The effects of belief in good luck and counterfactual thinking on gambling behavior

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Background and aims: One's belief in good luck, and belief that it is a personal trait, could play a crucial role in gambling behavior, and can lead gamblers to have an irrational anticipation to win and to over-generalize their subjective sense of control. And upward counterfactual thinking has been considered to be a factor that offsets those irrational beliefs. This study examined the effects of belief in good luck and of upward counterfactual thinking on gambling behavior. *Methods:* The subjects of the study were 52 college students who had been classified as non-problematic and non-pathological gamblers. They were assigned into one of two groups, distinguished by having either high ($n = 25$) or low ($n = 27$) levels of self-perception of luck, as determined by their scores on the Belief in Good Luck (BIGL) Scale. The subjects were assigned to different groups according to their reported experience of upward counterfactual thinking. *Results:* We found that those who had high BIGL scores spent more money on gambling than those who had low BIGL scores. Moreover, after taking into account the upward counterfactual thinking, the subjects with high BIGL scores showed a dramatic decrease in their expectations of winning. *Discussion:* The results indicate that to perceive luck as a personal and internal trait could affect gambling, which is one of the cognitive errors for gambling addiction. On the other hand, given that upward counterfactual thinking plays an important role in reducing cognitive errors, it could act as a protective factor against gambling addiction.

Keywords: luck, belief in good luck, counterfactual thinking, gambling behavior

INTRODUCTION

According to the DSM-5, gambling disorder, which is categorized under the classification of substance-related and addictive disorders, is characterized as a maladaptive behavior for which the individual suffers from a preoccupation with gambling, withdrawal, tolerance, repeated failure of control, hypersensitive feelings, avoidance, and deception (APA, 2013). Those maladaptive aspects cause not only a deficiency in impulse control but could also lead to other problems, such as crime, divorce, unemployment, suicide, and devastated personalities (National Research Council, 1999).

The prevalence of gambling addiction might vary according to the specific study and the measurements used, but according to a gambling industry statistic (The National Gambling Control Commission, 2014), the prevalence of gambling addiction in Korea was 7.2%. When using the same measurement, the prevalence is much higher than that of the United Kingdom (2.5%), France (1.3%), and Australia (2.4%). It is noteworthy to mention that gambling has rapidly spread among young people and is increasingly becoming a problem. In the United States, 85% of undergraduate students have gambled, and 23% of them gambled weekly (Indiana Prevention Resource Center, 2010). Similarly, in Korea, 70% of pathological gamblers started their first experience with gambling before the age of 20 (Rhee, Kim & Kim, 2003). The prevalence of gambling addiction in undergraduate students is 11%, which is twice higher than that for adults (Kwon & Kim, 2011). This demonstrates that the risk for gambling in youth has increased as the "get-rich-quick" fever for a jackpot (Kwon, Kim & Choi, 2006) has become a widespread phenomenon. Therefore, it is crucial to find the risk factors and precautions for gambling among the young population in Korea.

Problem gambling should be treated as complex consequences of various factors that affect each other (Kim, 2004; Kwon, Kim & Choi, 2006; Yeon, 2006), including cognitive error, which is a very critical factor in maintaining gambling behavior. It often allows the prediction of recurring gambling problems. An irrational belief in gambling that leads to winning could also lead to excessive gambling behavior (Ledgerwood & Petry, 2006; Wohl, Young & Hart, 2007). The irrational belief in gambling is a fallacious cognitive expectation or thought about the process of, as well as the result of gambling (Lee, 2003). There are several cognitive errors that have come to light: an illusion of control, a wrong perception, biased evaluations, and irrational cognition, etc. (Toneatto, 1999).

An erroneous perception of the randomness of gambling can lead to the illusion of control, and this illusion of control is the thought that gambling requires some kind of skill and that a gambler can predict or determine the result of gambling as long as he has learned such skills (Langer, 1975). For example, a gambler can make the mistake of thinking that gambling can be won with skills rather than with luck or chance (Griffiths, 1994; Walker, 1992).

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Many researchers have studied luck, as an irrational belief where the individual perceives a sense of control over unpredictable results (Darke & Freedman, 1997b; Friedland, 1998; Levenson, 1974; Rotter, 1966). Rotter (1966) believed that with respect to social learning theory, the differences between the locus of control can explain the differences between behaviors. Weiner et al. (1972) proposed that perceived control leads to attributing the result of an event to the individual. These two studies similarly claim that luck is an external, unstable factor. In other words, traditional social learning theorists assume that people would regard an event decided by luck to be out of control.

