



# Having a Positive Attitude or Doing Good Deeds? An Experimental Investigation of Poker Players' Responses to the Gambling Fallacies Measure

Philip Newall<sup>1</sup><sup>a</sup>, Jamie Torrance<sup>2,3</sup>

<sup>1</sup> School of Psychological Science, University of Bristol, Bristol, UK, <sup>2</sup> School of Psychology, University of Chester, Chester, UK, <sup>3</sup> Psychology, Swansea University

Keywords: Irrational cognitions, disordered gambling, gambling skill, skill-based gambling formats

<https://doi.org/10.1525/collabra.89007>

## Collabra: Psychology

Vol. 9, Issue 1, 2023

Gambling fallacies are irrational beliefs about how gambling works, which are common among disordered gamblers, and measured by questionnaires such as the Gambling Fallacies Measure (GFM). Less is known about the potentially rational cognitions of some skilled gamblers, such as professional poker players. The present research experimentally manipulated item 5 from the GFM, “A positive attitude or doing good deeds increases your likelihood of winning money when gambling”, by comparing two new versions focusing only on a “positive attitude” or “doing good deeds” to the original version (control). Item 5 is scored so that “disagree” is the non-fallacious correct answer, but it was hypothesized that the words “a positive attitude” might increase rates of poker players selecting “agree” in a non-fallacious manner. Online experiments were conducted on samples of professional poker players ( $N = 379$ ), and a broad sample of poker players with no inclusion criteria ( $N = 1,510$ ). Participants' responses to item 5 were associated with the rest of their GFM scores (GFM-9). Participants in both samples were more likely to disagree with the good deeds version, and less likely to disagree with the positive attitude version, compared to control. In comparison to the other conditions, good deeds responses were most strongly associated with GFM-9 scores among professionals, while positive attitude responses were least strongly associated with GFM-9 scores among the broad sample. The good deeds version of item 5 has advantageous measurement properties among professional poker players. New approaches are needed to better understand the potentially rational cognitions of skilled gamblers.

Disordered gambling is associated with irrational beliefs about how gambling works, known as gambling fallacies (Goodie & Fortune, 2013; Ladouceur & Walker, 1996; Leonard, Williams, et al., 2015). For example, the illusion of control refers to gamblers' overestimation of the extent to which their actions influence chance-driven outcomes, such as the belief that picking their own lottery numbers might increase their chances of winning (Langer, 1975). The gambler's fallacy refers to the mistaken belief that past outcomes influence future probabilities, such as the belief that several reds in a row at roulette increases the chances of black occurring next (Ayton & Fischer, 2004). Gambling fallacies have a central component to current theoretical models about disordered gambling, and correcting these fallacies forms a key part of current treatment approaches (Clark & Wohl, 2021). Gambling fallacies can be observed for example via “think aloud” protocols as people gamble

(Ladouceur et al., 1988), and measured via self-report questionnaires (Breen & Zuckerman, 1999; Joukhador et al., 2003; Leonard, Williams, et al., 2015; Raylu & Oei, 2004).

Of these self-report questionnaires, the Gambling Fallacies Measure (GFM) is relatively recently developed, and its 10 questions address six distinct fallacious thinking styles (Leonard & Williams, 2016), with examples of each thinking style given in [Table 1](#). Other questionnaires contain items that can overlap with separate aspects of disordered gambling, such as a preoccupation with gambling, which are conceptually separate from fallacious beliefs such as the gambler's fallacy (Leonard & Williams, 2016). Furthermore, other questionnaires often focus on specific fallacies such as the illusion of control, while not assessing other empirically-backed fallacies such as the belief that luck is dispositional or base-rate neglect (Leonard, Staples, et al., 2015). These issues affect popular questionnaires

a Correspondence: Philip Newall, [philip.newall@bristol.ac.uk](mailto:philip.newall@bristol.ac.uk)

**Table 1. Gambling fallacies included in the GFM and their definitions**

Gambling fallacy	Description
The hot hand fallacy	The mistaken belief that a streak of past success in a random event makes success more likely to continue in future, when in reality, each event is independent and unaffected by past outcomes.
The Monte-Carlo fallacy (gambler's fallacy)	The mistaken belief that future outcomes will 'even out' past random outcome streaks in games of chance. For example, believing that a series of consecutive red outcomes in roulette increases the likelihood of black appearing next.
Luck is dispositional	The belief that traits, behaviors, or choices of an individual make them more or less likely to experience lucky outcomes.
The illusion of control	The belief that actions can influence outcomes in random gambling outcomes, such as the belief that rolling a pair of dice hard can increase the chances of high numbers being rolled.
Insensitivity to sample-size	A lack of understanding that a large sample-size is more indicative of actual probabilities than a small sample-size is
Base rate neglect	The tendency to ignore general or base-rate information (e.g., long-run statistical probabilities) and to instead focus on specific, anecdotal information when making decisions or judgments.

including the Gambling Belief Questionnaire (Steenbergh et al., 2002), the Gambling Cognitions Inventory (McInnes et al., 2014), and the Gambling Related Cognitions Scale (Raylu & Oei, 2004).

