, and recreation). The results showed that social, escape, competition, and skill development moderated the gender-IGD link. Furthermore, all seven gaming motivations partially mediated the gender-IGD link. Limitations include the use of a cross-sectional design and a specific conceptualisation of gaming motivations. Limitations notwithstanding, the results highlighted the importance of gaming motivations and have both theoretical and clinical implications that could advance the field of IGD.

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Gender; gaming motivations;
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Research has shown that males are at higher risk for internet gaming disorder (IGD) than females (i.e. the gender-IGD link) (Chew and Wong 2022; Peeters, Konig, and van den Eijnden 2018; Stevens et al. 2021; Su et al. 2020). However, few studies have examined the boundary conditions or processes that underlie the gender-IGD link. Given the relationships between gender and gaming motivations (Demetrovics et al. 2011; Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022), and gaming motivations and IGD (Chew, Lin, and Yow 2024; Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022; Wu et al. 2016), the current study aimed to extend on the existing research by examining gaming motivations as moderators and mediators of the gender-IGD link.

1. Internet gaming disorder

The *Diagnostic and Statistics 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 behavioural symptoms, including progressive loss of control over gaming, tolerance, and withdrawal symptoms, analogous to the symptoms of substance use disorders’ (American

Psychiatric Association 2013, 796). According to the DSM-5, the nine criteria of IGD are: (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) relieve negative moods, (i) loss of a relationship or job. Individuals who meet five or more criteria during the past 12 months would meet the diagnostic criteria for IGD. Criticisms notwithstanding (Chew and Au 2024; Dullur and Starcevic 2018; Griffiths 2018), the presence of an official set of criteria enabled researchers to study the condition in a consistent manner. Indeed, a meta-analysis reported that the prevalence rate of problematic gaming varies widely, from 0.16% to 21.76% (with a pooled prevalence rate of 3.05%), due to the use of different instruments and diagnostic criteria (Stevens et al. 2021).

Individuals with higher scores on IGD instruments tend to experience a range of negative consequences. For example, IGD is associated with lower academic achievement among students (Hawi, Samaha, and Griffiths 2018). Furthermore, IGD is associated with negative emotional states such as depression, anxiety, and stress (Wong et al. 2020). In addition, due to amount of time spent on gaming, individuals with

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IGD tend to engage in bedtime procrastination, leading to poorer sleep quality (Krishnan and Chew 2024). Finally, IGD is associated with a lower quality of life (Beranuy et al. 2020). Given these consequences, it is important to understand the risk factors that contribute to the development of IGD.

The Interaction of Person-Affect-Cognition-Execution (I-PACE) model provides a framework for the development of IGD (Young and Brand 2017). In contrast to the other models of IGD (e.g. Dong and Potenza 2014; Kuss and Griffiths 2012), the I-PACE model was selected as a framework for the current study because it emphasised the importance of examining the interaction of various risk factors in predicting IGD. Specifically, the model postulated that an individual's core characteristics (e.g. personality) interact with (a) affective variables (e.g. craving), (b) cognitive variables (e.g. coping style), (c) executive functions, and (d) decision making, resulting in the development and maintenance of IGD. In other words, these variables act as both moderators and mediators of the link between core characteristics and IGD. Overall, the I-PACE model provides a useful framework to understand the risk factors for IGD (e.g. Chew 2022).

1.1. Gender and IGD

Gender is a risk factor for IGD (i.e. the gender-IGD link). Specifically, males are at higher risk for IGD than females. In correlational studies where multiple predictors are examined, gender often emerges as one of the significant predictors of IGD (Chew and Wong 2022; Peeters, Koning, and van den Eijnden 2018). Furthermore, one meta-analysis found gender differences in addiction pathways: males tend to have IGD whereas females tend to have social media addiction (Su et al. 2020). Indeed, a meta-analysis found that males (6.3%) tend to have higher prevalence rates of IGD than females (2.5%) (Stevens et al. 2021). It has been suggested that because games tend to contain competitive elements, opportunities for socially acceptable expressions of aggression, and sexualised content, males are more attracted to games than females, leading to higher IGD (Chew et al. 2025; Su et al. 2020). However, despite these findings, few studies have examined the boundary conditions or processes that underlie the gender-IGD link.