However, the view in which people believe that luck is external and unstable has long been questioned (Meyer, 1980; Meyer & Koelbl, 1982). Just like superstitious conventions or athletes' Jinx, many people indeed act in a way that shows they believe luck to be an internal, stable factor (Darke & Freedman, 1997b).

Such belief in good luck contributes to the maintenance of positive attitudes, including during uncontrollable events (Rothbaum, Weisz & Snyder, 1982). Besides, belief in good luck has a positive effect on various aspects, such as on psychological well-being (Day & Maltby, 2003; Taylor & Brown, 1988), confidence, sense of control, and optimism (Darke & Freedman, 1997a). Day and Maltby (2005) explained that belief in good luck could bring about goal-oriented behavior.

However, when it comes to pathological gambling, belief in good luck is deemed to be irrational. A gambler who thinks that he or she is lucky tends to believe that he would win as a result of that luck (Wohl & Enzle, 2002), and the expectation of luck-based wins then leads to gambling problems (Wohl, Stewart & Young, 2011). In Korea, research on college students (Lee & Hyun, 2012) found that individuals with high levels of belief in good luck gambled more often than did those with low levels of belief in good luck.

The traditional social learning theory says that the behavior of an individual can be explained through mechanisms of reinforcement and punishment. (For instance, an individual would gamble more frequently, if he or she would be reinforced to express such behavior. On the other hand, he or she would stop if punishment were at hand). However, gambling behaviors tend to continue even when negative results (e.g., financial losses) are repeated. Thus, other factors, such as individual characteristics, should also be considered. This study, therefore, sought to ascertain individuals' internal factor of their belief in good luck with respect to their gambling behavior.

A gambler shows a patterned, biased evaluation of reasoning about gambling outcomes (Toneatto, 1999). This biased evaluation indicates the tendency of a gambler to think that victory is a direct outcome of a successful prediction or efforts on his or her part. Fallacious cognitive characteristics of irrational gambling beliefs exist (Lee, 2007), and these consolidate distorted attritional processes of failures (Gilovich & Douglas, 1986; Ladouceur & Gaboury, 1988). Likewise, when there is a problem with a causal reasoning of the results, cognitive errors can occur.

One thought process that brings about causal reasoning is that of counterfactual thinking. Counterfactual thinking is the process where an individual thinks about an alternative virtual event, after experiencing an unpredictable outcome for an event (Kahneman & Tversky, 1982), e.g., "If I had bet this much money, then I would have won much more." This counterfactual thinking has a powerful effect on the experience of emotions and on behavior in the future (Landman, 1987; Medvec & Savitsky, 1997).

Counterfactual thinking is categorized into either structure or direction. Depending on the direction of the results, upward counterfactual thinking and downward counterfactual thinking can be indicated (Markman, Gavanski, Sherman & McMullen, 1993; McMullen, Markman & Gavanski, 1995). Simultaneously during an event, if an individual thinks about a better alternative event, this is called upward counterfactual thinking, and if it is a worse alternative event, then it is downward counterfactual thinking.

There are two factors that affect counterfactual thinking: mutability and situational aspects (Hur, 2002). In counterfactual thinking, an event that has occurred can be easily switched to an alternative event in a person's mind (Kahneman & Miller, 1986). Counterfactual thinking can be induced more easily in situations where personal behaviors are especially attributed to positive situations than to negative situations. With positive outcomes, downward counterfactual thinking is likely to occur, while upward counterfactual thinking occurs towards negative events (Markman, Gavanski, Sherman & McMullen, 1993; Na, 2007; Roese & Olson, 1995).

The effect of counterfactual thinking on behavior can be explained by psychological mechanisms, such as causal relationships and contrast effects (Roese, 1997). When a negative event occurs, upward counterfactual thinking indicates that an individual would think he or she could have avoided the negative event, leading to a causal reasoning. Subsequently, such causality potently imposes responsibilities or punishments for the behavior from the past (Wells & Gavanski, 1989). On the contrary, causal reasoning could have a positive effect, as well. That is, upward counterfactual thinking indicates that some conditions could have brought about a better outcome, so it helps to prepare the person for a similar event in the future (Nasco & Marsh, 1999; Roese, 1994).