Conceptually related, and yet subject to less previous research, are the potentially *rational* cognitions of some skill-based gamblers, in for example sports betting (Rosecrance, 1988), but especially poker (Palomäki et al., 2020). Poker outcomes are in the short-run driven largely by luck, but in the long-run skill predominates (Potter van Loon et al., 2015). Poker players with more skill than their opponents can win money overall, and some can win enough money to gamble professionally (Hayano, 1982). Poker professionals may use a range of skills (Leonard, Staples, et al., 2015; Leonard & Williams, 2015), including judging probabilities accurately (Zhu et al., 2022), understanding their opponents' body movements (Slepian et al., 2013), or using specialist software in online poker (Schüll, 2016). While some "professionals" might be disordered gamblers using the label to legitimize their gambling (Hing et al., 2016), or be experiencing harm due to the large number of hours spent playing (Bjerg, 2010), at least some professional poker players are successful (Laakasuo et al., 2016; Talberg, 2018). Successful poker players' rational gambling cognitions have been previously noted (Newall & Talberg, 2023).

One study investigated the GFM's ability to differentiate between amateur and skilled poker players (Newall & Zhu, 2023). The latter group scored at close to the GFM's ceiling of 10, which represents a rational approach to gambling ( $M = 8.97$ ), significantly higher than amateurs' average of 6.76. This difference held for all of the GFM's items except for item 5, "A positive attitude or doing good deeds increases your likelihood of winning money when gambling", to which 87.9% of skilled and 87.1% of amateurs answered "disagree" correctly (with "agree" being the only other incorrect potential answer).

A positive attitude can have no influence in gambling games where the illusion of control has been investigated deeply, such as craps or roulette (Dixon, 2000; Lim & Rogers, 2020). But poker strategy authors frequently note the need to maintain psychological control during short-term periods of losses (Angelo, 2007; Malmuth, 2015;

Schoonmaker, 2000; Tendler & Carter, 2011), which can lead to patterns of irrational and suboptimal play known as "tilt" (Palomäki et al., 2013). It may be that the relevance of psychological control to poker means that the words "a positive attitude" cause some poker players to respond "agree" to this item, in a way that is less consistent with the GFM's other gambling fallacies, and with any effects potentially being larger in a version focusing solely on "a positive attitude". By contrast, "doing good deeds" has less of a rational justification in terms of psychological control. Poker players may be less likely to agree with an item solely focusing on doing good deeds, and any potential agreement may be more consistent with the GFM's other gambling fallacies.

We therefore designed an online experiment to test these predictions. Participants first answered either the original version of item 5 from the GFM, or altered versions focusing only on a positive attitude or doing good deeds. Participants then completed the remainder of the GFM without the inclusion of item 5 (the "GFM-9"). Moreover, we collected data from a sample of poker players with experience of gambling for a living from a specialty forum ("professional sample"), as well as from a broad base sample of poker players with no inclusion criteria. The professional sample was provided with an opportunity to explain their responses to their version of item 5, and these responses were qualitatively analyzed.

## Method

Data and materials are available from <https://osf.io/qv562/>, and the two preregistrations are available from <https://osf.io/s3yng/> and <https://osf.io/2ue39/>. Data for the professional sample were obtained via a post on <https://forums.twoplustwo.com/>, and data for the broad sample obtained from the crowdsourcing platform [Prolific.co](https://www.prolific.co). Ethical approval was obtained from the School of Psychological Science Research Ethics Committee at the University of Bristol [#14196 and #14657].

## Participants

For the professional sample, an initial 686 responses were obtained during four weeks of data collection, of which 76 were incomplete. An inclusion criterion was pre-registered, such that only participants with at least one year of equivalent self-reported professional playing status were retained, where semi-professional years were weighted as half a year. This led to a loss of a further 231 responses (37.9% of the sample), resulting in a final sample size of 379. These participants had a median of three years professional and five years of semi-professional play, had an average age of 41.6 (SD = 11.7), and were 93.7% male (3.2% female, remaining other). These participants had a median completion time of 3.5 minutes.