1.2. Gender and gaming motivations

Gaming motivations might clarify the relationship between gender and IGD. Three approaches have been used to identify gaming motivations: the (a) qualitative

approach, (b) quantitative bottom-up approach (i.e. data driven), and (c) quantitative top-down approach (i.e. theory driven) (Chew and Ayu 2023). Demetrovics et al.'s (2011) used the quantitative bottom-up approach and identified seven motivations via a series of exploratory and confirmatory factor analyses involving 3818 participants: (a) social, (b) escape, (c) competition, (d) coping, (f) skill development, (g) fantasy, and (h) recreation. Currently, this is one of the most often used conceptualizations of gaming motivations in the literature.

Gender has a significant, albeit mixed, effect on gaming motivations. For example, the original study found no gender differences on skill development, but found that males were higher on competition than females whereas females were higher on social, escape, coping, fantasy, and recreation than males (Demetrovics et al. 2011). In contrast, subsequent studies found that males were generally higher on most gaming motivations except for escape and coping, where no gender differences were found (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022). These differences might be due to the varied sample sizes and nationality of the participants. According to the users and gratifications theory for online games, individuals are motivated to play games to satisfy their psychological needs (Wu, Wang, and Tsai 2010), and games tend to contain elements that fulfil the psychological needs of males (Chew et al. 2025; Su et al. 2020). Consequently, it is likely that males would have higher gaming motivations than females.

1.3. Gaming motivations and IGD

Gaming motivations are related to IGD. When examined separately, all seven gaming motivations were positively correlated with IGD (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022). Furthermore, individuals who meet the IGD diagnostic criteria reported higher scores on social, escape, coping, and fantasy (Laconi, Pirès, and Chabrol 2017). When examined concurrently while controlling for demographic variables like age and gender, escape, skill development, and fantasy, emerges as significant predictors of IGD (Rafiemanesh et al. 2022; Wu et al. 2016). Gaming motivations also explain cross-cultural differences in the pathways to IGD (Chew, Lin, and Yow 2024). Specifically, Singaporeans tend to be collectivistic and play games for social reasons, leading to IGD. In contrast, Australians tend to be individualistic and play games for competitive reasons, leading to IGD. Overall, gaming motivations are robust predictors of IGD, with some motivations (e.g. escape) being more important than others.

2. The current study

In summary, males are at higher risk for IGD than females (Stevens et al. 2021). Second, there are gender differences on gaming motivations (Demetrovics et al. 2011; Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022). Finally, gaming motivations are correlated with IGD (Chew, Lin, and Yow 2024; Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022; Wu et al. 2016). However, despite these relationships, little to no studies have examined gaming motivations as moderators and mediators of the gender-IGD link. The current study aimed to extend on the existing research by using the I-PACE model as a framework and conducting multidimensional analyses. Specifically, gender was conceptualised as a core characteristic of an individual, gaming motivations as an affective and cognitive variable, and IGD as an outcome variable. A non-hierarchical exploratory approach was adopted because of the mixed findings between gender and gaming motivations, and the varied importance of gaming motivations. Specifically, it is currently unclear which gaming motivations are the best predictors of IGD. Consequently, the current study examined all seven gaming motivations to identify the core (vs. peripheral) gaming motivations that would both moderate and mediate the gender-IGD link.

3. Method

3.1. Participants

Participants were a representative sample of 1001 young adults (50.15% females; 74.43% Chinese, 13.29% Malays, 9.29% Indians, and 3.00% Others) recruited online by Pureprofile (n.d.), a survey panel, based on the inclusion and exclusion criteria. Specifically, participants should be (a) Singaporeans or permanent residents, (b) played at least one game in the past 12 months, and (c) between 18 to 40 years of age (i.e. young adults). Their age ranged from 18 to 40 years ($M = 28.47$, $SD = 6.21$). The gender and ethnic distribution is similar to the Singaporean population (51.10% females; 74.30% Chinese, 13.50% Malays, 9.00% Indians, and 3.20% Others) (Singapore Department of Statistics 2020). The male sample consisted of 499 participants (74.55% Chinese, 13.23% Malays, 9.22% Indians, and 3.01% Others). Their age ranged from 18 to 40 years ($M = 29.12$, $SD = 5.76$). The female sample consisted of 502 participants (74.30% Chinese, 13.35% Malays, 9.36% Indians, and 2.99% Others). Their age ranged from 18 to 40 years ($M = 27.84$, $SD = 6.57$). The demographic and gaming-related information of the samples are presented in Table 1.

