



# The Relationship between Betting Propensity as Perceived by Golfers and Exercise Addiction: Verification of Moderating Effects According to Background Variables

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## Abstract

**Background:** We aimed to verify the effect of betting propensity as perceived by golf participants on exercise addiction, as well as the moderating effects of gender, average number of strokes, weekly exercise frequency, and monthly rounding frequency on these relationships.

**Methods:** The study included 377 individuals who utilized golf driving ranges and courses in Seoul and Gyeonggi Province (Korea) selected using the non-probability sampling method. The data collected thereafter were subjected to confirmatory factor analysis, reliability analysis, descriptive statistical analysis, correlation analysis, step-wise regression analysis, and moderating effect analysis using Jamovi version 2.2.2 (University of Newcastle, Sydney, Australia). When the moderating effect was statistically significant, simple linear regression analysis was used to verify the results.

**Results:** Betting propensity had a positive effect on all sub-factors related to exercise addiction (withdrawal symptoms, conflict, attachment, tolerance, and obsessive-compulsive disorder) ( $P < 0.05$ ). Only the average number of stroke exerted a significant moderating effect on these relationships ( $P < 0.05$ ). Specifically, greater perceived betting propensity was associated with a greater propensity for exercise addiction, and this phenomenon was more pronounced among those with a low average number of strokes.

**Conclusion:** The current results suggest that greater perceived betting propensity is associated with an increased risk of exercise addiction among golf participants, especially those who are relatively more skilled. These results highlight the need to emphasize participating for the enjoyment of golf and psychological satisfaction without promoting practices that can lead to exercise addiction, such as betting golf.

**Keywords:** Betting golf; Betting propensity; Exercise addiction

## Introduction

Golf is a closed game in which participants hit a stationary ball from a stationary position on various types of terrain, following which open movement to the next position is permitted (1,2). Given

the nature of the sport, in which progression of skill may be difficult to observe within a short time frame, it is important for golfers to derive a sense of pleasure or competence from their involvement



(3). To satisfy this desire, many Korean golfers place bets when competing against their companions (3), with the winner receiving material benefits such as the cost of golf games, caddy fees, or meals after exercise.

Betting golf can increase entertainment and satisfaction among players by improving motivation, concentration, and enjoyment, allowing them to immerse themselves in the exercise both physically and psychologically while reducing stress (4). According to a golf-related survey of 401 senior executives in the United States, approximately 87% of American CEOs had played betting golf at least once (4). In addition, approximately 80% of Korean golfers have also reported at least one experience with betting golf, which is thought to enhance the enjoyment derived by providing players with a positive goal (5). Such reports have also provided objective evidence that the number of people who enjoy betting golf is gradually increasing for these reasons (5).

However, despite reports of increased enjoyment, motivation, and psychological immersion, some authors have expressed concern that this may shift the focus to gambling on matches in an obsessive manner, rather than on playing for enjoyment and exercise (6). As negative perceptions concerning the tendency to be addicted to betting golf and habitual participation in betting golf can coexist, there is a need to proceed with research from more diverse perspectives (6).

Exercise addiction is characterized by a loss of self-control and an obsessive approach to sports activities, which commonly results in excessive exercise (7,8) and reduces an individual's capacity for self-regulation of exercise performance. Individuals with exercise addiction may become lethargic when they miss an exercise session (9) or be unable to suppress the desire to exercise. This psychological and physiological dependence on regular exercise intake can manifest as withdrawal symptoms within 24–36 hours after cessation of exercise (10).

Addiction to exercise represents a double-edged sword given that the positive effects of exercise on health are in competition with the negative effects

of addictive tendencies (11). Studies of running addiction have highlighted positive effects such as increased psychological and physical vitality (11,12) as well as improvements in symptoms of anxiety and depression. However, exercise may come to dominate an individual's life, making it impossible to make other choices or focus on other important goals and responsibilities, such as family and employment. In extreme cases, individuals with exercise addiction who fail to balance social responsibilities with their desire for physical activity can experience withdrawal symptoms, which can lead to indulgent practices and promote drug dependence (13,14).