For the broad sample, 1,510 responses were obtained within one day, all of which were complete. Participants were paid £0.45 each, and had a median completion time of 2.5 minutes (£10.80 per-hour pro rata). Participation was open to Prolific users from Australia, Canada, the UK, and the USA, who had previously indicated their engagement with online poker to Prolific. No further inclusion criteria were preregistered, in order to obtain data from as broad a sample as possible. Participants had an average age of 37.6 years (SD = 11.1), and were 76.7% male (23.0% female, remaining other). Overall, 59.5% of the sample had zero equivalent years of professional experience, and 31.4% had one year or more of equivalent professional experience (which was the minimum for inclusion in the professional sample). Interestingly, we found that the 31.4% of the broad sample who reported having some equivalent professional experience had lower GFM-9 scores ( $M = 6.0$ ,  $n = 474$ ) than the remainder of the broad sample ( $M = 6.4$ ,  $n = 1,036$ ), and this difference was statistically significant ( $t[1508] = 4.86$ ,  $p < .001$ ). This supports a contention from the previous literature that disordered/losing gamblers are likely to self-report being professional gamblers to reduce the perceived stigma around gamblers (Hing et al., 2016). We believe this is unlikely to be an issue with participants in the professional sample, given their recruitment from a targeted community and their high GFM-9 scores (provided later on).

## Materials and Procedure

Participants were randomly assigned to one of three conditions for item 5 from the GFM: control (“A positive attitude or doing good deeds increases your likelihood of winning money when gambling”), positive attitude (“A positive attitude increases your likelihood of winning money when gambling”), or good deeds (“Doing good deeds increases

your likelihood of winning money when gambling”). Participants in each condition were required to state their agreement in relation to the respective version of GFM item 5 via a binary measure (agree/disagree). Participants in the professional sample were also provided with an opportunity to “please briefly explain your answer”. This was not done with the broad sample, given the larger planned sample size.

Participants then completed the remaining questions on the GFM (termed the GFM-9 here as item 5 is not included) which contains items such as “a gambler goes to the casino and wins 75% of the time. How many times has he or she likely gone to the casino?” (Correct answer: “4 times”, incorrect potential answers: “100 times”, and “It is just as likely that he has gone either 4 or 100 times”). As with the GFM, each correctly answered item within the GFM-9 was given a score of 1, with items being summed to produce a total score ranging from 0-9. The GFM-9 items were forced-choice to ensure that all item responses were complete. The fallacies addressed by the GFM include the hot hand fallacy, Monte-Carlo fallacy, the belief that luck is dispositional, the illusion of control, insensitivity to sample size. and base rate neglect.

In the professional sample, the coefficient omega was .36 for the original GFM in the control condition, was .46 for the ten items in the positive attitude condition, and .31 in the good deeds condition.<sup>1</sup> Contrastingly, in the broad sample the coefficient omega was .64 for the GFM in the control condition, was .64 for the ten items in the positive attitude condition, and also .64 for the ten items in the good deeds condition. Therefore, the broad sample scale reliability scores were roughly in line with one recent large study using a similarly broad sample of gamblers, which revealed a coefficient omega of .69 for the GFM (Shaw et al., 2022). The lower omega scores in the professional sample may have been due to the high average scores in this group (i.e., a ceiling effect), or due to this group's interpretations of various questions (which will be returned to in the Discussion).

Participants in the professional sample then self-reported their demographics, while Prolific's pre-existing demographic data were used in the broad sample, and then answered the two questions on semi and professional playing (e.g., “For how many years have you played poker professionally [as the main source of your household income]? This question includes non-playing forms of poker income, such as profits from coaching or staking.”).<sup>2</sup> Semi-professional poker was defined as playing poker to a degree that provides an additional income support, but not as a main source. Participants were provided with their GFM-9 scores and feedback on the correct answers upon completion.

1 Item 10 had to be dropped from this analysis due to professional participants in the good deeds condition all answering this item correctly.

2 “Coaching” refers to being paid money to teach other players to play poker, and “staking” refers to taking on a proportion of another player's wins or losses at poker. Both are poker-related activities that some professionals engage in, and are highly recognized terms within the poker community (Newall & Talberg, 2023).

**Table 2. GFM-9 scores in each experiment**

GFM-9 score	Professional sample	Broad sample
0	0%	0.2%
1	0%	1.2%
2	0%	2.8%
3	0.3%	2.9%
4	0%	7.2%
5	0.3%	10.5%
6	4.5%	20.4%
7	22.4%	25.1%
8	28.8%	12.9%
9	43.8%	6.9%

## Analysis

Rates of item 5 responses across the three experimental conditions were compared using logistic regression, to see if as predicted there would be higher rates of participants selecting disagree in the good deeds condition, and lower rates in the positive attitude condition (compared to control).