3.2. Instruments

3.2.1. The background information form

The Background Information Form was developed for the purposes of the current study to collect demographic and gaming-related information. Demographic variables include nationality, age, gender, ethnicity, housing type, occupation, and current/highest education level. Gaming-related variables include the average amount of time (in hours) spent playing games in a typical weekday and weekend.

3.2.2. 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 (e.g. because I can get to know new people), (b) escape (e.g. because it makes me forget real life), (c) competition (e.g. because I like to win), (d) coping (e.g. because it reduces tension), (f) skill development (e.g. because it improves my skills), (g) fantasy (e.g. to feel as if I was somebody else), and (h) recreation (e.g. because I enjoy gaming) (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. The factors had acceptable internal consistency reliabilities that ranged from .79 to .90.

3.2.3. The internet gaming disorder scale-short-form (IGDS9-SF)

The IGDS9-SF is a 9-item instrument designed to assess the nine criteria of IGD in the DSM-5 (e.g. Do you systematically fail when trying to control or cease your gaming activity?) (Pontes and Griffiths 2015). 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 higher levels of IGD. The instrument had an acceptable internal consistency reliability of .87.

3.3. Procedure

The current study is part of a larger study to examine gaming behaviour among young adults in Singapore. Participants completed the study online via Qualtrics. Upon providing informed consent, participants completed a screener question to ensure that they have played games in the past 12 months and the Background Information Form. Subsequently, participants completed the Motives for Online Gaming Questionnaire (Demetrovics et al. 2011), the IGDS9-SF (Pontes and Griffiths 2015), and

Table 1. Demographic and gaming-related information of samples, *n* (%).

Variables	Total Sample (<i>n</i> = 966 to 1001)	Males (<i>n</i> = 478 to 499)	Females (<i>n</i> = 488 to 502)
Nationality			
Singaporean	880 (87.91)	446 (89.38)	434 (86.45)
Permanent Resident	121 (12.09)	53 (10.62)	68 (13.55)
Age, <i>M</i> (<i>SD</i>)	28.47 (6.21)	29.12 (5.76)	27.84 (6.57)
Gender			
Male	499 (49.85)	–	–
Female	502 (50.15)	–	–
Ethnicity			
Chinese	745 (74.43)	372 (74.55)	373 (74.30)
Malay	133 (13.29)	66 (13.23)	67 (13.35)
Indian	93 (9.29)	46 (9.22)	47 (9.36)
Others	30 (3.00)	15 (3.01)	15 (2.99)
Housing Type			
1-Room HDB Flat	12 (1.20)	8 (1.60)	4 (0.80)
2-Room HDB Flat	31 (3.10)	15 (2.81)	17 (3.39)
3-Room HDB Flat	275 (27.50)	129 (25.85)	146 (29.14)
4-Room HDB Flat	312 (31.20)	162 (32.47)	150 (29.94)
5-Room HDB Flat	180 (18.00)	87 (17.44)	93 (18.56)
Condominium	159 (15.90)	82 (16.43)	77 (15.37)
Landed Properties	28 (2.80)	14 (2.81)	14 (2.79)
Others	3 (0.30)	3 (0.60)	0 (0.00)
Occupation Status			
Student	177 (17.72)	49 (9.82)	128 (25.60)
Employed	768 (76.88)	431 (86.37)	337 (67.40)
Unemployed	34 (3.40)	10 (2.00)	24 (4.8)
Others	20 (2.00)	9 (1.80)	11 (2.20)
Education Level			
Below Secondary	1 (0.10)	0 (0.00)	1 (0.20)
Secondary	37 (3.76)	19 (3.87)	18 (3.66)
Post-Secondary (Non-Tertiary)	59 (6.00)	30 (6.11)	29 (5.89)
Diploma and Professional Qualification	211 (21.47)	103 (20.98)	108 (21.95)
University	675 (68.67)	339 (69.04)	336 (68.29)
Gaming Time, <i>M</i> (<i>SD</i>)			
Weekday	2.98 (2.73)	3.31 (3.15)	2.66 (2.21)
Weekend	4.29 (3.18)	4.80 (3.44)	3.78 (2.81)

Note: The sample sizes varied due to missing data on some variables.

three instruments unrelated to the aims of the current study. These instruments were administered in a randomised order to control fatigue and order effects. Participants were compensated SGD2 to SGD4.5. The compensation varied because higher incentives might be needed to recruit certain demographic groups (Pureprofile *n.d.*). Data collection was conducted and completed in August 2023 and the dataset is publicly available on the Open Science Framework (https://osf.io/d9fct/?view_only=cb01055a51b14a9bafbd5413bef31910). This procedure

was approved by the university's Human Research Ethics Committee (Approval number: H9100).