In contrast to the “positive” exercise addiction described earlier, this “negative” exercise addiction was first investigated in the context of running (12). In this study, the authors argued that exercise addiction can be regarded as negative upon meeting the following two requirements. First, the individual must feel that exercise is necessary to cope with daily life. Second, the individual must experience withdrawal symptoms such as depression, anxiety, and anger after stopping exercise (12). In such cases, life is organized around the extreme desire for regular exercise, and individuals may even experience secondary withdrawal symptoms such as fatigue, languor, and poor concentration (12).

Athletes who are negatively addicted to exercise may continue to participate in sports despite disturbances in other areas of life, such as health, employment, and relationships (15). Further, many people who are addicted to exercise cannot recognize the symptoms of negative indulgence on their own, and intense training can aggravate impairments in concentration, promote fatigue and poor judgment, and lead to difficulties in social and workplace settings. For example, people may fail to attend appointments or neglect health, occupational, and interpersonal responsibilities due to the desire for exercise (16).

Thus, while exercise addiction is initially perceived as positive, the addictive behavior may become overwhelming and difficult to control, and previous studies have reported that the intensity of ex-

ercise addiction increases as frequency of participation increases (5). Based on the results of these previous studies, players who engage in betting golf may be at risk for exercise addiction. Despite this risk, most studies of betting golf have focused on betting propensity and interaction patterns (5), factors that promote enjoyment or stress among players (17), the legal considerations and ethics of betting golf (18), and the relationship between betting propensity and commitment to exercise (5). However, to our knowledge, few if any studies have examined the relationships between psychological variables among those engaged in betting golf or the moderating effects of other background variables on these relationships.

In the current study, we aimed to verify these psychological relationships as well as the moderating effects of factors such as the average number of strokes and exercise level. In addition to providing basic theoretical data, this approach is meaningful given the recent increase in exercise- and health-related interests and the potential for betting to promote exercise addiction.

## Methods

### Participants

We utilized the non-probability sampling method to select golfers who practiced at driving ranges and courses in Seoul and Gyeonggi Province, Korea, for a survey conducted from September 1, 2021, to November 1, 2021. Researchers and assistants directly visited golf courses with prior permission from the instructor or manager. Specifically, after visiting each site, researchers distributed self-report questionnaires to golfers who agreed to participate voluntarily, following which the study purpose and questionnaire instructions were fully explained.

Questionnaires were collected directly from the site. A total of 417 surveys were collected. After excluding questionnaires from 26 participants who provided incomplete responses, we analyzed data for a total of 377 golfers. The characteristics of the included participants are shown in Table 1.

All study participants provided informed consent and agreed to participate in the study, and the study design was approved by Gachon University in Korea.

### Assessment tools

Betting propensity was assessed using a questionnaire developed by Ajzen and Driver (19), which is based on the rational activity theory proposed by Gordin et al (20). This questionnaire included four items related to betting attitude (e.g., *I usually play betting games rather than regular games*), three questions related to betting consequences (e.g., *I have lost social relationships due to betting on golf games*), and three questions related to perceived behavioral control (e.g., *I can control my betting golf activities on my own*).

Exercise addiction was assessed using a questionnaire developed by Kang (9), which includes five items related to withdrawal symptoms (e.g., *When I did not play golf for several days for any reason, I became nervous or depressed about having people around me*), four items related to conflict (e.g., *I had a conflict with a friend or colleague because of golf*), three items related to attachment (e.g., *Golf is the driving force behind my life*), three items related to tolerance (e.g., *I usually play golf longer than I initially thought*), and three items related to obsessive-compulsive disorder (e.g., *Even if I get injured while playing golf, I usually play without stopping*), resulting in a total of 18 question across five main factors. Responses to items on both questionnaires were provided using a 5-point Likert scale ranging from 1–5 (completely agree, 5 points; agree, 4 points; neutral, 3 points; disagree, 2 points; and completely disagree, 1 point).