Free text explanations given for item 5 were subject to a thematic analysis (Braun & Clarke, 2006). Analyses were conducted to yield common themes underlying patterns for participants' reasoning. Initial analyses were conducted by the second author, and refined via discussion with the first author, with both authors agreeing on the resulting findings. The thematic analysis was based on 191 relevant responses.

GFM-9 scores (i.e., excluding the scores on item 5, the target of the experimental manipulation) were the dependent variable in the regression analysis. Ordinary least squares regression on the raw scores was deemed inappropriate, due to the predicted sparsity of low scores (Newall & Zhu, 2023), and the potential for predicted scores outside of the 0-9 interval. Therefore, we used an ordered logistic regression, with preregistered rescored values for the professional sample of 0 (raw score of 7 or below), 1 (8), and 2 (9). As can be seen in Table 2, GFM-9 scores were lower on average in the broad sample ( $M = 6.3$ ) than in the professional sample ( $M = 8.1$ ). An exploratory two-sample  $t$ -test revealed that this difference was significant ( $t [1887] = 20.0$ ,  $p < .001$ ). Therefore, for the broad sample we used rescored values of 0 (6 or below), 1 (7 or 8), and 2 (9). This different rescoring of the broad sample is justified given the different pattern of responding to the GFM-9 items in this group, and is also reflected in the preregistration for this experiment:

"We do not yet know how the GFM-9 scores will be distributed in our group, so we will order the scores as those scoring 9 in the highest category (2), and then find a scoring threshold that cuts the remaining participants into two equally-sized groups, e.g. scores 8-7 (1), scores 6 or below (0). This will be as similar as possible to the analysis used in the previous study."

Independent variables in these regressions were a categorical variable for experimental condition, a binary vari-

able corresponding to their item 5 response (coded following the GFM, with 1 for "disagree", and 0 for "agree"), and an interaction term between these two variables. We planned to omit responses from any condition with item 5 accuracy rates of 95% or above due to a potential ceiling effect; however, none of these exclusions were required.

For this model, the predictions translated into a positive interaction in the good deeds condition, and a negative interaction in the positive attitude condition.

## Results

### Item 5 Responses

In the professional sample, 76.1% of participants selected "disagree" to item 5 in the control condition, which was shown as predicted to be significantly lower ( $z = 3.19$ ,  $p = .001$ ) than the 91.3% of participants in the good deeds condition, and significantly higher ( $z = -3.76$ ,  $p < .001$ ) than the 52.3% of participants in the positive attitude condition. In the broad sample, 76.6% of participants selected "disagree" to item 5 in the control condition, which was shown as predicted to be significantly lower ( $z = 5.7$ ,  $p < .001$ ) than the 90.5% of participants in the good deeds condition, and also significantly higher ( $z = -6.2$ ,  $p < .001$ ) than the 58.4% of participants in the positive attitude condition.

### Qualitative Analysis

Three main themes were indicated by the thematic analysis of open text responses to item 5 in the professional sample:

*A positive attitude can improve poker success.* Participants ( $n = 68$ ) emphasized that poker was a unique gambling game, where it is important to think strategically and avoid emotion-driven decisions, known to poker players as "tilt":

"Agree only if 'gambling' means poker, which is a game of skill over the long run. Disagree if 'gambling' means games of chance. In poker, a positive attitude helps avoid 'tilt', i.e., a mindset that compromises optimal decision-making." (Participant 325, 1.5 equivalent years of professional experience)

*Good deeds do not affect gambling outcomes.* Participants ( $n = 66$ ) stated that superstitious beliefs cannot affect gambling outcomes, whether in poker or other formats, where statistical probabilities reign supreme:

"Gambling is based on probabilities and external factors cannot influence these probabilities." (Participant 1, 7.5 equivalent years of professional experience)

*Good deeds could create a positive attitude to indirectly improve poker success.* A few participants ( $n = 8$ ) had an interesting reason to agree to versions of item 5 containing the phrase "good deeds". This was not due to superstition, but due to an indirect path, whereby good deeds can put players in a more positive frame of mind, which then causes improvements in poker success:

"Doing good makes you feel good and that translates into feeling better about yourself and having a positive attitude when gambling." (Participant 161, 7.5 years of equivalent professional experience)

**Table 3. Regression analysis output predicting GFM-9 scores in each experiment**

Sample	Variable	Odds ratio	Z-score	P-value
Professional	Good deeds	0.19	-2.35	.019
	Positive attitude	0.89	-0.28	.777
	Item 5 response	1.04	0.09	.926
	Good deeds x Item 5 response	4.87	2.12	.034
	Positive attitude x Item 5 response	1.36	0.59	.554
Broad	Good deeds	0.48	-1.67	.095
	Positive attitude	1.63	2.03	.042
	Item 5 response	3.67	5.91	<.001
	Good deeds x Item 5 response	2.12	1.65	.100
	Positive attitude x Item 5 response	0.56	-2.06	.040

Note. Item 5 response coded in line with the GFM, where "disagree" is coded as 1 and agree as 0.