4. Results

The results were analysed using SPSS version 21 and Hayes' (2017) PROCESS macro version 3.5. The descriptives and intercorrelations of the variables are presented in Table 2. Gender (1 = Male and 2 = Female) was negatively correlated with the seven gaming motivations and

Table 2. Descriptives and intercorrelations of the variables (*n* = 1001).

Variables	1	2	3	4	5	6	7	8	9
1. Gender	–								
2. Social	–.18***	–							
3. Escape	–.12***	.65***	–						
4. Competition	–.22***	.68***	.67***	–					
5. Coping	–.15***	.69***	.81***	.75***	–				
6. Skill Development	–.15***	.74***	.68***	.73***	.78***	–			
7. Fantasy	–.19***	.69***	.78***	.70***	.75***	.69***	–		
8. Recreation	–.10**	.51***	.65***	.57***	.70***	.64***	.56***	–	
9. IGD	–.22***	.59***	.55***	.56***	.55***	.54***	.57***	.35***	–
<i>M</i>	–	10.53	11.47	11.08	11.68	11.45	10.95	9.92	20.67
<i>SD</i>	–	4.00	4.19	4.12	3.90	4.13	4.35	3.10	8.24
Cronbach's α	–	.84	.87	.85	.82	.88	.87	.82	.93

Note: Gender was coded as 1 = Male and 2 = Female; IGD = Internet Gaming Disorder.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3. Gender differences on gaming motivations and internet gaming disorder.

Variables	Males		Females		<i>t</i> (999) =	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Social	11.24	3.98	9.83	3.90	5.67	<.001	.36
Escape	11.98	4.14	10.96	4.19	3.87	<.001	.24
Competition	11.99	4.02	10.19	4.03	7.08	<.001	.45
Coping	12.24	3.86	11.12	3.87	4.62	<.001	.29
Skill Development	12.07	4.10	10.84	4.07	4.77	<.001	.30
Fantasy	11.76	4.26	10.14	4.28	6.02	<.001	.38
Recreation	10.22	3.09	9.63	3.09	3.01	=.003	.19
IGD	22.47	8.69	18.88	7.35	7.06	<.001	.45

IGD. In addition, the seven gaming motivations were positively correlated with IGD. A series of *t*-tests were conducted to examine the effects of gender on gaming motivations and IGD, and the results are presented in Table 3. Overall, males had higher scores on the seven gaming motivations and IGD than females.

4.1. Moderation analyses

A series of seven moderation analyses were conducted using Hayes' (2017) PROCESS Model 1 with gender (1 = Male and 2 = Female) as the independent variable,

the seven gaming motivations (mean centred) as the moderators, and IGD as the dependent variable. There were significant main effects for gender, with males associated with higher IGD. There were also significant main effects for the seven gaming motivations, with higher gaming motivations associated with higher IGD. Finally, there were significant interaction effects between gender and social, escape, competition, and skill development. The results are presented in Table 4.

First, simple slopes analyses were conducted to probe the interaction effect by examining the effects of gender on IGD at 16th (Low), 50th (Average), and 84th (High)

Table 4. Gaming motivations as moderators of the gender-gaming disorder link.

