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Equivalent gambling warning labels are perceived differently

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ABSTRACT

Background and Aims The same information may be perceived differently, depending on how it is described. The risk information given on many gambling warning labels tends to accentuate what a gambler might expect to win, e.g. 'This game has an average percentage payout of 90%' (return-to-player), rather than what a gambler might expect to lose, e.g. 'This game keeps 10% of all money bet on average' (house-edge). We compared gamblers' perceived chances of winning and levels of warning label understanding under factually equivalent return-to-player and house-edge formats. **Design** Online surveys: experiment 1 was designed to test how gamblers' perceived chances of winning would vary under equivalent warning labels, and experiment 2 explored how often equivalent warning labels were correctly understood by gamblers. **Setting** United Kingdom. **Participants** UK nationals, aged 18 years and over and with experience of virtual on-line gambling games, such as on-line roulette, were recruited from an on-line crowd-sourcing panel (experiment 1, $n = 399$; experiment 2, $n = 407$). **Measurements** The main dependent variables were a gambler's perceived chances of winning on a seven-point Likert scale (experiment 1) and a multiple-choice measure of warning label understanding (experiment 2). **Findings** The house-edge label led to lower perceived chances of winning in experiment 1, $F_{(1, 388)} = 19.03$, $P < 0.001$. In experiment 2, the house-edge warning label was understood by more gamblers [66.5, 95% confidence interval (CI) = 60.0%, 73.0%] than the return-to-player warning label (45.6%, 95% CI = 38.8%, 52.4%, $z = 4.22$, $P < 0.001$). **Conclusions** House-edge warning labels on electronic gambling machines and on-line casino games, which explain what a gambler might expect to lose, could help gamblers to pay greater attention to product risk and would be better understood by gamblers than equivalent return-to-player labels.

Keywords Behavioural science, electronic gambling machines, framing effect, house-edge, return-to-player, risk communication.

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INTRODUCTION

Firms use their marketing to present their products in the best light possible. For example, food packaging will often state that an item is, for instance, '90%-fat-free', which sounds more attractive than the equivalent description of '10%-fat'. Although these descriptions are factually equivalent, food products are evaluated more positively with the 90%-fat-free description than with the 10%-fat description [1,2]. This is an example of a 'framing' effect, where judgements are influenced by how information is described [3]. Here we explore a potential framing effect relevant to gambling warning labels. The United Kingdom's gambling regulator, the Gambling Commission, states that remote virtual gambling games, such as on-line roulette, must provide 'information that may reasonably be expected to enable the customer to make an informed decision about his or her chances of winning' ([4] p. 12). Among the options allowed by the Gambling Commission are two equivalent frames for the gambler's chances of winning: the 'return-to-player' and 'house-edge' percentages.

Despite this regulatory flexibility, only the return-to-player format seems to be in current widespread use, e.g. 'This game has an average percentage payout of 90%'. A return-to-player of 90% means that for every £100 wagered, the gambler will receive an average of £90 back. The same information communicated as a house-edge would instead state that the game keeps an average of £10 per £100 wagered. Therefore, return-to-player and house-edge are factually equivalent frames [5]. Both are

allowed by the Gambling Commission for virtual on-line gambling [4] and yet, in practice, only return-to-player framing appears to be in use.

There is some evidence that gamblers struggle to understand return-to-player information. A survey of 25 UK electronic gambling machine (EGM) gamblers found that only 24% correctly answered a four-alternative multiple-choice question on return-to-player information correctly [6]. This failure is worrying, given that the return-to-player is also displayed on UK EGMs [7]. A qualitative survey of Canadian EGM gamblers similarly found widespread misunderstanding around the return-to-player, [8] as has other qualitative work from the UK [9]. Return-to-player information is also displayed by law on EGMs in the Australian state of Victoria [10]. An experimental study of Australian undergraduates also found a widespread misunderstanding of the return-to-player [10].