## Regression Analysis

Regression analysis output is shown in [Table 3](#). In the professional sample, there was a significant effect for good deeds, suggesting that participants in this condition had lower GFM-9 scores on average compared to the positive attitude condition ( $z = -2.35, p = .019$ ). There was also a significant positive interaction (interpreted below) between the good deeds condition and the item 5 response ( $z = 2.12, p = .034$ ). In the broad sample, there was a significant effect for positive attitude ( $z = 2.03, p = .042$ ), suggesting that participants in this condition had higher GFM-9 scores on average compared to the good deeds condition. There was also a significant effect for item 5 response ( $z = 5.91, p < .001$ ), suggesting that participants who selected "disagree" across the three versions of item 5 had higher GFM-9 scores than participants who selected "agree". There was also a significant negative interaction between the positive attitude condition and the item 5 response ( $z = -2.06, p = .040$ ).

These two significant interaction terms can be interpreted by showing the predicted probabilities from these models of participants scoring perfectly on the GFM-9, broken down by the three experimental conditions and whether they selected "agree" or "disagree" to their version of item 5, as shown in [Table 4](#). For the professional sample, there was a difference in this predicted probability of .010 in the control condition, .303 in the good deeds condition, and .086 in the positive attitude condition. Selecting "disagree" to item 5 was positively associated with GFM-9 scores in the good deeds condition, as revealed by that positive interaction effect. For the broad sample, there was a difference in this predicted probability of .059 in the control condition, .072 in the good deeds condition, and .038 in the positive attitude condition. Selecting "disagree" to item 5 was associated with an increase in participants' GFM-9 scores in all three conditions, but this association was significantly weaker in the positive attitude condition, as revealed by the negative interaction effect.

## Discussion

Gambling fallacies are irrational beliefs about gambling that are associated with disordered gambling (Ladouceur & Walker, 1996), and measured by self-report questionnaires like the GFM (Leonard, Williams, et al., 2015). In a previous study skilled poker players had higher GFM scores than amateur players, except for item 5 which both groups answered correctly at the same rate (Newall & Zhu, 2023). The present research experimentally manipulated item 5, via two new items focusing on good deeds and a positive attitude, and by associating these responses with the GFM-9 in professional and broad samples of poker players. Professionals had higher GFM-9 scores than broad sample participants; participants in both samples were in comparison to the control less likely to disagree with the positive attitude item, and more likely to disagree with the good deeds item. In the professional sample, responses on the good deeds item were most consistent with GFM-9 scores. In the broad sample, all versions of item 5 were consistent with GFM-9 scores, but the association was significantly weaker in the positive attitude condition. The thematic analysis of professionals' item 5 responses was consistent with how a positive attitude could improve poker outcomes by reducing "tilt" (Palomäki et al., 2013), with no superstitious beliefs about good deeds directly affecting gambling outcomes, but with a few participants suggesting an indirect effect mediated by good deeds' effect on a positive attitude. Interestingly, participants in both samples had similar rates of disagreement for each version of item 5. Overall, these results suggest that the good deeds version of item 5 has advantageous measurement properties compared to the original version among professional poker players, while presenting no disadvantageous measurement properties among broad samples of poker players.

These results have other implications for the study of rational gambling cognitions among skill-based gamblers. While GFM scores were higher in the professional sample, the GFM is subject to ceiling effects among skilled/professional players (Newall & Zhu, 2023), suggesting that bespoke scales need developing for these groups. The GFM has acceptable levels of scale reliability for gamblers gen-

**Table 4. Predicted probability of participants scoring perfectly on the GFM-9, depending on their sample, their experimental condition, and whether they agreed or disagreed with their version of item 5.**

Sample	Control		Good deeds		Positive attitude	
	Agree	Disagree	Agree	Disagree	Agree	Disagree
Professional	.441	.451	.133	.436	.412	.498
Broad	.024	.083	.012	.084	.038	.076

erally, with a coefficient omega of .66 for the GFM in one large recent study (Shaw et al., 2022). Scale reliability as measured by coefficient omega was lower in the present research's professional sample, at .36 for the GFM in the control condition. Some professionals responded to the forum recruitment post arguing for plausible alternative correct answers to some GFM-9 items. For example, for item 8, "Which game can you consistently win money at if you use the right strategy?" (correct answer, "none of the above"), "slot machines" was argued for, as slot machines can present opportunities to win money over time when high progressive jackpots are on offer (Sklansky & Malmuth, 1998). Arguably, if "incorrect" answers provided by a professional sample are not reflective of irrational cognitions, and instead reflect a plausible alternative "rational" explanation, then these may well be more idiosyncratic than truly irrational response. Additional research is needed to better understand skilled gamblers' reasons for giving various responses across GFM-9 items (for example, a systematic qualitative survey).