Variables	<i>R</i> ²	SE	β	<i>t</i> =	95% CI		<i>p</i>
					LLCI	ULCI	
Social							
Model	.369	–	–	–	–	–	<.001
Gender	–	.42	–1.93	–4.59	–2.76	–1.11	<.001
Social	–	.17	1.69	10.19	1.36	2.01	<.001
Gender x Social	.007	.11	–.34	–3.27	–.55	–.14	=.001
Escape							
Model	.331	–	–	–	–	–	<.001
Gender	–	.43	–2.52	–5.86	–3.36	–1.67	<.001
Escape	–	.16	1.40	8.61	1.08	1.72	<.001
Gender x Escape	.004	.10	–.23	–2.28	–.43	–.03	=.023
Competition							
Model	.329	–	–	–	–	–	<.001
Gender	–	.44	–1.64	–3.75	–2.50	–.78	<.001
Competition	–	.17	1.48	8.82	1.15	1.81	<.001
Gender x Competition	.004	.11	–.27	–2.53	–.48	–.06	=.011
Coping							
Model	.321	–	–	–	–	–	<.001
Gender	–	.43	–2.33	–5.37	–3.18	–1.48	<.001
Coping	–	.18	1.30	7.38	.96	1.65	<.001
Gender x Coping	.001	.11	–.13	–1.13	–.34	.09	=.261
Skill Development							
Model	.318	–	–	–	–	–	<.001
Gender	–	.44	–2.31	–5.29	–3.16	–1.45	<.001
Skill Development	–	.17	1.44	8.66	1.12	1.77	<.001
Gender x Skill Development	.004	.11	–.27	–2.54	–.48	–.06	=.011
Fantasy							
Model	.337	–	–	–	–	–	<.001
Gender	–	.43	–1.90	–4.40	–2.75	–1.05	<.001
Fantasy	–	.16	1.22	7.75	.91	1.53	<.001
Gender x Fantasy	.001	.10	–.12	–1.24	–.32	.07	=.216
Recreation							
Model	.157	–	–	–	–	–	<.001
Gender	–	.48	–3.07	–6.38	–4.01	–2.13	<.001
Recreation	–	.25	.95	3.87	.47	1.43	<.001
Gender x Recreation	.000	.16	–.05	–.29	–.35	.26	=.771

Note: Gender was coded as 1 = Male and 2 = Female; SE = standard error; β = standardized regression coefficients; CI = confidence interval; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval.

percentile of social (see Figure 1). The analyses showed that gender had a significant effect on IGD among high social participants, $b = -3.13$, $t(997) = -5.61$, $p < .001$, average social participants, $b = -2.10$, $t(997) = -4.94$, $p < .001$, but not among low social participants, $b = -.37$, $t(997) = -.59$, $p = .56$. The Johnson – Neyman Technique was used to explore the region of significance (Spiller et al. 2013). When social = 7.81, gender had a significant effect on IGD, $b = -1.00$, $t(997) = -1.96$, $p = .05$. As social increases, gender had a greater significant effect on IGD, highest social = 20, $b = -5.20$, $t(997) = -4.80$, $p < .001$. A total of 76.52% of the participants ($n = 766$) fall within the region of significance.

Second, simple slopes analyses were conducted to probe the interaction effect by examining the effects of gender on IGD at 16th (Low), 50th (Average), and 84th (High) percentile of escape (see Figure 1). The analyses showed that gender had a significant effect on IGD among high escape participants, $b = -3.58$, $t(997) = -5.66$, $p < .001$, average escape participants, $b = -2.64$, $t(997) = -6.10$, $p < .001$, and low escape participants, $b = -1.47$, $t(997) = -2.34$, $p = .02$. The Johnson – Neyman Technique was used to explore the region of significance (Spiller et al. 2013). When escape = 6.38, gender had a significant effect on IGD, $b = -1.33$, $t(997) = -1.96$, $p = .05$. As escape increases, gender had a greater significant effect on IGD, highest escape = 20, $b = -4.51$, $t(997) = -4.63$, $p < .001$. A total of 85.61% of the participants ($n = 857$) fall within the region of significance.

Third, simple slopes analyses were conducted to probe the interaction effect by examining the effects of gender on IGD at 16th (Low), 50th (Average), and 84th (High) percentile of competition (see Figure 1). The analyses showed that gender had a significant effect on IGD among high competition participants, $b = -2.70$, $t(997) = -4.47$, $p < .001$, average competition participants, $b = -1.62$, $t(997) = -3.70$, $p < .001$, but not among low competition participants, $b = -.27$, $t(997) = -.39$, $p = .69$. The Johnson – Neyman Technique was used to explore the region of significance (Spiller et al. 2013). When competition = 8.68, gender had a significant effect on IGD, $b = -1.00$, $t(997) = -1.96$, $p = .05$. As competition increases, gender had a greater significant effect on IGD, highest competition = 20, $b = -4.05$, $t(997) = -3.88$, $p < .001$. A total of 71.43% of the participants ($n = 715$) fall within the region of significance.