Moreover, counterfactual thinking results in a contrast where greater emphasis is attributed to an alternative event that could have happened, rather than on the actual event that has occurred (McMullen, 1997; Roese, 1997). Upward counterfactual thinking (i.e., thinking about a better possible event) can deceive the individual by suggesting an event that has happened is more negative than in reality. This process is called a contrast effect, and it is generally followed by negative feelings, such as regret (Zeelenberg et al., 1998), shame (Niedenthal, Tangney & Gavanski, 1994), guilt (Mandel & Dahmi, 2005), and hopelessness (Davis, Lehman, Wortman, Silver & Thomson, 1995).

Taken together, it is hypothesized that people who believe they are lucky when gambling would engage in further inadequate gambling behavior. The difference in the belief in good luck depends on whether a person believes in the existence of luck, and the extent to which the person perceives the presence of luck in everyday life. People with high levels of perception in luck may be overconfident in

believing that personal traits "affect" the results of gambling, which in reality is caused by chance (Wohl & Enzle, 2002). As a result, an irrational belief in good luck leads a gambler to engage in more dangerous gambling behaviors and to have higher expectations for winning.

At the same time, upward counterfactual thinking leads to causal reasoning in that it could also provide a chance for correcting wrong causality. The contrast effects of upward counterfactual thinking would perform such a correction for those who have high levels of perception in luck due to high levels of expectations for winning. That is, a person would perceive an event more negatively when the individual thinks that he or she could have won if he or she had been luckier. This is a negative evaluation that would decrease gambling behavior.

The present study examined the effects of belief in good luck and upward counterfactual thinking on gambling. More specifically, the goal of this study is to investigate the effects that those two factors have on cognitive evaluations of wagering and of the results of roulette games. This study further speculates risk factors and buffering factors for gambling problems.

METHOD

Participants

Three hundred and thirty-nine students at C University, which is located in Seoul, were asked to fill out a survey to measure their Belief in Good Luck (BIGL) score. One hundred samples in the top and bottom 15% of the measurement were selected. Thirty-eight of these could not be contacted again or refused to participate. Thus, 62 students participated in this study. Five samples had scores higher than 3, and these were classified into the problematic and pathological gambling group, and another 5 did not follow the instruments for counterfactual thinking, so they were excluded. Therefore, a total of 52 participants were considered for the later analysis.

Twenty-five participants perceived luck to be an internal characteristic (56% of which were female), and the mean of their BIGL score was 56.52 (SD = 6.15). On the other hand, 27 people perceived luck to be something determined by chance (70.4% of which were female), with a mean BIGL score of 33.22 (SD = 4.28). Given that the mean ages of those two groups were 21.72 (SD = 2.25) and 21.96 (SD = 2.01), respectively, and that the means of the K-NODS scores were 0.76 (SD = 0.78) and 0.48 (SD = 0.75), there was no significant difference between the groups in terms of age and gambling activities. Table 1 displays the classification of the participants depending on the groups.

Measures

Belief in Good Luck. The Belief in Good Luck (BIGL) Scale, developed by Darke and Freedman (1997b), was adapted. Two other students in a graduate program in clinical psychology compared the adaption to the researcher's adaptation. Then, a bilingual person generated questions for back translation. After those questionnaires were

Table 1. Classification of the participants depending on the groups

		Belief in Good Luck		
		Low	High	Total
Upward Counterfactual Thinking	Yes	13	12	25
	No	12	15	27
	Total	25	27	52

sent out for supervision by Darke, the final items were reviewed by the researcher and a Doctoral student in clinical psychology. This measure was based on a 6-point Likert self-report scale, consisting of 12 items, with a higher score representing a stronger belief in good luck. In the present study, Cronbach's α was .82.

K-NODS: Screen for gambling problems. The severity of gambling was measured using K-NODS, which was adapted by Kyo-Heon Kim (2003) from NORC DSM-IV Screen for Gambling Problems (NODS), which was defined by the National Opinion Research Center (NORC) at the University of Chicago. This measure was designed to apply the criteria of DSM-IV to pathological gambling through interviews. In this study, L-type questions were used to check whether gambling problems were present throughout participants' lives. There were a total of 17 items in this measurement, with a 0 representing a non-gambler or a group at low risk, 1 and 2 indicate a group at high risk, 3 and 4 were considered problem gamblers, and scores above 5 represent a pathological gambler. The number of participants who scored 1 or 2 was 23, and 5 participants with scores higher than 3 were excluded from the final analysis. Cronbach's α for K-NODS was .91 (Kim, 2003).