A novel gambling cognitions scale might benefit from focusing on skilled gamblers' *rational* cognitions. Previously reported patterns include successful poker professionals' tendency to not just avoid non-poker forms of gambling, but to even avoid other poker formats, while focusing on only their given speciality, such as in-person no-limit hold 'em tournaments (Newall & Talberg, 2023). By contrast, disordered gamblers who self-describe themselves as professionals tend to engage in many gambling formats (Hing et al., 2016), just like other disordered gamblers tend to (Brosowski et al., 2012). Successful poker professionals also tend to reflect openly on their skill and see developing expertise as a continuing practice (Newall & Talberg, 2023), an "active open-minded" thinking style (Baron, 2008), that could also set them apart from disordered gamblers.

The present findings are subject to various limitations. Participants in both samples engaged with short online experiments, and mischievous or inattentive responding could have affected data quality, given the lack of incentive-compatible rewards. Participants were selected based on their engagement with only one skill-based gambling format, and other patterns could occur among for example skilled sports bettors, where "tilt" has also been suggested by researchers as a potential consideration (Torrance et al., 2022). Future research should therefore investigate similar issues among skilled/professional sports bettors. The findings are also relevant to only the GFM, and other measures of irrational cognitions could yield different patterns among skill-based gamblers (Russell et al., 2019). Further replication in larger samples of skilled gamblers would

make other analyses, such as factor analysis, feasible, which were not possible given the multiple sub-groups within each experiment conducted here.

In conclusion, this study contributed to our understanding of rational and irrational gambling cognitions among different groups of gamblers. Specifically, item 5 of the GFM would benefit from being rephrased to say only "Doing good deeds increases your likelihood of winning money when gambling" for highly-skilled/professional poker players, and this recommendation is supported by both quantitative and qualitative analysis among this group. For the broad sample, we did not see clear (only directional and non-significant) benefits from this rephrasing of item 5, but the alternative rephrasing, which focused only on a positive attitude, was significantly less strongly associated with GFM-9 scores compared to the control. Overall, this suggests that the words "a positive attitude" may add some unwanted response noise to item 5, and we would suggest that the same rephrasing that we suggest for highly-skilled/professional poker players is unlikely to cause measurement issues among other groups of gamblers. Further research among other groups of gamblers may in time add to this tentative suggestion.

### Author Contributions

PN performed the quantitative analysis and drafted the article. JT performed the qualitative analysis and provided critical edits.

### Competing Interests

Philip Newall is a member of the Advisory Board for Safer Gambling – an advisory group of the Gambling Commission in Great Britain, and in 2020 was a special advisor to the House of Lords Select Committee Enquiry on the Social and Economic Impact of the Gambling Industry. In the last three years, Philip Newall has contributed to research projects funded by the Academic Forum for the Study of Gambling, Clean Up Gambling, Gambling Research Australia, NSW Responsible Gambling Fund, and the Victorian Responsible Gambling Foundation. Philip Newall has received travel and accommodation funding from Alberta Gambling Research Institute, and received open access fee funding from Gambling Research Exchange Ontario.

In the last three years, Jamie Torrance has received research and travel funding from the Academic Forum for the

Study of Gambling. Jamie has also received open access fee funding from Gambling Research Exchange Ontario.

### Funding Declaration

This research was funded by a startup grant awarded to Philip Newall by the University of Bristol.

### Data Accessibility Statement

Materials, data, and the preregistration document are available from <https://osf.io/qy562/>

Submitted: September 29, 2023 PDT, Accepted: October 09, 2023 PDT



This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CCBY-4.0). View this license's legal deed at <http://creativecommons.org/licenses/by/4.0> and legal code at <http://creativecommons.org/licenses/by/4.0/legalcode> for more information.

