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Not always as advertised: Different effects from viewing safer gambling (harm prevention) adverts on gambling urges

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ABSTRACT

Public concern around gambling advertising in the UK has been met not by government action but by industry self-regulations, such as a forthcoming voluntary ban on front-of-shirt gambling sponsorship in Premier League soccer. "Safer gambling" (harm prevention) adverts are one recent example, and are TV commercials which inform viewers about gambling-related harm. The present work is the first independent evaluation of safer gambling adverts by both gambling operators and a charity called GambleAware. In an online experiment, we observed the change in participants' (N = 2,741) Gambling Urge Scale (GUS) scores after viewing either: a conventional financial inducement gambling advert, a gambling operator's safer gambling advert, an advert from the GambleAware "bet regret" campaign, an advert from the GambleAware "stigma reduction" campaign, or a control advert that was not about gambling. Relative to a neutral control advert, GUS scores increased after viewing a financial inducement or an operator's safer gambling advert. In comparison to the neutral control condition, GUS score changes were similar after viewing a bet regret advert, but showed a significant decrease after viewing a stigma reduction advert. Those at higher risk of harm reported larger decreases in GUS after watching a bet regret or stigma reduction advert. Overall, this study introduced a novel experimental paradigm for evaluating safer gambling adverts, uncovered a potential downside from gambling operators' safer gambling adverts, and revealed variation in the potential effectiveness of charity-delivered safer gambling adverts.

1. Introduction

Widespread gambling advertising, especially around live televised sport, is common in many jurisdictions that have liberalized gambling (Binde, 2014; De Jans et al., 2023; Houghton et al., 2023; McGrane et al., 2023; Newall et al., 2019; Torrance et al., 2021). International research has found that gambling advertising tends to include certain specific themes, such as the promotion of "free bets" and other financial inducements (Di Censo et al., 2023; Hing et al., 2018; Killick & Griffiths, 2022; Lopez-Gonzalez et al., 2018). Gambling advertising has become so embedded in the UK that some adverts (commercials) are shown just to inform viewers about the potential harms of gambling, and these "safer gambling" (harm prevention) adverts have been shown by both gambling operators and by charities (Newall, Ferreira, et al., 2022; Sharman et al., 2023). While widespread gambling advertising is relatively recent in the US and Canada (Grubbs & Kraus, 2023; Wheaton et al., 2024), it has been established for longer in Australia and various European jurisdictions (Hing et al., 2023), which has led to some countries such as Spain and Belgium now imposing restrictions (De Jans et al., 2024; Ministerio de la Presidencia, 2020). The UK Government published a White Paper on gambling in April 2023 which contained many proposals for example on the regulation of online gambling products, but no similar restrictions on gambling advertising (DCMS, 2023). The White Paper specifically mentioned the gambling industry's various self-regulations – such as introducing safer gambling adverts – as a reason to avoid Belgium or Spain's stricter governmental restrictions. However, we are aware of no independent evaluations of safer gambling adverts, and this is relevant as other gambling self-regulations have fared poorly when evaluated.

As a term, safer gambling is used by a range of stakeholders to describe a range of interventions aimed to reduce gambling-related harm. Safer gambling has in recent years come to largely replace the

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term "responsible gambling", which is seen as shifting the task of harm-prevention from industry and government to gamblers instead (Livingstone, 2024). Some stakeholders might still view "safer gambling" term as being overly favorable to industry, though the term is commonly used by both the regulator (Gambling Commission, 2019) and the government (DCMS, 2023) in the UK. Nonetheless, terminology in the gambling field is still subject to development and improvement, in order to create as respectful a discourse as possible (Biggar & Wardle, 2024). Therefore, while we will largely use the term "safer gambling" in this paper to maintain consistency with the study's preregistration materials, we believe the term "harm prevention" is largely synonymous, and we are open to stakeholder feedback on the best terminology to use going forward.