**Table 1:** Participant characteristics

Variables	Sex	age	cm	kg	BMI	Average score (points)	Weekly frequency of practice	Monthly rounding frequency
Mean	Male (n=224)	50.48	174.74	72.96	23.85	85.96	4.15	3.18
	Female (n=153)	44.18	162.76	53.18	20.07	90.95	4.05	3.20
	Total (n=377)	47.93	169.88	64.93	22.31	87.98	4.11	3.19
Standard deviation	Male (n=224)	8.12	4.48	9.92	2.67	11.54	1.94	2.64
	Female (n=153)	7.69	3.44	2.90	0.92	10.55	1.63	2.70
	Total (n=377)	8.52	7.17	12.51	2.83	11.40	1.82	2.66
Minimum	Male (n=224)	33.00	164.00	53.80	18.20	69.00	1.00	1.00
	Female (n=153)	30.00	157.80	48.20	18.70	72.00	1.00	1.00
	Total (n=377)	30.00	157.80	48.20	18.20	69.00	1.00	1.00
Maximum	Male (n=224)	65.00	183.70	100.50	29.80	140.00	7.00	17.00
	Female (n=153)	58.00	171.00	59.70	23.00	124.00	7.00	16.00
	Total (n=377)	65.00	183.70	100.50	29.80	140.00	7.00	17.00

**Evaluation of the measurement model**

Prior to analyzing the results of the study, a confirmatory factor analysis was performed using the maximum likelihood method to verify the validity and reliability of the overall measurement model including all sub-factors related to betting propensity and exercise addiction. The results of this analysis are shown in Table 2. The fitness index of the overall measurement model was found to be relatively suitable based on the following results: chi square = 708.466, df = 295,  $P < 0.001$ , Tucker–Lewis index (TLI) = 0.919, comparative fit index (CFI) = 0.932, root mean square error of approximation (RMSEA) = 0.060. The validity and reliability of the test tools used were also verified, with conceptual reliability values of 0.70 or higher, average variance extracted (AVE) values of 0.50 or higher, and Cronbach  $\alpha$  values of 0.70 for all sub-

factors (21). Based on these results, these scales were judged to have a good fit index.

**Statistical analysis**

Statistical analysis was performed using the R-based Jamovi program (version 2.2.2, University of Newcastle, Sydney, Australia). First, frequency analysis, confirmatory factor analysis, concept reliability, AVE, and Cronbach  $\alpha$  levels were calculated to verify the validity and reliability of the collected data. In addition, descriptive statistical and Pearson correlation analyses were performed to identify sub-factors, which were then examined via multiple regression analysis. Analyses of moderating effects were also performed. The significance level for all analyses was  $\alpha = 0.05$ .

**Table 2:** Evaluation of the measurement model via confirmatory factor analysis

<i>Variables</i>	<i>Sub-variables</i>	<i>Items</i>	<i>Standardized regression weight</i>	<i>Standard error</i>	<i>Critical ratio</i>	<i>Average variance extracted</i>	<i>Concept reliability</i>	<i>Cronbach's <math>\alpha</math></i>
Betting propensity	Betting attitude	→ 01	0.768	-	-	0.565	0.838	0.884
		→ 02	0.876	0.064	18.035** *			
		→ 03	0.879	0.063	18.090** *			
		→ 04	0.720	0.067	14.497** *			
	Betting consequences	→ 05	0.873	-	-	0.702	0.874	0.845
		→ 06	0.896	0.054	19.999** *			
		→ 07	0.667	0.058	14.440** *			
	Perceived behavioral control	→ 08	0.734	-	-	0.511	0.758	0.817
		→ 09	0.808	0.081	13.352** *			
		→ 10	0.780	0.081	13.228** *			
Exercise addiction	Withdrawal symptoms	→ 01	0.785	-	-	0.638	0.897	0.905
		→ 02	0.900	0.065	19.750** *			
		→ 03	0.884	0.066	19.382** *			
		→ 04	0.737	0.065	15.455** *			
		→ 05	0.658	0.069	13.479** *			
	Conflict	→ 06	0.689	-	-	0.528	0.817	0.839
		→ 07	0.760	0.079	13.149** *			
		→ 08	0.791	0.085	13.574** *			
		→ 09	0.776	0.084	13.367** *			
	Attachment	→ 10	0.746	-	-	0.642	0.841	0.809
		→ 11	0.922	0.073	15.656** *			
		→ 12	0.673	0.066	12.954** *			
	Tolerance	→ 13	0.796	-	-	0.529	0.767	0.744
		→ 14	0.797	0.069	14.414** *			
		→ 15	0.574	0.076	10.649** *			
	Obsessive-compulsive disorder	→ 16	0.862	-	-	0.800	0.920	0.751
		→ 17	0.953	0.064	18.094** *			
		→ 18	0.567	0.068	10.039** *			

\*\*\* $P < 0.001$ ; tested via confirmatory factor analysis

## Results

Descriptive statistics and the results of the correlation analysis for eight sub-factors are shown in

Table 3. Skewness ( $\leq 2.0$ ) and kurtosis ( $\leq 4.0$ ) values indicated that all measured values conformed to a normal distribution.