## References

- Angelo, T. (2007). *Elements of poker*. Tommy Angelo LLC.
- Ayton, P., & Fischer, I. (2004). The hot hand fallacy and the gambler's fallacy: Two faces of subjective randomness? *Memory & Cognition*, *32*(8), 1369–1378. <https://doi.org/10.3758/bf03206327>
- Baron, J. (2008). *Thinking and deciding* (4th ed.). Cambridge University Press.
- Bjerg, O. (2010). Problem gambling in poker: Money, rationality and control in a skill-based social game. *International Gambling Studies*, *10*(3), 239–254. <https://doi.org/10.1080/14459795.2010.520330>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Breen, R. B., & Zuckerman, M. (1999). "Chasing" in gambling behavior: Personality and cognitive determinants. *Personality and Individual Differences*, *27*(6), 1097–1111. [https://doi.org/10.1016/s0191-8869\(99\)00052-5](https://doi.org/10.1016/s0191-8869(99)00052-5)
- Brosowski, T., Meyer, G., & Hayer, T. (2012). Analyses of multiple types of online gambling within one provider: An extended evaluation framework of actual online gambling behaviour. *International Gambling Studies*, *12*(3), 405–419. <https://doi.org/10.1080/14459795.2012.698295>
- Clark, L., & Wohl, M. J. A. (2021). Langer's illusion of control and the cognitive model of disordered gambling. *Addiction*, *117*(4), 1146–1151. <https://doi.org/10.1111/add.15649>
- Dixon, M. R. (2000). Manipulating the illusion of control: Variations in gambling as a function of perceived control over chance outcomes. *The Psychological Record*, *50*(4), 705–719. <https://doi.org/10.1007/bf03395379>
- Goodie, A. S., & Fortune, E. E. (2013). Measuring cognitive distortions in pathological gambling: Review and meta-analyses. *Psychology of Addictive Behaviors*, *27*(3), 730–743. <https://doi.org/10.1037/a0031892>
- Hayano, D. M. (1982). *Poker faces: The life and work of professional card players*. University of California Press.
- Hing, N., Russell, A. M. T., Gainsbury, S. M., & Blaszczynski, A. (2016). A case of mistaken identity? A comparison of professional and amateur problem gamblers. *Journal of Gambling Studies*, *32*(1), 277–289. <https://doi.org/10.1007/s10899-015-9531-4>
- Joukhador, J., MacCallum, F., & Blaszczynski, A. (2003). Differences in cognitive distortions between problem and social gamblers. *Psychological Reports*, *92*(3), 1203–1214. <https://doi.org/10.2466/pr0.92.3.1203-1214>
- Laakasuo, M., Palomäki, J., & Salmela, M. (2016). Poker players with experience and skill are not "ill" – Exposing a discrepancy in measures of problem gambling. *Journal of Gambling and Commercial Gaming Research*, *1*, 1–18. <https://doi.org/10.17536/jgcgr.2016.001>
- Ladouceur, R., Gaboury, A., Dumont, M., & Rochette, P. (1988). Gambling: Relationship Between the Frequency of Wins and Irrational Thinking. *The Journal of Psychology*, *122*(4), 409–414. <https://doi.org/10.1080/00223980.1988.9915527>
- Ladouceur, R., & Walker, M. (1996). A cognitive perspective on gambling. In P. M. Salkovskis (Ed.), *Trends in cognitive and behavioural therapies* (pp. 89–120). Wiley-Blackwell.
- Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology*, *32*(2), 311–328. <https://doi.org/10.1037/0022-3514.32.2.311>
- Leonard, C. A., Staples, J., & Williams, R. J. (2015). Development and validation of the Poker Skills Measure (PSM). *Journal of Gambling Studies*, *31*(3), 849–866. <https://doi.org/10.1007/s10899-014-9475-0>
- Leonard, C. A., & Williams, R. J. (2015). Characteristics of Good Poker Players. *Journal of Gambling Issues*, *31*(31), 45. <https://doi.org/10.4309/jgi.2015.31.5>
- Leonard, C. A., & Williams, R. J. (2016). The relationship between gambling fallacies and problem gambling. *Psychology of Addictive Behaviors*, *30*(6), 694–704. <https://doi.org/10.1037/adb0000189>
- Leonard, C. A., Williams, R. J., & Vokey, J. (2015). Gambling fallacies: What are they and how are they best measured. *Journal of Addiction Research & Therapy*, *6*(4). <https://doi.org/10.4172/2155-6105.1000256>
- Lim, M. S. M., & Rogers, R. D. (2020). Simulated die-rolling behaviours express illusions of control in regular gamblers. *International Gambling Studies*, *20*(1), 57–79. <https://doi.org/10.1080/14459795.2019.1652668>
- Malmuth, M. (2015). *Real poker psychology*. Two Plus Two Publishing.
- McInnes, A., Hodgins, D. C., & Holub, A. (2014). The Gambling Cognitions Inventory: Scale development and psychometric validation with problem and pathological gamblers. *International Gambling Studies*, *14*(3), 410–431. <https://doi.org/10.1080/14459795.2014.923483>
- Newall, P. W. S., & Talberg, N. (2023). Elite professional online poker players: Factors underlying success in a gambling game usually associated with financial loss and harm. *Addiction Research & Theory*, 1–12. <https://doi.org/10.1080/16066359.2023.2179997>
- Newall, P. W. S., & Zhu, J.-Q. (2023). Skilled poker players provide more accurate responses than amateur poker players to the Gambling Fallacies Measure. *Journal of Gambling Issues*. <https://doi.org/10.4309/nfyv4596>