This paper investigates the issue of equivalently framed gambling warning labels experimentally. Participants were either given a return-to-player wording or a novel house-edge reframing of the same information, e.g. 'This game keeps 10% of all money bet on average'. For each experiment, a pre-registered hypothesis and analysis plan, study materials, results and analysis output files are available from https://osf.io/7avnz/. Experiment 1 was run on 31 May 2019, where it was hypothesized that house-edge framing would lead to a lower perceived chance of winning than return-to-player framing across a range of typical average payouts. Experiment 2 was run on 2 June 2019, where it was hypothesized that gamblers would answer a four-alternative multiple-choice question correctly more often with a house-edge than return-to-player label.

EXPERIMENT 1

Participants

A total of 399 UK nationals aged 18 years or older were recruited via Prolific Academic and paid £0.50 each. Participants took an average of 3.3 minutes to complete the study, so this translated to £9.09/hour. Participants were 50.5% female (0.75% preferred not to answer), had a mean age of 33.9 years (SD = 10.9), a mean problem gambling severity index of 3.7 (SD = 4.7) and gambled an average of 58.0 days during the last year (SD = 80.4). No other demographic information was collected.

Participants had earlier indicated to Prolific Academic that they had experience in playing at least one on-line virtual casino gambling game.

Design and materials

Using G*Power version 3.1, [11] with the design below, we estimated that to achieve 95% power, with alpha = 0.01, three measurements (corr = 0.5) and a small effect size ($f = 0.10$), at least 347 participants were required.

On each trial participants were presented with some short introductory text about on-line gambling and then a warning label. Figure 1a shows an example from the return-to-player condition.

Throughout three trials, the magnitude of the house-edge (return-to-player) was varied to check whether any potential framing effect was moderated by average payout size. These were: 5 (95%), 10 (90%) and 15% (85%), respectively. These percentage values were based on the existing norms for gambling products. Prior EGM research suggests a house-edge range of 5–9% (US [12]), 4–15% (Canada [13]) and 7–15% (Australia [14]).

Procedure

Participants were randomly allocated to either the return-to-player or house-edge condition and completed the three trials in random order. Participants then completed an attention check with the same warning label, but where the percentage corresponded to 95% in the house-edge condition and 5% in the return-to-player condition (which are implausibly unfair games). Our pre-registered analysis plan states that any participant giving a higher perceived winning chance on this attention check than on any previous trial would be excluded from the analysis, as they may not have been paying attention.

After the main experimental trials, age, gender, return-to-player warning label understanding, problem gambling severity index (PGSI) [15] and last-year gambling frequency ('On how many days over the last 12 months have you gambled?') were collected in random order. The measure of return-to-player warning label understanding (which was given to participants in both conditions) is shown in Fig. 1b (correct answer: 'For every £100 bet on this game about £90 is paid out in prizes').

Measures

The dependent variable was the gambler's perceived chances of winning, as measured by a seven-point Likert scale (see Fig. 1a).

Results

In total, nine participants failed the attention-check question, and were excluded from the analysis (four in the house-edge condition and five in the return-to-player condition).

Data were analysed using a mixed-effects model, to account for the shared variance between a participant's responses across different trials. Responses were regressed on the independent variables of framing (two levels, between-participants) and magnitude (three levels,