As a first self-regulatory failure, major gambling operators began adding "safer gambling messages" to their adverts from 2014 onwards, which are short slogans aiming to inform gamblers about the risks of gambling (Rintoul, 2022). However, experimental evaluations of the two main messages used by UK-based gambling operators, "when the fun stops, stop" (Newall, Weiss-Cohen, et al., 2022), and "take time to think" (Newall, Hayes, et al., 2023), have suggested that they have no positive impact on immediate gambling behaviors. Second, a self-regulatory "whistle-to-whistle ban" has removed any TV advertising during live sport since 2018, but only covering the interval from 5-minutes before to 5-minutes after the relevant game. This means that between 4.5 (Newall, Ferreira, et al., 2022) and 5.2 adverts (Sharman et al., 2023) were shown across the entire broadcasts of televised men's international soccer tournaments on average. Third, in 2023 the top flight of men's professional soccer, the English Premier League, agreed to prevent gambling companies from being front-of-shirt sponsors from August 2026 onwards. This action was cited approvingly in the government's White Paper (DCMS, 2023). However, this would have only removed 7 % of the 1,500 gambling logos shown on average per-game during the 23/24 season, due to the preponderance of gambling logos on pitch-side billboards and in other locations (Torrance et al., 2023).

These examples reveal that self-regulatory gambling reforms should be evaluated independently, and we know of no such research on safer gambling adverts. Safer gambling adverts shown by gambling operators tend to focus on the availability of safer gambling tools such as deposit limits, and therefore adopt a "personal responsibility" lens toward preventing gambling-related harm, which has been previously critiqued (Hancock & Smith, 2017; Livingstone, 2024; Reith, 2008). Operator-led safer gambling adverts also contain the same branding and color schemes as conventional gambling adverts, suggesting that they could trigger urges or craving to gamble in a way that could undermine their intended purpose. Charity-funded safer gambling adverts have run for some years with their own branding which might be less likely to induce gambling urges, but with varying levels of face validity. In 2019, the charity GambleAware – which has been criticized for being funded by voluntary donations from the gambling industry (McCartney, 2023) – ran a campaign called "bet regret", featuring wrestlers and an attempted comic tone, which was criticized at the time by independent experts (Busby, 2019). By comparison, the same charity started a "stigma reduction" campaign in 2023, which was created using input from lived experience experts (GambleAware, 2023b), and which describes various first-person accounts of gambling-related harm, with arguably greater levels of face validity. GambleAware's technical report contains more detail on this campaign's development (GambleAware, 2023a). Any independent evaluation of safer gambling adverts should compare this full range of content.

The present research is an initial attempt to address these gaps. Our dependent measure was within-participant changes in the Gambling Urge Scale (Raylu & Oei, 2004). This scale measures instinctive cravings to gamble which can lead to unwanted gambling behavior or even relapses among abstinent gamblers (Oei & Gordon, 2008; Smith et al., 2015). Participants in an online experiment viewed either a control TV advert which was not about gambling, viewed a traditional gambling video advert with a financial inducement (which have been shown to affect other aspects of gambling behavior; Balem et al., 2021; Browne et al., 2019), or viewed a safer gambling adverts shown by either an operator or a charity. Financial inducement adverts are the most common type of conventional gambling advert (Newall, Ferreira, et al., 2022; Sharman et al., 2023), and may well induce gambling urges given the "free bets" that they can offer. In total there were five between-participants conditions, to evaluate both the bet regret and stigma reduction GambleAware campaigns. Our initial hypothesis was that the bet regret campaign might lead to increases in gambling urges, either due to its trivialisation of gambling harm or due to the effect that induced positive affective states can have on levels of risk-taking (Slovic et al., 2007). We thought that the stigma reduction campaign would be better than the bet regret campaign, but due to the scant previous evidence on effective safer gambling campaigns, we hypothesized that it would lead to no overall effect. Finally, as gambling operators' brands can act as triggers among gamblers experiencing high levels of harm, we thought that the operator adverts would interact with participants' Problem Gambling Severity Index (Ferris & Wynne, 2001) scores.