- Palomäki, J., Laakasuo, M., Cowley, B. U., & Lappi, O. (2020). Poker as a domain of expertise. *Journal of Expertise*, 3(2).
- Palomäki, J., Laakasuo, M., & Salmela, M. (2013). 'This is just so unfair!': A qualitative analysis of loss-induced emotions and tilting in on-line poker. *International Gambling Studies*, 13(2), 255–270. <http://doi.org/10.1080/14459795.2013.780631>
- Potter van Loon, R. J. D., van den Assem, M. J., & van Dolder, D. (2015). Beyond chance? The persistence of performance in online poker. *PLoS One*, 10(3), e0115479. <https://doi.org/10.1371/journal.pone.0115479>
- Raylu, N., & Oei, T. P. S. (2004). The Gambling Related Cognitions Scale (GRCS): Development, confirmatory factor validation and psychometric properties. *Addiction*, 99(6), 757–769. <https://doi.org/10.1111/j.1360-0443.2004.00753.x>
- Rosecrance, J. (1988). Professional horse race gambling: Working without a safety net. *Work and Occupations*, 15(2), 220–236. <https://doi.org/10.1177/0730888488015002005>
- Russell, A. M. T., Hing, N., & Browne, M. (2019). Risk factors for gambling problems specifically associated with sports betting. *Journal of Gambling Studies*, 35(4), 1211–1228. <https://doi.org/10.1007/s10899-019-09848-x>
- Schoonmaker, A. N. (2000). *The psychology of poker*. Two Plus Two Publishing.
- Schüll, N. D. (2016). Abiding chance: Online poker and the software of self-discipline. *Public Culture*, 28(3), 563–592. <https://doi.org/10.1215/08992363-3511550>
- Shaw, C. A., Hodgins, D. C., Williams, R. J., Belanger, Y. D., Christensen, D. R., el-Guebaly, N., McGrath, D. S., & Stevens, R. M. G. (2022). Gambling in Canada During the Pandemic: 6 Months After the National COVID Lockdown. *Canadian Journal of Addiction*, 13(3), 36–45. <https://doi.org/10.1097/cxa.00000000000000157>
- Sklansky, D., & Malmuth, M. (1998). *Gambling for a living: How to make \$100,000 a year*. Two Plus Two Publishing.
- Slepian, M. L., Young, S. G., Rutchick, A. M., & Ambady, N. (2013). Quality of professional players' poker hands is perceived accurately from arm motions. *Psychological Science*, 24(11), 2335–2338. <https://doi.org/10.1177/0956797613487384>
- Steenbergh, T. A., Meyers, A. W., May, R. K., & Whelan, J. P. (2002). Development and validation of the Gamblers' Beliefs Questionnaire. *Psychology of Addictive Behaviors*, 16(2), 143–149. <https://doi.org/10.1037/0893-164x.16.2.143>
- Talberg, O. N. (2018). Don't talk to them, they will not understand: How poker players experience criticism and stigma. *Journal of Gambling Issues*, 39. <https://doi.org/10.4309/jgi.2018.39.10>
- Tendler, J., & Carter, B. (2011). *The mental game of poker: Proven strategies for improving tilt control, confidence, motivation, coping with variance, and more*. Jared Tendler LLC.
- Torrance, J., Roderique-Davies, G., Greville, J., O'Hanrahan, M., Davies, N., Sabolova, K., & John, B. (2022). Conceptualising emotional and cognitive dysregulation amongst sports bettors; an exploratory study of 'tilting' in a new context. *PLoS One*, 17(2), e0264000. <https://doi.org/10.1371/journal.pone.0264000>
- Zhu, J.-Q., Newall, P. W. S., Sundh, J., Chater, N., & Sanborn, A. N. (2022). Clarifying the relationship between coherence and accuracy in probability judgments. *Cognition*, 223, 105022. <https://doi.org/10.1016/j.cognition.2022.105022>

## Supplementary Materials

### Peer Review History

Download: [https://collabra.scholasticahq.com/article/89007-having-a-positive-attitude-or-doing-good-deeds-an-experimental-investigation-of-poker-players-responses-to-the-gambling-fallacies-measure/attachment/183880.docx?auth\\_token=rCBtejl\\_st3bbyit9E5B](https://collabra.scholasticahq.com/article/89007-having-a-positive-attitude-or-doing-good-deeds-an-experimental-investigation-of-poker-players-responses-to-the-gambling-fallacies-measure/attachment/183880.docx?auth_token=rCBtejl_st3bbyit9E5B)

---