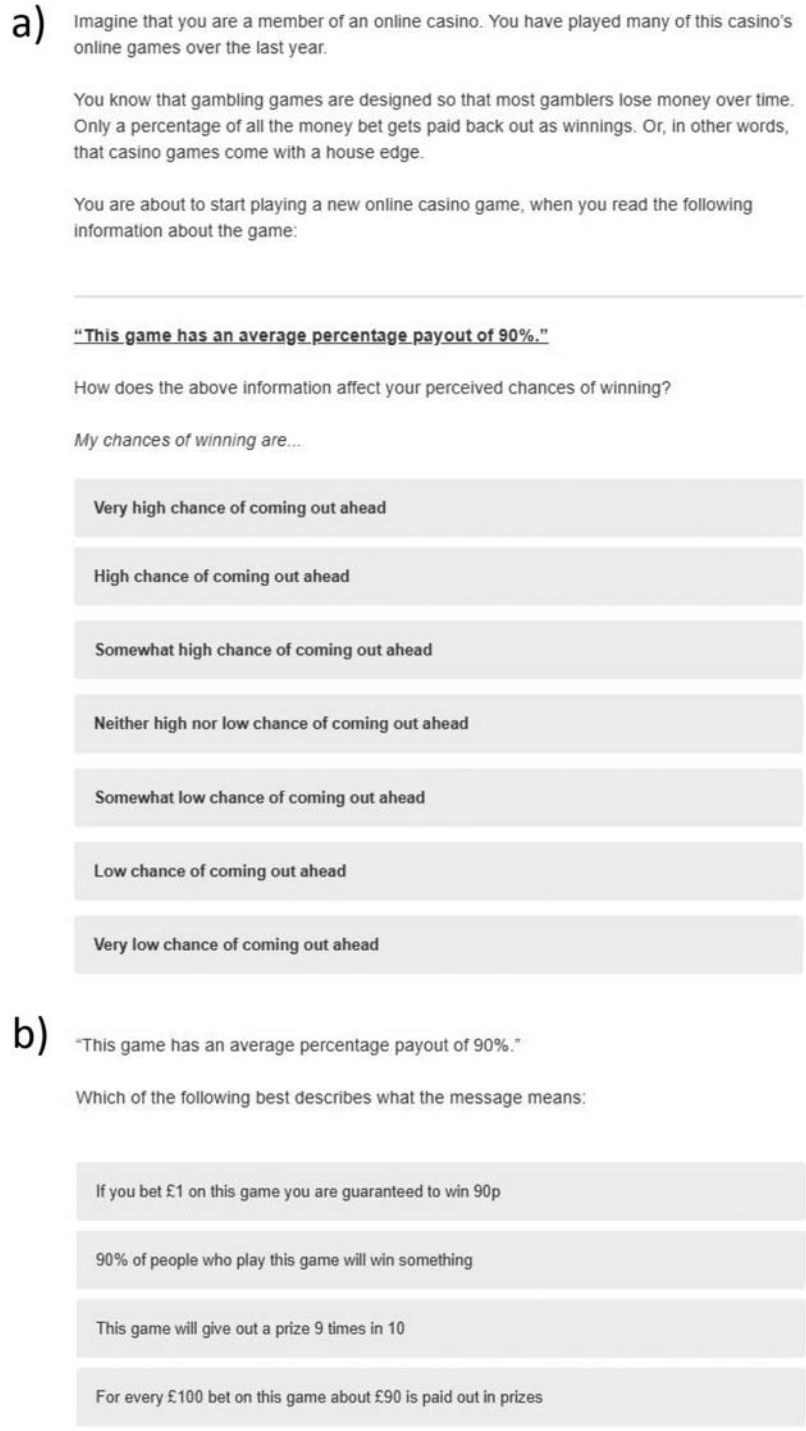

Figure 1 Example of the (a) main stimulus screen and (b) measure of return-to-player understanding. The main stimulus screen (a) looked identical to participants in both conditions, except in the house-edge condition the main label was altered to, e.g. 'This game keeps 10% of all money bet on average'. Participants in both conditions answered the measure of warning label understanding as shown in (b)

within-participants) and their interaction. In addition, a random intercept for participants was included in the model. The fitting was performed using the afex package [16] in R.

Figure 2 presents the mean perceived chance of winning across all levels of the factors. Error bars in the figure depict 95% confidence intervals (CIs) based on the model fit. There was a significant effect of condition, $F_{(1, 388)} = 19.03$, $P < 0.001$, showing that perceived chances of winning were higher under the return-to-player frame. There was also a significant effect of magnitude, $F_{(2, 776)} = 244.85$, $P < 0.001$, showing that perceived chances