Gambling urges were measured before and after an advert was shown (pre-test and post-test, respectively). The following hypotheses were therefore preregistered with regards to the change in gambling urges (pre to post) as a result of being shown one of the adverts:

1. The change in gambling urges (pre to post) will be moderated by advert category, and we will use this same model to interpret any potentially significant differences between the different types of gambling adverts, in relation to the change (pre to post) from the non-gambling control adverts which will serve as a baseline:
   a. The financial inducement operator gambling adverts will lead to the highest increase in gambling urges (pre to post) in comparison to the change (pre to post) which followed from the non-gambling control adverts.
   b. The safer operator gambling advert will lead to a positive increase in gambling urges (pre to post) in comparison to the change (pre to post) which followed from the non-gambling control adverts.
   c. The bet regret comic charity adverts will lead to an increase in gambling urges (pre to post) in comparison to the change (pre to post) which followed from the non-gambling control advert.
   d. The stigma reduction charity adverts will not lead to an increase in gambling urges (pre to post) compared to the change (pre to post) which followed from the non-gambling control adverts
2. The change in gambling urges (pre to post) for participants exposed to the operator gambling adverts (both financial inducement and safer) will be moderated by PGSI.

2. Methods

Materials, data, analyses, and results are available from https://osf.io/dcey2/ and the preregistration can be seen in https://osf.io/xgt3p/. Ethical approval was obtained from the University of Bristol's School of Psychological Science Research Ethics Committee (#17625).

2.1. Participants

An initial sample of N = 2,924 UK-based participants, who had earlier reported experience in non-lottery online gambling formats to the panel provider, were recruited via Prolific, with the message "the purpose of this study is to investigate how you feel about gambling before and after watching some short video content." Of those who started, 123 did not finish the study, most of them failing the initial audio test, for a total of N = 2,801 who completed the study until the end. Preregistered exclusions resulted in five participants who failed a self-reported carelessness check (Brühlmann et al., 2020), and 55 participants who took longer than 3 standard deviations above the mean time to complete the study. These two exclusion criteria were

preregistered to help mitigate potential concerns around the findings from crowdsourced samples such as this being potentially driven by participant inattentiveness (Pickering & Blaszczynski, 2021). The exclusion of participants who took too long was chosen here as these participants may have no longer been influenced by the video they were shown. The final sample therefore consisted of N = 2,741 participants who had a mean age of 39.8 years (SD = 12.2); 1,508 (55.0 %) of whom were male, 1,224 (44.7 %) were female, six (0.2 %) were non-binary, and three (0.1 %) preferred not to say. Prolific only allows for pre-screening based upon online gambling participation. The sample distribution of self-reported engagement with online gambling modes is presented in Table 1. Forty percent of participants reported previous experience with online slots. Participants were paid £0.85 each, and took an average of 4.2 min (SD = 3.2) to complete the experiment (£12.14 an hour pro-rata). Data collection was conducted on 08/02/2024 and lasted five hours.

The average PGSI score was 3.06 (SD = 4.31) and participants were distributed across the four categories of PGSI according to their scores: no-risk (score of 0) = 36.5 %, low-risk (1 or 2) = 25.9 %, moderate-risk (3 to 7) = 25.5 %, and high-risk (8 or above) = 12.2 %. As follows other online samples, the present sample therefore had a relatively high proportion of high-risk gamblers in comparison to for example telephone surveys of gambling prevalence (Russell et al., 2021). Since higher PGSI scores are predictive of higher total amounts of time spent gambling (Rockloff, 2012), this recruitment method can be seen as a more cost-effective way of recruiting from the primary population of interest for gambling research studies, in comparison to the alternative of population-weighted recruitment approaches (Russell et al., 2021).

2.2. Experimental design

Post-consent, participants were first given two attempts to complete a sound test to show that their audio was working. Participants then completed an initial pre-test Gambling Urge Scale (GUS: Raylu & Oei, 2004) questionnaire, a widely-used six-item measure of gambling urges. Each question was answered on a 7-point Likert scale from "strongly disagree" to "strongly agree." This scale was chosen over alternative measures of gambling urges and cravings (Mallorquí-Bagué et al., 2023; Young & Wohl, 2009), as it is relatively brief, probes a single dimension of urges, and is widely-used in the literature.