**Table 3:** Descriptive statistics and correlation analysis

<i>Variable</i>	<i>Betting attitude</i>	<i>Betting consequences</i>	<i>Perceived behavioral control</i>	<i>Withdrawal symptoms</i>	<i>Conflict</i>	<i>Attachment</i>	<i>Tolerance</i>	<i>Obsessive-compulsive disorder</i>
Mean	2.990	1.780	3.880	2.260	2.400	3.200	3.340	2.600
Standard deviation	1.040	0.787	1.000	0.868	0.921	0.861	0.795	1.010
Skewness	-0.019	1.080	-0.748	0.546	0.387	-0.201	-0.101	0.266
Kurtosis	-0.593	0.916	0.002	-0.053	-0.376	-0.079	0.342	-0.688
Betting attitude	—							
Betting consequences	0.357***	—						
Perceived behavioral control	0.016	-0.309	—					
Withdrawal symptoms	0.240***	0.361***	-0.118*	—				
Conflict	0.301***	0.404***	-0.143**	0.529***	—			
Attachment	0.237***	0.17***	0.125*	0.325***	0.350***	—		
Tolerance	0.294***	0.002	0.128*	0.206***	0.111*	0.501***	—	
Obsessive-compulsive disorder	0.214***	0.277***	-0.096	0.482***	0.426***	0.351***	0.292***	—

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ ; tested via Pearson correlation analysis

All correlations for these factors were statistically significant except those between (a) betting attitudes and perceived behavioral control, (b) betting consequences and perceived behavioral control, (c) betting consequences and tolerance, and (d) perceived behavioral control and obsessive-compulsive disorder. No factors had correlation coefficients of 0.8 or more, and no issues multicollinearity were observed.

A stepwise regression analysis was conducted to verify the effect of betting propensity on exercise addiction (Table 4). This analysis revealed that betting tendency as perceived by golf participants had

a positive effect on all sub-factors related to exercise addiction, except perceived behavioral control, which was excluded from the analysis.

The moderating effects of these relationships according to gender, average number of strokes, weekly exercise frequency, and monthly rounding frequency are shown in Table 5. Only the average number of strokes exerted a moderating effect on the relationships between (a) betting attitude and withdrawal symptoms, (b) betting consequences and conflict, and (c) betting attitude and conflict.

**Table 4:** Relationship between betting propensity and exercise addiction

<i>Dependent variable</i>	<i>Predictor</i>	<i>Estimate</i>	<i>Standard error</i>	<i>Standard estimate</i>	<i>t</i>	<i>R</i>	<i>R<sup>2</sup></i>	<i>ΔR<sup>2</sup></i>	<i>F</i>
Withdrawal symptoms	Betting consequences	0.33	0.06	0.31	6.07***	0.35	0.12		53.5***
	Betting attitude	0.10	0.04	0.12	2.37*	0.37	0.13	0.013	29.9***
Conflict	Betting consequences	0.40	0.06	0.34	7.06***	0.41	0.16		76.2***
	Betting attitude	0.15	0.04	0.17	3.57***	0.44	0.19	0.027	45.6***
Attachment	Betting attitude	0.22	0.04	0.29	5.69***	0.29	0.08		34.8***
	Perceived behavioral control	0.10	0.04	0.13	2.71**	0.32	0.10	0.017	21.4***
Tolerance	Betting attitude	0.16	0.04	0.19	3.65***	0.24	0.06		24.2***
	Perceived behavioral control	0.14	0.04	0.17	3.28**	0.27	0.07	0.015	15.5***
	Betting consequences	0.16	0.06	0.15	2.81**	0.30	0.09	0.019	13.1***
Obsessive-compulsive disorder	Betting consequences	0.31	0.07	0.24	4.69***	0.28	0.08		34.1***
	Betting attitude	0.12	0.05	0.12	2.33*	0.31	0.09	0.013	20.0***

