*Original Research*

SAGE Open
January-March 2020: 1–6

DOI: 10.1177/2158244019899436
journals.sagepub.com/home/sgo
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# Is Self-Reported Propensity for Everyday Illusions of Control Higher in Gamblers and Is It Associated With Gambling-Specific Erroneous Beliefs?

**Paul Delfabbro[1], Neophytos Georgiou[1], Catia Malvaso[1], and Daniel King[1]**

**Abstract**

People who engage in gambling are known to hold erroneous views about the nature of gambling. One of the most commonly observed cognitive biases is the illusion of control, where people's subjective appraisal of contingency between behavior and events is greater than the objective contingency. Such beliefs have been found to be strongest in problem gamblers and can lead to over-confidence in the ability to win money from gambling. A question, however, is whether such perceptions are (a) specific to gambling and whether gamblers display a tendency to over-estimate contingencies in everyday life and (b) if a tendency to endorse everyday illusion of control beliefs is related to specific gambling-related beliefs among those who gamble. Answers to these questions might provide insights into whether some people are potentially more vulnerable to beliefs that might have implications for gambling. An online sample of 788 adults completed a survey about simple everyday situations where people might attempt to exert control (e.g., pressing elevator buttons more often, throwing dice in games). The survey included a scale that captured everyday situations as well as established measures of illusion of control and superstition in gambling. The results showed that those who report greater control in everyday tasks scored higher on standardized measures of beliefs about chance and gambling-related cognitions relating to illusory control. Scores on both types of measures were higher in gamblers than non-gamblers. The findings suggest that gamblers may differ in how they generally perceive and respond to situations involving tasks largely dominated by chance or limited opportunities for genuine control.

**Keywords**

illusion of control, gambling, non-contingency, everyday tasks, beliefs about chance

## Introduction

The illusion of control (IOC) is a well-documented heuristic or bias that refers to a subjective over-estimation of control in situations involving individual action (Langer, 1975; Thompson et al., 1998). In formal operant learning theory, the IOC is similar to the notion of false contingency (Alloy & Abramson, 1979; Blanco et al., 2011; Matute, 1995, 1996; Wasserman et al., 1993). This bias is also said to occur when people believe that the probability of outcomes resulting from their actions (P (O| R)) is greater than the objective probability. From this axiom, it follows that inferences of control in situations involving random or chance outcomes must constitute an IOC. However, it is also possible for an IOC to exist in some partially skill-based tasks if people over-estimate their ability to influence outcomes (e.g., as might be the case in some card-based gambling activities available in casinos). It should also be noted that these two definitions of IOC are not fully consistent. The Langer definition really only refers to one side of the contingency inequality (P(O/R)), so that it is possible for a person's appraisal of causality to be mistaken as a result of under-estimating P (O/No response). In other words, for an accurate appraisal of causality to occur, the person must get both conditional probabilities correct. The greater the difference between these two probabilities, the stronger the perception of causality between response and outcomes.[1]

[1]The University of Adelaide, Australia

**Corresponding Author:**
Paul Delfabbro, The University of Adelaide, North Terrace Campus, C/O School of Psychology, Adelaide, South Australia 5005, Australia.
Email: paul.delfabbro@adelaide.edu.au

According to Langer (1975), the IOC probably arises as a result of both motivational and cognitive factors. In her view, people are motivated to achieve control over their environments because this serves an ego-defensive and adaptive function. Elements of this logic are inherent, for example, in many areas of psychology from Freudian theory to Skinner's operant conditioning theory. In modern cognitive theory (Thompson et al., 1998), the IOC is recognized as resulting from neurologically hard-wired tendencies to form associations between actions and outcomes. However, it is also recognized that the triggering of this disposition can be contextually bound and influenced by individual variations. For example, people are thought to be more likely to infer an IOC when they have a strong need for the outcome, if they are personally involved in the activity, have foreknowledge of the nature of outcome success, and greater success feedback.

The IOC has been extensively studied in laboratory environments (e.g., Ejova et al., 2015; Matute, 1995, 1996; Wohl & Enzle, 2002; Yarritu et al., 2014) and also in applied contexts. In laboratory research, much of the principal focus has been upon finding effective ways to capture the effect; understanding the role of individual differences, and whether there are situational factors that make the effect more likely to occur. Much of the focus of Langer's (1975) early work was on gambling-like tasks (e.g., drawing lottery tickets, placing bets on roulette like games or playing cards), whereas subsequent tasks have tended to be more abstract. Typical laboratory tasks have involved button presses or simple tasks where people are asked to make events occur (e.g., make a light come on, noise stop, or color change), but in situations where outcomes are random or pre-determined (e.g., 75% of trials will involve light on-sets irrespective of responses). In most of these studies, the results show that a certain proportion of participants will display an IOC and act as if there was a direct connection between the outcomes and their actions.