Participants were then randomly allocated to one of five different advert categories, and randomly shown one of three 30-seconds adverts shown on UK television and available on YouTube within the advert category they were assigned to. Since it would be imprudent to make general claims based on only a single advert of each type, we selected three adverts for each experimental condition, to improve the generalizability of any findings (Yarkoni, 2022). The five advert categories were: control (furniture, instant coffee, wood preservative); financial inducement (shown by one of three major UK gambling operators); safer operator (shown by the three same major UK gambling operators, thereby controlling for brand recognition effects); bet regret (featuring wrestlers and first shown in 2019); and stigma reduction (first-person narratives and first shown in 2023). Participants were unable to proceed beyond this page until 30 s had elapsed and participants were unable to pause or fast forward the video. Although we cannot guarantee participants' level of attentiveness to the manipulated stimuli during this interval, other work using the same participant pool has observed significant effects at one-month follow-up in response to much longer seven-minute videos (Torrance et al., 2023). This suggests that participants should have been attentive to the much shorter videos shown here.

Participants then completed the post-test Gambling Urge Scale to record their post-manipulation level of gambling urges (Raylu & Oei, 2004). This pre- post-design has been used previously with the GUS (Ashrafioun et al., 2012; Park et al., 2015), and assuming that participants have some baseline level of gambling urges, allowed us to efficiently measure any potential increases or decreases in gambling urges following the experimental manipulation. Participants finally self-reported their age and gender, completed the PGSI (Ferris & Wynne, 2001), and completed the self-reported carelessness check (Brühlmann et al., 2020).

Table 1
Reported online gambling experience of the sample who answered the Prolific pre-screener question "what type of online gambling / casino games have you played."

Online Gambling mode[a]	*N* = 2,741 (%)
Baccarat	70 (2.6)
Blackjack	850 (31)
Bingo	1,466 (53.5)
Craps	85 (3.1)
Lottery[b]	1,602 (58.4)
Pachinko	77 (2.8)
Poker	843 (30.8)
Race & Sports Book	1,159 (42.3)
Roulette	837 (30.5)
Slots	1,083 (39.5)
Video poker	235 (8.6)
Virtual Sports Betting	437 (15.9)

Note: There was no specific time period mentioned in the Prolific question.

[a] Participants could choose more than one answer.

[b] Even though we filtered for participants who reported experience in non-lottery online gambling, some participants reported experience with lottery in addition to one or more other formats in this list.

2.3. Statistical analysis

The main dependent variable was the Gambling Urge Scale (GUS), calculated as the sum of six individual 7-point Likert-scale responses, each with a 0–6 range, for a total score range of 0–36. Because GUS scores were bounded, with a prominent floor effect with a large percentage (42 %) of participants responding with a zero score (i.e., the minimum possible level of urge to gamble), the variable did not fit a normal distribution. Instead, we converted the results into a (0, 1) scale by dividing the scores by 36, and fitted a model based on a beta distribution. Beta distributions are well-suited for bounded proportion responses to psychological questionnaires that can be expressed on a scale between 0 and 1 (Verkuilen & Smithson, 2012). As beta distributions cannot have values that are exactly equal to zero, we fitted a zero-inflated beta regression to the converted GUS scores, which accounted for the large proportion of responses equal to zero. Beta distributions also cannot have values that are exactly equal to one, but there were too few observations (0.2 %) at the maximum score to allow for a one-inflated model to be fitted, and therefore we changed the scores that were equal to 1 to be equal to 0.9999 (as per Smithson & Verkuilen, 2006). The use of alternative distributions such as a normal distribution or a beta distribution without zero inflation would lead to very similar conclusions reported here, but with worse model fits (see supplementary materials at https://osf.io/dcey2/ for the results from analyses using these other distributions).