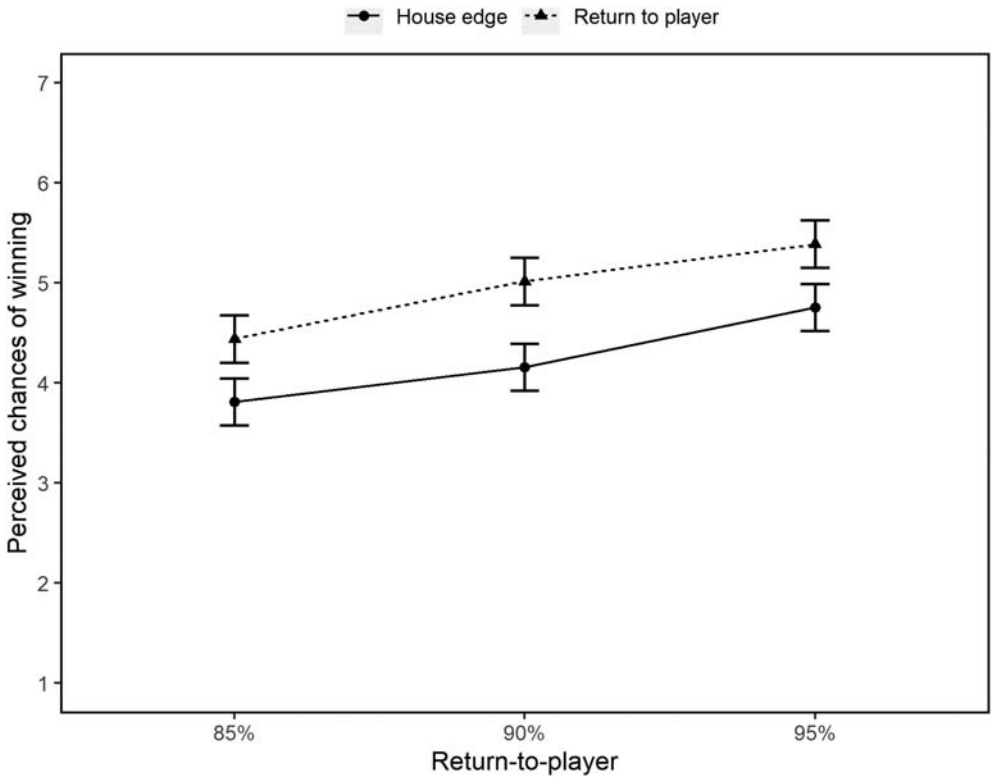

Figure 2 Mean perceived chance of winning in experiment 1. Perceived chances of winning: 7 = very high chance of coming out ahead, 4 = neither high nor low chance of coming out ahead, 1 = very low chance of coming out ahead. Error bars represent 95% confidence intervals

of winning were higher for higher values of the return-to-player. The interaction between the two variables was significant, $F_{(2,\ 776)} = 4.74$, $P = 0.009$. Despite this interaction, inspection of the means in Fig. 2 shows that responses differed significantly between the two conditions across all magnitude levels.

An additional model was run to observe if these effects remained if gamblers' characteristics were taken into account. The model included fixed effects of PGSI and gambling frequency. We tested for the presence of significant two-way interactions between magnitude, condition, PGSI and gambling frequency. An analysis of variance (ANOVA) table is displayed in Table 1. As can be seen, the only new statistically significant interaction term was between PGSI and condition ($F = 5.34$, $P = 0.021$). Closer inspection of the marginal effects revealed a trend such that those with higher PGSI scores gave higher responses in the house-edge condition (marginal trend = 0.21, 95%

Table 1 Mixed-model analysis of variance (ANOVA) table.

	Model 1		*Model 2*	
Variable	*F-value*	*P-value*	*F-value*	*P-value*
Condition	19.03	(< 0.001)	21.15	0
Magnitude	244.85	(< 0.001)	245.72	(< 0.001)
Magnitude × condition	4.74	(0.009)	4.92	(0.008)
Problem gambling severity			< 0.01	(0.994)
Gambling frequency			5.94	(0.015)
Problem gambling severity × condition			5.34	(0.021)
Gambling frequency × condition			0.04	(0.843)
Problem gambling severity × magnitude			2.25	(0.106)
Gambling frequency × magnitude			1.18	(0.307)
Problem gambling severity × Gambling frequency			0.42	(0.517)

F-values and *P*-values in parentheses, for a model that compares experimentally manipulated variables (model 1) and a model that adds individual difference variables and two-way interactions (model 2), showing main effects and interactions, with interactions denoted by *.

CIs = −0.06; 0.48), but lower responses in the return-to-player condition (marginal trend = −0.21, 95% CIs = −0.46; 0.04.

Overall, 47.4% of participants responded correctly to the multiple-choice question of return-to-player understanding. As can be seen in Table 2, the most-commonly given incorrect answers were: '90% of people who play this game will win something' (23.8%) and: 'This game will give out a prize 9 times in 10' (23.8%).