Such studies have important implications for real-world behavior. A particular area where there has been strong interest in the IOC is the field of gambling studies. Within this context, a number of studies have shown that the IOC may be an important factor in the development of gambling behavior and has been implicated in the etiology of problem gambling (Joukhador et al., 2004; Raylu & Oei, 2004; Wohl & Enzle, 2002). Such beliefs are thought to lead to over-estimations of skill and over-confidence, often in chance tasks involving no objective contingency (e.g., Lambos & Delfabbro, 2007; Pallesen et al., 2005; Toneatto & Ladouceur, 2003). Gamblers and, in particular, problem gamblers score higher on measures of erroneous gambling-related beliefs including those which capture the IOC. For example, slot-machine gamblers believe that they can pick the highest paying machines, anticipate when machines will pay out, whereas roulette gamblers will believe that certain placements of chips can increase their chances of winning.

A question which such research has not, however, investigated is whether such beliefs arise merely as a consequence of an involvement with gambling or whether people who display these beliefs or gamble in general have a broader tendency to display an IOC in other parts of life. For example, are gamblers more likely to engage in the sorts of behaviors (e.g., excessive button pressing) observed in laboratory studies and other simple games and daily activities (e.g., always preferring to be the driver, consistently using herbal remedies to cure colds)? In this study, this question is examined using a self-report survey that asks gamblers and non-gamblers to respond to a series of items relating to everyday IOC behaviors and beliefs as well as established gambling-specific measures of IOC. The latter measures were included to investigate whether a general tendency to perceive or attempt to control tasks in everyday life is associated with higher scores on measures which reflect IOC beliefs in gambling-specific contexts.

## Method

### *Participants*

The study involved 788 respondents (442 men, 344 women, 2 gender missing) aged 18 years or older. Most fell into the 18 to 30 ($n = 515$) or were aged 31 to 40 ($n = 164$) so that 86% were aged 40 years or younger. Most participants ($n = 762$, 96.7%) had either completed high school ($n = 232$, 29.4%), a bachelor's degree ($n = 141$, 17.9%), or higher qualifications ($n = 389$, 49.3%), as their highest level of education. The majority of the sample indicated a mathematical ability of at least above average to A level student ($n = 703$, 89.2%). Just under half (or 44%) had gambled at least once in the previous year. The most common activities were lotteries ($n = 124$, 15.7%) and various formats of sports betting ($n = 107$, 13.6%).

Participants were recruited from the general population through an advertisement on the website Crowdflower. Crowdflower is similar to services such as Amazon Turk. Samples recruited using this methodology are generally recognized as producing results very similar to those produced through broader population samples and are considered superior to a reliance on university student samples (Bartneck et al., 2015; Clifford et al., 2015). Participants received a small $5 compensation for participation.

### *Study Design*

The study was conducted entirely online. Participants completed several demographic questions and general behavioral measures to gather an understanding of participants' gambling frequency and preferred mode of gambling if applicable. Participants then completed a series of survey questions regarding their level of IOC in everyday tasks, in gambling, their beliefs about chance events, and some single items. The study design and procedures were approved by the Human

Research Ethics Subcommittee the University of Adelaide, School of Psychology. The study URL directed potential participants to an information page containing inclusion and exclusion criteria and consent form. Participants read the study information and confirmed consent before proceeding to the main study page. All responses were kept confidential and reported in group form. The survey was opened on a specific date and then closed on another once 700 participants had been obtained. This sample size was felt to be sufficient to allow for some diversity in responding and provided adequate statistical power for all analyses.

### Measures

*Demographics and gambling experience.* Participants were asked to indicate their gender, age, and highest level of education obtained. They also indicated whether they had undertaken gambling activity over the past 12 months and what type of activity.