Roulette program using a computer. A roulette game on a computer was used to measure gambling behaviors. The right side of the screen indicated a scale of 1 to 12 on a roulette wheel, whereas the left side showed a layout of game money with the amount of the wager, betting type, etc. The amount of the wager was 500 Korean Won, with 500 won as a minimum and 5,000 won as a maximum per game. Once participants chose the amount of the bet, the betting type, and the roulette number, the game started at a push of a "start" button. At the "stop" button, the wheel slowly came to a stop. The participants won when the wheel stopped and the roulette number they had chosen matched up with the number that the arrow on the upper side pointed at. The winners received game money depending on the odds, while losers lost their initial amount wagered. The types of betting and the odds that participants could choose are shown in Table 2.

Table 2. Types of betting and odds

Types of Begging	Number of Cases	Odds
Single Number Bet	12	7
Two Number Bet	6 (1–2/3–4/5–6/7–8/9–10/11–12)	5
Four Number Bet	3 (1–4/5–8/9–12)	2
Even/Odd Number Bet	2	1

The roulette game was divided into two sessions, and each session consisted of 25 games. The two sessions were designed to have predetermined outcomes, so Session 1 was set up with 7 wins, while Session 2 had 2 wins (at the 2nd and 16th turns). 80,000 won of game money was given during each session. When all of the money that had been initially given was used up, the participants were forewarned through a pop-up window that their money would continue to be deducted according to their next outcome.

Session 1 was designed to induce upward counterfactual thinking, and the processes for such manipulation reflected a revised version of the method described by Petrocelli and Crysel (2009). For the condition that manipulated upward counterfactual thinking, whenever participants lost, they were given a pop-up instrument written as follows: "Please think about an action that could have led to a win," and write it down as one sentence. (There was also an example of a sentence, such as "If I had . . . ., I would have . . . ") This study was designed to keep the game going only after the participants had typed a sentence. Either for the condition where the participants won or the condition without the manipulation of upward counterfactual thinking, participants were given an instrument saying "Please write down the first thought that came to your mind in a sentence."

Session 2 was intended for measurement, so there were 25 games without the manipulation of upward counterfactual thinking. At the end of each session, the pop-up of game money was indicated, and the total of those amounts determined the ranks for each participant.

Average betting amount & expected winning rates. The average betting amount was calculated after all of the amounts were collected at the end of Session 2. The expected winning rates were determined during a post-game interview, "If you were to play another set of 10 games, how many games do you think you would win?"

Procedures

First of all, after measuring the BIGL, the top and bottom 15% were randomly assigned into one of two groups, one was induced in terms of counterfactual thinking and the other was not.

To generate accurate gambling conditions, the participants were informed that they would receive a participation fee depending on the results of the roulette games. After filling out a consent form, the participants were asked to read different instructions depending on their condition.

Before getting started, the participants were asked to practice twice with the researcher to check if they thoroughly understood the process. When the games were finished, the participants were given questionnaires to assess the expected winning rates and to debrief. Those who were classified as problem and pathological gamblers were excluded from the data analysis. As informed, all of the participants were paid depending on the ranks of the games.

Analysis

A frequency analysis and a descriptive statistics analysis were conducted in order to investigate the division of the groups and their demographic characteristics. An internal consistency of the measure of belief in good luck was verified using Cronbach's α.

A 2 × 2 ANOVA [the level of belief in good luck (high, low) x a tendency for upward counterfactual thinking (Yes, No)] was conducted to examine the differences between the average betting amount and the expected winning rates, depending on the belief in good luck and the experience of upward counterfactual thinking.

Ethics

All participants were informed about the study, and all provided informed consent. The Institutional Review Board of the Chung-Ang University approved the study.

RESULTS

The gambling behaviors that depend on the level of belief in good luck and on upward counterfactual thinking were pictured in Table 3. Table 4 and 5 represent the effects of upward counterfactual thinking on the gambling behavior among people who perceived luck to be an internal factor versus those who did not. With respect to the mean amount of betting, there was a significant main effect of belief in good luck, $F(1,48) = 8.91$, $p < .01$, but neither the main effect for upward counterfactual thinking, $F(1,48) = 1.62$, *n.s.,* nor the interaction between belief in good luck and upward counterfactual thinking, $F(1,48) = 0.46$, *n.s.,* were significant. The results showed that people who had higher levels of perception of luck, and who thought for luck to be an internal factor, tended to bet higher amounts of money when gambling than those who did not.