Finally, simple slopes analyses were conducted to probe the interaction effect by examining the effects of gender on IGD at 16th (Low), 50th (Average), and 84th (High) percentile of skill development (see Figure 1). The analyses showed that gender had a significant effect on IGD among high skill development

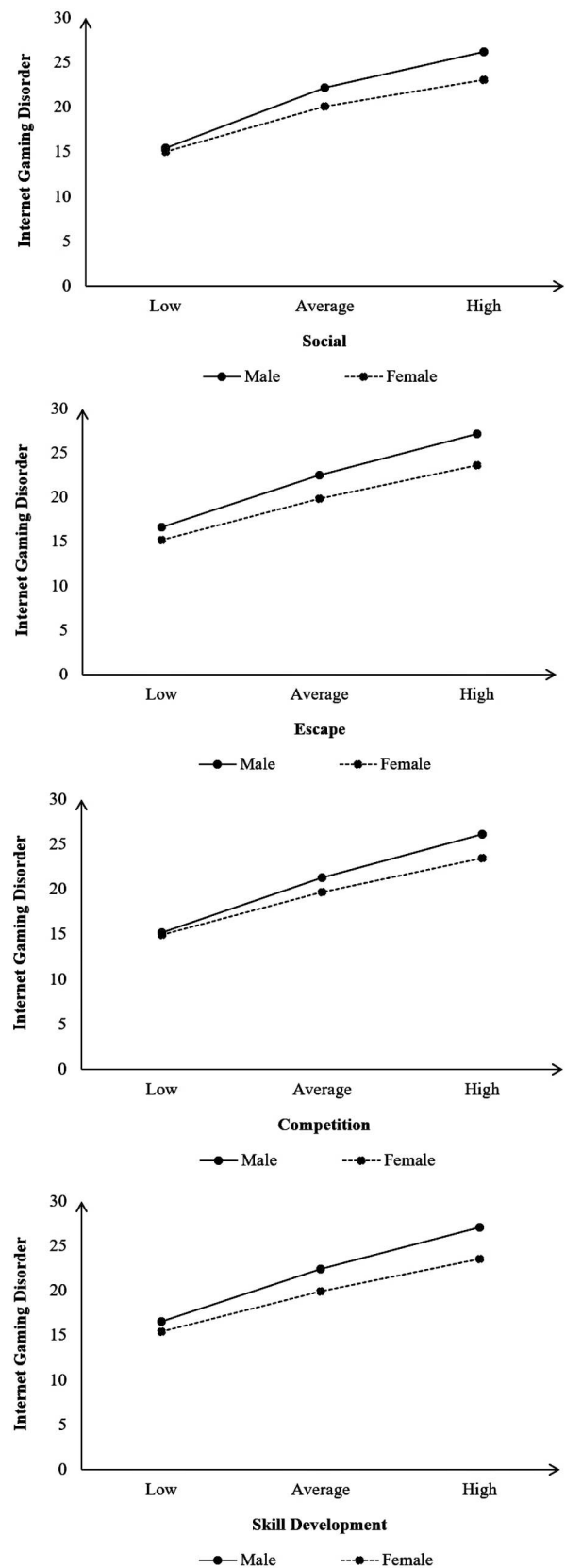


Figure 1. Effects of gender on internet gaming disorder at 16th (Low), 50th (Average), and 84th (High) percentile of social, escape, competition, and skill development.

participants, $b = -3.53$, $t(997) = -5.44$, $p < .001$, average skill development participants, $b = -2.45$, $t(997) = -5.58$, $p < .001$, but not among low skill development participants, $b = -1.11$, $t(997) = -1.73$, $p = .08$. The Johnson – Neyman Technique was used to explore the region of significance (Spiller et al. 2013). When skill development = 7.35, gender had a significant effect on IGD, $b = -1.21$, $t(997) = -1.96$, $p = .05$. As skill development increases, gender had a greater significant effect on IGD, highest skill development = 20, $b = -4.60$, $t(997) = -4.59$, $p < .001$. A total of 81.72% of the participants ($n = 818$) fall within the region of significance.

4.2. Mediation analyses

A series of seven mediation analyses were conducted using Hayes' (2017) PROCESS Model 4 with gender (1 = Male and 2 = Female) as the independent variable, the seven gaming motivations as the mediators, and IGD as the dependent variable. The 95% confidence intervals for indirect effects were estimated using 5000 bootstrap samples. First, gender was negatively correlated with gaming motivations, with males having higher gaming motivations than females. Second, gaming motivations were positively correlated with IGD. Third, all indirect effects of gender on IGD were significant. Finally, all direct effects of gender on IGD in the presence of gaming motivations were also significant. Hence, gaming motivations partially mediated the relationship between gender and IGD. The results are presented in Table 5 and Figure 2.