Model 1: To test for Hypothesis 1 we fitted GUS scores converted into a (0, 0.9999) scale to a zero-inflated beta regression with two fixed predictors: advert category (with five levels: control, safer operator, financial inducement, bet regret, and stigma reduction) and timing of measurement (with two levels: pre- vs post-test, see Van Breukelen, 2013), and their interaction. Two random intercepts – one for each participant, and one for each of the 15 individual adverts – were included to allow for differences across stimuli and participants. Model 2: To test for Hypotheses 2 we added centered PGSI scores and their interactions with the other predictors to Model 1 from Hypotheses 1. All analyses were run on R version 4.3.2 (R Core Team, 2023) and the regressions were fitted using the glmmTMB package (Brooks et al., 2017).

To correct for multiple comparisons, we preregistered an alpha of 0.005 ($p < 0.005$). A parametric bootstrapping power analysis with 1000 simulations for each sample size showed that 2520 participants were required to achieve a power of 0.8 for hypothesis H2 (three-way interaction between PGSI, advert category, and timing of measurement), the lowest-powered of the two hypotheses (with alpha = 0.005).

3. Results

Zero-inflated models have two distinct components: the zero-inflation component (ZI), which is the probability of a participant responding with a zero score, modeled using a logistic binary regression; and the conditional response (CR), which is the score conditional on the participant providing a non-zero answer, modeled here using a beta distribution. It is important to note that *increases* in the zero-inflation percentages translate into *lower* urges to gamble, as they indicate higher likelihoods of responding with a zero. Estimated marginal means for both components from Model 1 are shown in Table 2. It shows that the overall main effect of timing of measurement across all advert categories was significant both for the zero-inflation ($\chi^2(1) = 77.68$, $p < 0.0001$) and conditional components ($\chi^2(1) = 30.25$, $p < 0.0001$), with an increase in probability of responding with a zero and reduction in conditional response from pre-test to post-test, equivalent to an overall reduction in urges.

Hypothesis 1 was confirmed via a significant interaction between advert category and timing of measurement in Model 1, both for the zero-inflation ($\chi^2(4) = 57.49$, $p < 0.0001$) and conditional response components ($\chi^2(4) = 253.34$, $p < 0.0001$). The changes in gambling urges from pre-test to post-test were moderated by the different advert categories, with significant differences between the different types of adverts (Table 2).

In the control condition, the probability of answering with a zero increased significantly (ZI: OR = 4.55, SE = 1.08, z = 6.37, $p < 0.0001$), and the conditional GUS scores decreased significantly (CR: OR = 0.80, SE = 0.03, z = 5.72, $p < 0.0001$), from pre-test to post-test (Table 2). Viewing a short 30-second neutral control advert that had nothing to do with gambling led to an overall baseline reduction in participants' gambling urges. This aspect of the results will be returned to in the Discussion. Tests of Hypothesis 1 are therefore evaluated by comparing the changes in each treatment condition to this overall downwards trend in the control condition. Results of these comparisons are in Fig. 1.

In comparison to the control condition, the largest significant increase in gambling urges occurred after viewing the financial inducement adverts (both in ZI and CR), confirming H1a. There was a large significant positive increase after the safer operator adverts (CR only), second largest only behind financial inducement adverts, confirming H1b. There was no difference in the change in gambling urges after the bet regret adverts, which was no better than a neutral control advert in reducing GUS scores. This change was lower than with the two operator adverts, but as there was no difference in comparison to the control adverts, there was only partial support for H1c. Finally, there was a significantly larger reduction in gambling urges with the stigma reduction adverts (CR only), confirming H1d.

Hypothesis 2 was tested via the three-way interaction between advert category, timing of measurement, and centered PGSI scores in Model 2, which was significant for the conditional component ($\chi^2(4) = 17.11$, $p = 0.002$) but not for the zero-inflation component ($\chi^2(4) = 8.37$, $p = 0.079$). PGSI scores moderated the change of non-zero GUS scores differently across the different advert categories (Table 3).