Regarding the expected winning rates, there was no significant main effect for the degree of belief in good luck, $F(1,48) = 2.97$, *n.s.,* yet a significant main effect for upward counterfactual thinking was found, $F(1,48) = 6.82$, $p < .05$. Therefore, people who experienced upward

Table 3. Gambling behaviors depending on the level of belief in good luck and upward counterfactual thinking

			BIGL	
			High	Low
Upward Counterfactual Thinking	Yes	Average Betting Amount (100 won) (SD)	32.92 (14.12)	17.58 (12.52)
		Expected Winning Rates (%) (SD)	20.77 (8.62)	22.5 (9.65)
	No	Average Betting Amount (100 won) (SD)	35.42 (16.37)	25.75 (16.47)
		Expected Winning Rates (%) (SD)	35 (13.14)	23.33 (9.76)

Table 4. Comparisons of average betting amount on the level of belief in good luck and upward counterfactual thinking

Source of Variance	Sum of Squares	df	Mean Square	F	Eta Squared
BIGL	2016.03	1	2016.3	8.91**	.157
Upward Counterfactual Thinking	366.05	1	366.05	1.62	.033
BIGL × Upward Counterfactual Thinking	103.61	1	103.61	.46	.009
Error	10862.95	48	226.31		
Total	13215.71	51			

*p < .05, **p < .01

Table 5. Comparisons of expected winning rates on the level of belief in good luck and upward counterfactual thinking

Source of Variance	Sum of Squares	df	Mean Square	F	Eta Squared
BIGL	318.2	1	318.2	2.97	.058
Upward Counterfactual Thinking	731.42	1	731.42	6.82*	.124
BIGL × Upward Counterfactual Thinking	578.53	1	578.53	5.39*	.101
Error	5150.64	48	107.3		
Total	6698.08	51			

*p < .05, **p < .01

counterfactual thinking expected to have fewer wins in gambling than those who did not.

There was a significant interaction between the belief in good luck and upward counterfactual thinking, $F(1,48) = 5.39$, $p < .05$, as shown in Figure 1. The simple main effects of the analysis for the interaction results revealed that when belief in good luck was low, there was no significant difference depending on upward counterfactual thinking, $F(1,25) = 0.049$, *n.s.,* and when belief in good luck was high, the group who experienced upward counterfactual thinking had higher expected winning rates than the group who did not, $F(1,23) = 10.41$, $p = .004$.

DISCUSSION

The purpose of this study was to examine the effects of belief in good luck and of upward counterfactual thinking on gambling behavior among college students. First, results indicate that groups with high levels of belief in good luck
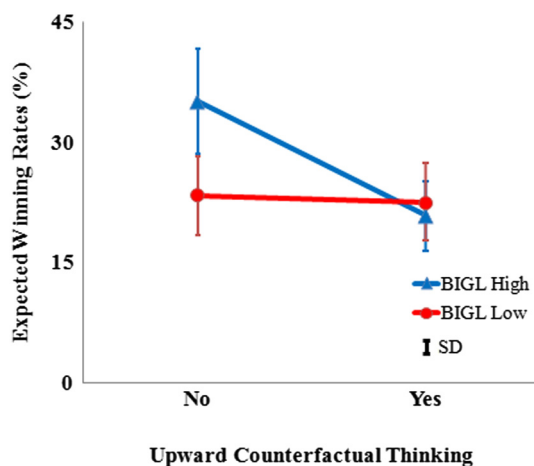

Figure 1. Interaction between the belief in good luck and Upward Counterfactual Thinking, as correlated with expected winning rates

wager more money when gambling than groups with low levels of belief in good luck. This suggests that perceiving luck as an internal trait is a factor that leads to wager more money when gambling. This confirms the results of other studies, where a higher belief in good luck led to increased confidence and risk-taking behaviors towards uncertain situations (Darke & Freedman, 1997a); those thinking that they were lucky tended to wager more money (Wohl, Young & Hart, 2005).

There was no difference between the groups with and without upward counterfactual thinking. This seems consistent with results from other studies (Hayes, Brownstein, Zettle, Rosenfarb & Korn, 1986; LeFrancois, Chase & Joyce, 1988) that claim betting behavior is related to cognitive factors, rather than to the results of gambling. In other words, it can be said that belief in good luck may have a relatively more powerful effect on betting behavior than upward counterfactual thinking.