5. Discussion

The current study aimed to extend on the existing research by using the I-PACE model as a framework and conducting multidimensional analyses. Specifically, gender was conceptualised as a core characteristic of an individual, gaming motivations as an affective and cognitive variable, and IGD as an outcome variable. The

finding that males were associated with higher IGD were consistent with previous studies (Stevens et al. 2021) and provided support for the gender-IGD link. In addition, the finding that higher gaming motivations were associated with higher IGD was also consistent with previous studies (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022).

5.1. Moderation analyses

The results also found some core (vs. peripheral) gaming motivations that moderated the gender-IGD link. Specifically, the results extended on previous research by showing that social, escape, competition, and skill development moderated the effects of gender on IGD. Social had the largest effect size ($R^2 = .007$), while escape, competition, and skill development all showed smaller, but equal, effect sizes ($R^2 = .004$). However, despite the smaller effect size, and consistent with the gaming motivations literature (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022; Wu et al. 2016), simple slopes analyses highlighted the relative importance of escape as a moderator. Specifically, males have higher IGD than females if they have at least average levels of social, competition, and skill development. However, males have higher IGD than females even at low levels of escape. Taken together, these four core gaming motivations served as boundary conditions of the gender-IGD link in the current study.

There were nonsignificant moderation effects for coping, fantasy, and recreation. Given the relatively large sample size of the current study, it is unlikely that this was due to a lack of power. Instead, it is possible that these gaming motivations affect IGD equally across gender. For example, coping might serve as a general risk factor for IGD, increasing its risk in a similar manner for both genders. Consequently, these gaming motivations do not serve as boundary conditions of the gender-IGD link in the current study.

Table 5. Gaming motivations as mediators of the gender-gaming disorder link.

Relationship	Total Effect	Direct Effect	Indirect Effect	95% CI		$t =$	Conclusion
				LLCI	ULCI		
Gender → Social → IGD	-3.59	-1.93	-1.65	-2.30	-1.04	-5.22	Partial Mediation
Gender → Escape → IGD	-3.59	-2.52	-1.07	-1.65	-.52	-3.72	Partial Mediation
Gender → Competition → IGD	-3.59	-1.65	-1.94	-2.55	-1.36	-6.44	Partial Mediation
Gender → Coping → IGD	-3.59	-2.33	-1.26	-1.82	-.72	-4.44	Partial Mediation
Gender → Skill Development → IGD	-3.59	-2.31	-1.28	-1.84	-.73	-4.58	Partial Mediation
Gender → Fantasy → IGD	-3.59	-1.90	-1.69	-2.29	-1.12	-5.64	Partial Mediation
Gender → Recreation → IGD	-3.59	-3.07	-.52	-.88	-.18	-2.86	Partial Mediation

Note: Gender was coded as 1 = Male and 2 = Female; IGD = Internet Gaming Disorder; CI = confidence interval; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval. All total and direct effects are significant with $p < .001$.