Discussion

Participants rated their perceived chances of winning as higher in the return-to-player condition than the house-edge condition. Perceived chances of winning are subjective, however, and hence there is no 'correct' response to experiment 1. Experiment 2 was designed to address this limitation, by assessing whether participants would answer the four-alternative multiple-choice question correctly more often with a house-edge than return-to-player label.

EXPERIMENT 2

In total, 407 participants were recruited (56.8% female, mean age = 33.7 years, mean PGSI = 3, SD = 4.6, mean days gambled over previous 12 months = 55.6, SD = 78.3). No other demographic information was collected. Participants were paid £0.25 and took an average of 2.0 minutes to complete the study, which translates to £7.50/hour. Participants were given either a return-to-player or house-edge warning label (both equivalent to a house-edge of 10%), and asked to complete the multiple-choice measure of understanding used in the previous experiment. In the previous experiment this measure of understanding was given to all participants with the return-to-player warning label only, but here understanding of both labels (return-to-player and house-edge) was assessed.

Results

In total, 66.5% (95% CI = 60.0%, 73.0%) of participants in the house-edge condition answered the understanding question correctly, which was shown by logistic regression to be significantly more than the 45.6% (95% CI = 38.8%, 52.4%) of participants in the return-to-player condition ($z = 4.22$, $P < 0.001$). Table 2 provides a breakdown of responses to this measure across the two experiments. The house-edge condition was associated with a large shift away from the incorrect response: 'This game will give out a prize 9 times in 10'.

A model was run to observe if this effect remained if gamblers' characteristics were taken into account. A logistic regression model was run controlling for PGSI and gambling frequency and including interaction terms between experimental condition and these two individual difference variables. There was an additional significant main effect of PGSI, whereby gamblers with higher PGSI levels were more likely to answer the question correctly in either label condition [$z = 2.18$, $P = 0.030$, odds ratio (OR) = 1.08]. However, neither the interaction term on PGSI severity ($z = -1.31$, $P = 0.190$) nor gambling frequency ($z = -0.60$, $P = 0.545$) was statistically significant. Therefore, the house-edge warning label was understood more clearly by all gamblers.

GENERAL DISCUSSION

The present findings contribute to the literature on gambling warning labels [17]. Gamblers' perceived chances of winning were significantly lower under the house-edge warning label than a return-to-player warning label in experiment 1. Perceived chances of winning are subjective, and hence there is no 'correct' response to experiment 1. Experiment 2 addressed this limitation, and showed that more gamblers correctly understood the house-edge label than the return-to-player label. Given the international evidence base showing that return-to-player information is frequently misunderstood, [6,8,10] these results suggest that it would be better to display house-edge information instead in jurisdictions such as the United Kingdom [4] or Victoria, Australia [10].

Measures of gambling behaviour in a realistic gambling task would help to provide further support to the practical policy relevance of these results. Warning labels on UK EGMs and virtual on-line gambling games, however, are currently only found on low-prominence help screens,

Table 2 Responses to the measure of warning label understanding.

Response	*Experiment 1*	*Experiment 2 (return-to-player condition)*	*Experiment 2 (house-edge condition)*
'90% of people who play this game will win something'	23.8%	18.1%	16.3%
'This game will give out a prize 9 times in 10'	23.8%	32.8%	10.3%
'If you bet £1 on this game you are guaranteed to win 90p'	5.0%	3.4%	6.9%
Correct response: 'For every £100 bet on this game about £90 is paid out in prizes'	47.4%	45.6%	66.5%

which many regular gamblers have not even seen [6]. Tobacco control research suggests that effective warning labels must be more prominent [18]. Additional changes may be required to yield measurable changes in gamblers' behaviour in real gambling environments. More research is also required for gamblers at the highest levels of problem gambling severity, and to explore other gambler subtypes who might respond differently to the framing manipulation.

While these results suggest that house-edge information is a better way to communicate gambling risks, even better information formats are surely possible. For example, graphical risk representations can be more effective than equivalent numerical information [19]. House-edge information might be even better understood with visual aids.

These results provide evidence for a novel framing effect in gambling warning labels. This further supports the view that gambling policy should reflect behavioural scientific insights [20–22].

Declaration of interests

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