These results can be also explained by the fact that upward counterfactual thinking took place in a manner which minimized regrets after gambling behavior, not in a way that maximized benefits after weighing the gains and losses (McConnell et al., 2000; Simonson, 1992). That is, the individual does not engage in causal reasoning because he or she does not want to regret what could have been won if less money had been bet, and the individual had not lowered the betting amount. Walker (1992) coined the term, "the state being caught in a trap," to explain a phenomenon that results from a similar psychological mechanism as those discussed above, e.g., when people keep buying the same combinations of lotto numbers once they have bought a certain combination.

In addition to individuals not wanting to feel regretful, the chasing behavior could have affected the results of this study. Chasing refers to the behavior where after repeated losses, people tend to increase the amounts bet in order to make up for those losses (Dickerson, 1993). This chasing is a well-known factor that results in several negative gambling problems (Lesieur, 1984).

The second result of this study is related to the expected winning rates, and it indicates that groups with upward counterfactual thinking expect fewer wins than those without it. An interaction between the belief in good luck and upward counterfactual thinking was also found. This indicates that there was no difference between the expected winning rates in the groups with low levels of belief in good luck, despite of the presence of upward counterfactual thinking. However, among groups with high levels of belief in good luck, those with upward counterfactual thinking had a dramatic decrease in their expected winning rates.

During their participation, people with low levels of belief in good luck thought luck was a coincidental, unstable factor (Darke & Freedman, 1997b), and largely considered the contingency in the results of gambling. As a result, when given a question to predict the winning rate, assuming that they would perform the same game, they made a realistic judgment based on their experiences of gambling, regardless of the upward anticipated counterfactual thinking.

On the other hand, people with high levels of belief in good luck thought their luck and behavior affected their chances of gambling, led to a decrease in the expected winning rates through upward counterfactual thinking. That is, a contrast effect occurred in that the higher expectations of winnings coming from luck magnified the reality of the failure, which in turn caused negative effects and evaluations.

There are many studies that examine the directions of anticipated counterfactual thinking related to emotions (Mandel, 2003; McMullen, 1997), but inconsistent results have been found in follow-up studies. Believing that the directions were not the only factor for which anticipated counterfactual thinking affected emotions, Markman and McMullen (2003) proposed a reflection and evaluation model (REM).

According to this model, given that upward counterfactual thinking occurs, if the content is reflective, it is accompanied with positive emotions, and negative emotions occur when the content of upward counterfactual thinking is evaluative. For instance, assuming that upward counterfactual thinking occurs, an individual would think that, "If I had studied harder, I would have received a better grade." If the individual reflectively accepts this thought, focusing on the possibility that an A could have been obtained, he or she would feel positive emotions. On the contrary, if the individual feels that the thought is evaluative, paying close attention to an evaluation toward the fact that an A was not received, he or she could feel negative emotions. REM illustrates that for a contrast effect to occur, it is crucial to counter how to perceive the content of upward anticipated counterfactual thinking.

The results of this study have implications in terms of providing a precaution against gambling addiction. First, it was suggested that perceiving luck as an internal trait could affect gambling, which is one of the cognitive errors. When it comes to prevention, correcting the cognitive errors of gamblers is important. As a result, when targeting those with high levels of belief in good luck, it is necessary to develop a process to rectify cognitive errors of the results of gambling and of overestimations towards winning.

Second, this study found that upward counterfactual thinking may be a means of severing the link between dangerous gambling behaviors, including chasing and unreasonable betting. Gambling requires immediate decision-making, which increases risks due to impulse. Also, there are few chances in gambling to make up for losses. With causal reasoning, if people have repeatedly worked through the operations that help them realize that gambling is not an internal factor, such as that involving skills and efforts, the risk of gambling addiction would decrease.

Some implications for future studies and limitations of the current study should be mentioned. First, this study focused only on assessing upwardly counterfactual thinking. Therefore, future studies assessing not only upwardly, but also downwardly, are needed to build up better findings of the effects of counterfactual thinking on gambling behavior. Second, it was about virtual money, and participants were all non-problem gamblers. Thus, future studies should also consider pathological gamblers to examine whether or not belief in good luck is a risk factor leading to gambling addiction. Third, the effects of upward counterfactual thinking on emotions, motivations, cognition, or on a perceived sense of control were not measured. Future studies should address those issues in order to investigate the effects of other factors on gambling behavior along with upward counterfactual thinking.

Conflict of interest: The authors declare no conflict of interest.

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