*Everyday IOC measure.* A total of 12 items were developed from a pool of formulated items developed by the authors based on a review of laboratory and published studies and popular science articles that refer to numerous everyday "button pressing activities" that would appear to mirror laboratory tasks (e.g., crossing signals, lift buttons). Items were cross-validated and refined by two independent raters until they agreed 100% that items were consistent with an IOC belief. Items were selected to capture everyday behaviors that are likely to be common in the general population (e.g., nearly everyone is likely to be involved in a raffle or lottery at some time, but many people do not gamble at casinos, gaming machines, or on sports and racing) (Jahoda, 1974). Items included those relating to operating simple mechanical devices, computers, driving or simple gambling and carnival tasks likely to be familiar to the majority of the population. It is acknowledged that the selection of items in this context will often be contentious because there may be debate about whether any situation is entirely devoid of opportunities for control. For example, there is debate about whether some herbal remedies for colds work, some pedestrian crossings may respond to multiple presses, and not all people will necessarily have a similar degree of exposure to the listed situations or behaviors. It is hoped, however, that using a range of items and situations would assuage concerns about the undue influence of any particular item. Each item was scored from 1 = Strongly disagree to 5 = Strongly agree. Scores could range from 12 (lowest) to 60 (highest) to indicate a person's level of illusion of control. The Cronbach's α for the present study was .70.

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*Illusion of Control subscale from the Gambling-Related Cognition Scale (GRCS).* Participants completed the four-item Illusion of Control subscale from the GRCS (Raylu & Oei, 2004). Items referred to using special objects, prayer, and rituals to increase one's chance of winning, but none of these specifically referred to specific gambling games in the wording. Each item is scored from 1 (*strongly disagree*) to 7 (*strongly agree*) (range = 4–28) with higher scores indicating stronger IOC beliefs. The Cronbach's α for the present study was .88.

*Illusion of Control subscale from the Drake Beliefs About Chance Inventory (DBC).* Participants completed the 11-item Illusion of Control subscale from the DBC, which is a self-report measure developed to assess erroneous cognitions about chance-based events (Wood & Clapham, 2005). Each item is scored from 1 (*strongly agree*) to 5 (*strongly disagree*) to yield a score of 11 to 55. The Cronbach's α for the present study was .88.

*Other explanations.* We also felt that it was worthwhile to examine whether any competing explanations might be advanced to explain any effects observed. Participants were asked to rate how much they "liked to be in control of things" and whether they were typically "impatient for things to happen." Such items were used as brief validity checks to ascertain if there might be other reasons why people engage in certain everyday behaviors (e.g., press buttons multiple times) or like to control of driving or dice throws in games.

## Results

### Descriptive Statistics

The participants generally scored in the mid-range of the DBC ($M = 29.77$, $SD = 7.17$, possible range = 10–50) and below the mid-point on the Illusion of Control Scale from the GRCS ($M = 10.57$, $SD = 6.86$, possible range = 4–28). In other words, there appeared to be reasonable variability in the scores and no evidence that the online sample was skewed in a particular direction. A total of 406 (52%) reported having engaged in gambling in the previous 12 months, 330 (44% were non-gamblers) and 8% did not say whether they gambled or not. Men were significantly more likely to be gamblers (60%) than women (51%) and males also scored higher on the Everyday Illusions Scale ($M = 38.5$, $SD = 6.35$) than women ($M = 36.4$, $SD = 5.57$), $t(742) = 4.66$, $p < .01$.

### Gambling and IOC

As shown in Table 1, gamblers scored higher on gambling-related IOC beliefs (GRCS subscale) on the DBC and also on the Everyday Illusions Scale with moderate effect sizes. Given that a small number of items in the Everyday Illusions Scale also contained some gambling items, all scale items were also individually compared between gamblers and non-gamblers to reduce concerns about circularity of argument. Gamblers scored significantly higher on all items except the item relating to fairground games and webpage loading (Table 2). These effects were obtained irrespective of whether

**Table 1.** Illusion of Control Scores for Gamblers and Non-Gamblers.

| Measure | Gamblers ($n = 406$) | Non-gamblers ($n = 330$) | *t* value | Cohen's *d* |
|---|---|---|---|---|
| Drake Beliefs About Chance Inventory | 30.8 (6.92) | 28.5 (7.32) | 4.27** | .32 |
| GRCS | 11.4 (6.29) | 9.55 (7.0) | 3.64** | .28 |
| Everyday Illusion of control | 38.7 (6.23) | 36.1 (5.85) | 5.87** | .43 |

*Note.* GRCS = Illusion of Control subscale from Gambling-Related Cognition Scale.
**$p < .01$.