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ ; tested via stepwise regression analysis

**Table 5:** Verification of moderating effects

<i>Path</i>	<i>Moderating variable</i>	<i>Estimate</i>	<i>Standard error</i>	<i>Z</i>	<i>p</i>
Betting attitude → Withdrawal symptoms	Average number of strokes	-0.060	0.024	-2.47	0.013
Betting consequences → Conflict	Average number of strokes	-0.094	0.047	-2.91	0.004
Betting attitude → Conflict	Average number of strokes	-0.071	0.065	-3.01	0.003

Tested via Bootstrapping Method

## Discussion

In this study, we examined the effect of betting propensity on exercise addiction among golfers, as well as the moderating effects of gender, average number of strokes, weekly exercise frequency, and monthly rounding frequency on this relationship. First, betting propensity as recognized by golf participants exerted a positive effect on all sub-factors related to exercise addiction. These results suggested that people who placed small bets rather than large bets tended to be less concerned about

losing money and less excessively immersed in dysfunctional social patterns. These findings are in accordance with those of several previous studies reporting that betting increases enjoyment and immersion in exercise-related activities themselves (6,22). Stronger attitudes toward betting were associated with a greater tendency for immersion in sports (5). This may in turn result in more positive effects on withdrawal symptoms, attachment, tolerance, and obsessive-compulsive disorder in the

context of exercise addiction (23). Our results support the notion that stronger better propensity is closely associated with exercise addiction.

Although the majority of individuals who participate in betting golf initially engage in sports activities to improve health or attain psychological satisfaction, previous results suggest that an addictive tendency can develop as the activity becomes a mandatory and essential part of life, resulting in continuous participation and gradually increases in the time and money invested (24). In these individuals, golf may become overwhelming rather than enjoyable, which may lead to the development of other compulsive and addictive behaviors, highlighting the need to regulate participation in betting golf to an appropriate level.

Our findings also indicated that only the average number of strokes exerted a moderating effect on the relationships between (a) betting propensity and withdrawal symptoms, (b) betting consequences and conflict, and (c) betting propensity and conflict variables. In addition, greater recognition of one's betting propensity and betting consequences was associated with greater recognition of withdrawal symptoms and major conflicts with other individuals. Although results vary somewhat among sports, in a study, better exercise ability was more strongly associated with sub-variables of exercise addiction, such as withdrawal symptoms, social problems, and exercise desire (25). However, as few studies have investigated the moderating effects of different variables in the context of golf, direct comparison is difficult.

Specifically, according to a previous study (1), the average number of strokes is among the short-term factors influencing one's current golf tendency, with individuals exhibiting a relatively low handicap also exhibiting greater perceived confidence and enjoyment during golf-related activities. Interestingly, bet amounts differed between individuals grouped according to high and low handicap, with positive effects occurring mainly in the low-handicap group and negative effects occurring mainly in the high-handicap group. Together, the current results suggest that a stronger betting propensity is associated with an increased risk of exercise addiction, especially among those

with relatively good golf skills. Therefore, individuals must remain aware of this risk and recognize betting golf as a form of gambling, regardless of the amount bet on each game.

This study had some limitations in that only betting propensity was examined as a psychological variable affecting exercise addiction. Moreover, it may be helpful to discuss whether there were any differences in betting propensity in relation to other factors such as age, gender, marital status, income level, but this study did not include these components. Therefore, further studies are required to examine additional factors that can influence exercise addiction.

## **Conclusion**

Betting propensity as perceived by golf participants is associated with the potential for exercise addiction, and that this relationship is moderated by various background variables. Specifically, greater perceived betting propensity was associated with a greater propensity for exercise addiction, especially among relatively more skilled golfers. These results highlight the need to emphasize participating for the enjoyment of golf and psychological satisfaction without promoting practices that can lead to exercise addiction, such as betting golf.

## **Journalism Ethics considerations**

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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## **Conflict of Interest**

The authors have no conflicts of interest to declare.



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