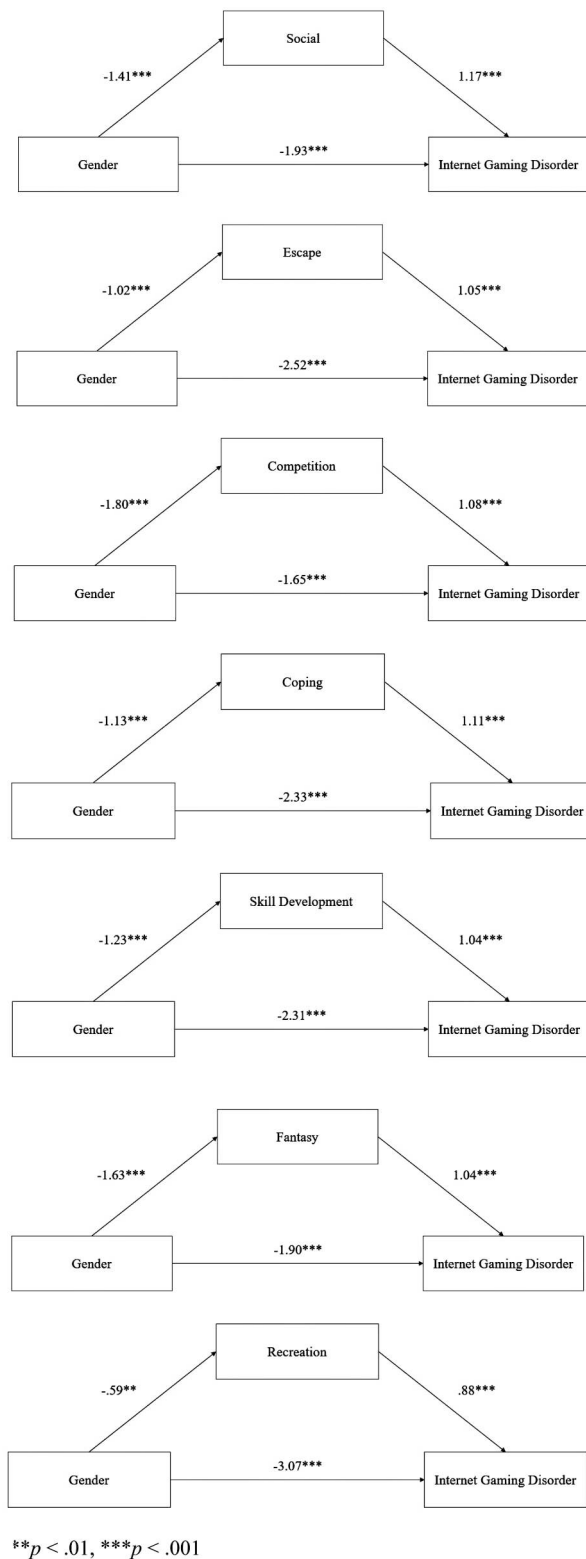


Figure 2. Gaming motivations as mediators in the relationship between gender and internet gaming disorder.

5.2. Mediation analyses

Finally, the results also found that gaming motivations mediated the gender-IGD link. First, the finding that

males had higher scores on all seven gaming motivations than females were consistent with some previous studies (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022) but not others (Demetrovics et al. 2011). Second, the finding that higher gaming motivations were associated with higher IGD was also consistent with previous studies (Laconi, Pirès, and Chabrol 2017; Rafiemanesh et al. 2022). Finally, the results extended on previous research by showing that the seven gaming motivations partially mediated the relationship between gender and IGD. In other words, males were more motivated than females to play games for a wide range of reasons, leading to higher IGD. Taken together, gaming motivations served as processes that underlie the gender-IGD link in the current study.

The results have theoretical implications. Specifically, the results supported the I-PACE model's conceptualisation of gender and gaming motivations as core characteristics that predict IGD (Young and Brand 2017). More important, the results suggested that gaming motivations could also be conceptualised as an affective and cognitive variable that moderates and mediates the relationship between core characteristics (i.e. gender) and IGD. The results also have clinical implications. Specifically, interventions for IGD could be developed based on an individual's gaming motivations. For example, if a male is playing games primarily as a form of escape (i.e. avoidance coping; with a score of at least 6.38 out of 20 on the escape factor), the clinician could work with the individual to develop healthier methods of coping. Overall, these implications have the potential to advance both theory and practice in the field of IGD.

Limitations of the study should be noted. First, the study used a cross-sectional design, imposing a limit to the conclusions drawn from the mediation models. Second, the study used Demetrovics et al.'s (2011) conceptualisation of gaming motivations. Given the different conceptualizations of gaming motivations (i.e. different motivations and different number of motivations) (Chew and Ayu 2023), it is unclear if the results of the study would be replicated if another conceptualisation was used. Finally, the current study used a representative sample of Singaporean young adults. Given that there are cross-cultural differences in the pathways to IGD (Chew, Lin, and Yow 2024), the results might not generalise to Western or clinical populations.

Future research directions might include conducting a longitudinal study, with gender assessed at Time 1, gaming motivations at Time 2, and IGD at Time 3. The results could enable researchers to draw more robust conclusions with regards to the mediating

effect of gaming motivations. Furthermore, future research could compare and contrast different conceptualizations of gaming motivations and examine their ability to moderate and mediate the gender-IGD link. Finally, future research could conduct a similar study among Western populations to explore the cross-cultural generalizability of the results.

In summary, there are boundary conditions to the gender-IGD link. Specifically, males who play games for social, escape, competition, or skill development are at higher risk for IGD than females. Furthermore, the gender-IGD link was also partially mediated by the seven gaming motivations. Limitations notwithstanding, the results highlighted the importance of gaming motivations and have both theoretical and clinical implications that could advance the field of IGD.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Consent to participate

Participants provided their informed consent to participate in the study.

Consent for publication

Participants provided their informed consent to publish the study.

Ethics approval

The study was approved by the university's Human Research Ethics Committee.

Data availability statement

The data is available upon request.

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