**Table 2.** *M* (*SD*) for Everyday Illusion of Control Items.

| Item | *M* (*SD*) | Gamblers | Non-gamblers | *t* value | Cohen's *d* |
|---|---|---|---|---|---|
| I tend to push elevator buttons multiple times even when they are lit/activated | 2.96 (1.29) | 3.10 (1.25) | 2.77 (1.31) | 3.48** | .26 |
| When playing board games, I prefer to throw the dice myself rather than have someone else do it | 3.83 (1.00) | 3.92 (0.96) | 3.71 (1.04) | 2.73** | .21 |
| I prefer to choose my own tickets in raffles | 3.62 (0.98) | 3.71 (0.96) | 3.51 (0.98) | 2.86** | .21 |
| I am generally better than other people at getting the numbers I want when I throw dice in games | 2.94 (0.95) | 3.06 (0.95) | 2.79 (0.94) | 3.90** | .33 |
| There are ways to make tails or heads come up more often in a coin toss | 2.50 (1.08) | 2.66 (1.07) | 2.32 (1.06) | 4.35** | .32 |
| Pressing the pedestrian crossing button a few times can make the signal change more quickly | 2.48 (1.19) | 2.58 (1.18) | 2.35 (1.19) | 2.65** | .19 |
| Websites tend to load at about the same speed anyway, no matter how often you keep pressing refresh or "return" (R) | 3.34 (1.05) | 3.37 (1.01) | 3.29 (1.09) | *ns* | *ns* |
| I take remedies which can help me recover from a common cold more quickly | 3.04 (0.96) | 3.46 (1.05) | 3.23 (1.16) | 2.90** | .21 |
| There are ways to insert balls into the laughing clowns at a fairground to win better prizes | 3.25 (1.12) | 3.13 (0.94) | 3.42 (1.11) | 2.93** | .28 |
| I prefer to be the driver if it is a choice between me and another person I trust to drive | 3.25 (1.12) | 3.38 (1.11) | 3.09 (1.11) | 3.56** | .26 |
| If I had to play a lottery style game, I would not let other people or the computer choose my numbers | 3.34 (1.09) | 3.42 (1.11) | 3.23 (1.07) | 2.90** | .17 |
| Practice won't make any difference in most fairground games (R) | 2.91 (1.09) | 2.93 (1.13) | 2.88 (1.04) | *ns* | *ns* |

*Note.* R = reversed scored.
*$p < .05$. **$p < .01$.

the data were treated as metric with a *t* test or ordinal using Mann–Whitney *U* tests. Effect sizes were generally small to moderate. In other words, the differences between the two groups were sustained across items that did not specifically refer to simple gambling games. Nearly all these effects were highly significant and remained so even after correcting for multiple comparisons.

## Correlation Analysis

Pearson's correlations were undertaken to examine the relationship between the standard IOC and belief measures (GRCS and Drake measure) and Everyday Illusion scores. There were small to medium positive relationships between Everyday Illusion scores and the GRCS ($r = .31, p < .05$) as well as the DBC ($r = .39, p < .05$). There was no association between the ratings on the "I like to be in control" or "I am impatient for things to happen" questions and Everyday Illusion scores as based on Pearson's or Spearman's correlations. Scores on these items did not differ depending upon whether a person gambled. All analyses were then repeated for gamblers only and revealed a smaller relationship between Everyday Illusions and GRCS scores ($r = .19, p < .05$), but still a moderate relationship with Drake scores ($r = .35, p < .05$).

## Testing for Gender Confound

Given that males were more likely to gamble and also scored higher on the Everyday Illusions measure, analyses were conducted to examine whether the effects for gambling held holding gender constant. Comparisons across gambling

status were conducted for men and women separately and this showed the same effect as for the whole sample. A regression analysis also examined whether gambling status predicted Everyday Illusion scores after controlling for gender and this showed that both variables were significant predictors with a standardized beta of –.19 for gambling status and .14 for gender. In other words, the gambling effect remained and did not appear to be explained by gender differences.

## Discussion

This study had two principal aims. The first was to examine whether people who report an interest in gambling are more likely to report displaying illusions of control in everyday life as compared with non-gamblers. The second was to examine whether gamblers who endorse erroneous beliefs associated with gambling are more likely to report behaviors in everyday life which suggest a tendency toward behavior consistent with IOC beliefs. Overall, the results showed that gamblers tended to score higher on all measures of illusory control as well as general erroneous beliefs about chance events. These findings confirm previous studies which have shown that scores on the GRCS and the DBC both vary according to people's level of gambling involvement (Raylu & Oei, 2004; Wood & Clapham, 2005). Gamblers also reported attempting to exert more control in everyday tasks where the connection between outcomes and behaviors is likely to be tenuous. Such behavior is reported across a variety of domains from the tendency to press elevator buttons repeatedly, beliefs about the efficacy of herbal remedies, as well as attempts to exert control in simple board games. The study also showed that endorsement of everyday beliefs was related to scores on gambling-specific beliefs relating to the IOC.

Taken together, the results suggest that people who gamble may differ in their general belief systems and how they perceive everyday tasks and events. The reason for this remains unclear from the present study. However, theoretical analysis of the illusion of the control effect suggests that it may be due to several underlying factors (Langer, 1975). Some people, including gamblers, may have a stronger personal motivation to see events as controllable and predictable. Such perceptions often serve an ego enhancement or protection function. Another view (e.g., Ejova & Ohtsuka, 2019; Langer, 1975) is that people miscategorise the structure of activities (e.g., chance vs. skill) or over-generalize principles from one situation to another where those laws do not apply. For example, some people may see chance gambling games as being more like board games where strategy improves the objective long-term return-to-player or they may believe that skills (e.g., throwing an object a certain way) make a difference to outcomes as might be true in some skilled activities. There is also a specific clinical literature that proposes that some people are more prone to erroneous inferences about causation because they focus too strongly on evidence that confirms outcome–behavior connections and ignore instances where the evidencce is inconsistent (Balzan et al., 2013). Although this study did not examine problem gambling, there is evidence which suggests that heavier gambling can often be associated with deficits in decision-making (Toplak et al., 2007) and a higher prevalence of co-morbidities (e.g., personality disorders, mood disturbances, schizotypy) that may predispose people to erroneous cognitions (see Abdollahnejad et al., 2015; Lorains, Cowlishaw, & Thomas, 2011).

### *Limitations and Future Directions*

There are several limitations of this study that should be taken into account when interpreting the findings. First, as a self-report study, one cannot always be sure that people report their behavior accurately. A potentially useful extension of this project, therefore, would be to ask gamblers and non-gamblers to undertake a simple standardized test of IOC (e.g., button press task) to see whether this reflects broader differences in self-report measures. Second, this study only defined gambling in a very general sense (last 12 months participation). For these findings to have greater relevance, it would be important to examine whether the strengths of the effects observed here increase when one surveys regular or problem gamblers. Inclusion of a more diverse group of gamblers and using more refined measures could indicate much stronger association between illusion of control, and the intensity and type of gambling behavior. Third, it is possible that different people interpret items in different ways or have different experiences (e.g., pedestrian lights or lifts which do respond differently with multiple presses), but we included a variety of situations and behaviors to capture people's general tendency to infer control more generally. Finally, it is not clear whether there may be other unmeasured co-morbid conditions or personality factors that might account for the associations observed.

### *Conclusion*

People who gamble appear more likely to be prone to erroneous beliefs relating to the IOC both in gambling contexts as well as in their broader lives. It may be that people who gamble are more strongly motivated to see behavioral-outcome connections than other people or that they possess certain traits which make such perceptions more likely. Further research into the general cognitive traits of gamblers and, in particular, regular gamblers would be of interest to understand how cognitive factors may play a role in the uptake and maintainence of gambling behavior.

#### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## ORCID iD

Paul Delfabbro https://orcid.org/0000-0002-0466-5611

## Note

1. The authors are grateful for the clarification of this difference provided by an anonymous reviewer of this article.

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## Author Biographies

**Paul Delfabbro** is a professor in the School of Psychology at the University of Adelaide where he lectures in learning and behaviour and statistics. He has conducted extensive research in the areas of behavioural addictions and child protection.

**Neophytos Georgiou** is a PhD candidate in the School of Psychology and conducts research into applied cognition, including the clinical correlates of beliefs in conspiracy theories.

**Catia Malvaso** is a post-doctoral fellow in the School of Psychology at the University of Adelaide. Catia is a lecturer in human development and conducts research into the links between childhood trauma and juvenile justice.

**Daniel King** is a senior lecturer in the psychology at Flinders University and who has conducted extensive research into behavioural addictions.