When evaluating each advert category individually, PGSI scores did not significantly moderate the changes in GUS scores for the control condition (Table 3). At our preregistered alpha of 0.005, only two GUS responses were significantly moderated by PGSI scores. First, the zero-inflation component for stigma reduction adverts was significantly positive (Table 3), which can be interpreted as participants with higher PGSI scores more likely to respond with a zero score post-test. Second, the conditional response component for the bet regret adverts was significantly negative (Table 3). For these adverts, participants with higher PGSI scores responded with lower urges to gamble post-test. Overall, it appears that PGSI scores moderated the change in responses to participants in the two charity categories (stigma reduction and bet regret), with participants with higher PGSI scores reporting a larger reduction in urges to gamble post-test. This is likely related to the overall main effect of PGSI scores on urges to gamble overall (ZI: $\chi^2(1) = 144.02$, $p < 0.0001$; CR: $\chi^2(1) = 707.22$, $p < 0.0001$): participants with higher PGSI scores reported higher overall urges to gamble across the board, as would be expected. As we observed some three-way interactions with PGSI but resulting from the charity adverts, not from the operator adverts as predicted, there was at best only partial support for Hypothesis 2.

As PGSI was measured after exposure to each advert, we conducted an additional exploratory analysis, which was not preregistered, to evaluate if different advert categories influenced PGSI scores. We used a negative binomial regression, also supported by the glmmTMB package in R, because PGSI scores do not follow a normal distribution. The new dependent variable was PGSI score, and the single predictor was advert category. There was no significant effect of advert category on PGSI scores ($\chi^2(4) = 5.72$, $p = 0.221$). The different advert category shown to participants did not result in different PGSI scores being measured (Estimated mean of PGSI scores and 99.5 % confidence intervals: control = 3.03 [2.54, 3.61], stigma reduction = 2.95 [2.47, 3.52], bet regret = 3.19 [2.68, 3.81], safer operator = 2.77 [2.32, 3.30], and financial inducement = 3.36 [2.83, 4.00]). None of the pairwise comparison differences were significant (Tukey-adjusted *p*-values > 0.176).

Table 2
Estimated marginal means (standard errors in brackets) for GUS scores from Model 1.

Advert category	Zero-inflation (ZI)		Conditional response (CR)	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Control	10.6 % (3.5 %)	34.9 % (7.9 %)	7.01 (0.38)	5.83 (0.34)
Stigma reduction	18.1 % (4.8 %)	71.8 % (6.4 %)	6.68 (0.37)	4.57 (0.29)
Bet regret	9.1 % (3.2 %)	32.2 % (7.7 %)	7.18 (0.38)	5.52 (0.32)
Safer operator	11.1 % (3.8 %)	21.6 % (6.3 %)	7.16 (0.38)	7.16 (0.39)
Financial inducement	5.6 % (2.2 %)	5.3 % (2.1 %)	7.26 (0.37)	9.36 (0.43)
Average	10.3 % (2.3 %)	28.5 % (4.1 %)	7.06 (0.17)	6.33 (0.16)

Note: Zero-inflation is the average probability to respond with a zero score. Conditional response is the average score conditional on the participant not responding with a zero.

4. Discussion

Gambling advertising in the UK has led to no government action as of the time of writing, but has instead led to various self-regulatory actions which have not performed well when evaluated independently (Newall, Weiss-Cohen, et al., 2022; Newall, Hayes, et al., 2023; Torrance et al., 2023). The present work is the first that we are aware of to independently evaluate safer gambling (harm prevention) adverts, a heterogeneous gambling harm intervention shown either by gambling operators or by charities. The novel online experimental paradigm used here involved participants completing the Gambling Urge Scale (GUS) either side of watching a short advert that has been shown on UK television, with the change in their GUS scores acting as the dependent variable. As many participants reported having no gambling urges when they first completed the GUS, and so were unable to report any further reductions in gambling urges, a two-step statistical model was used, which

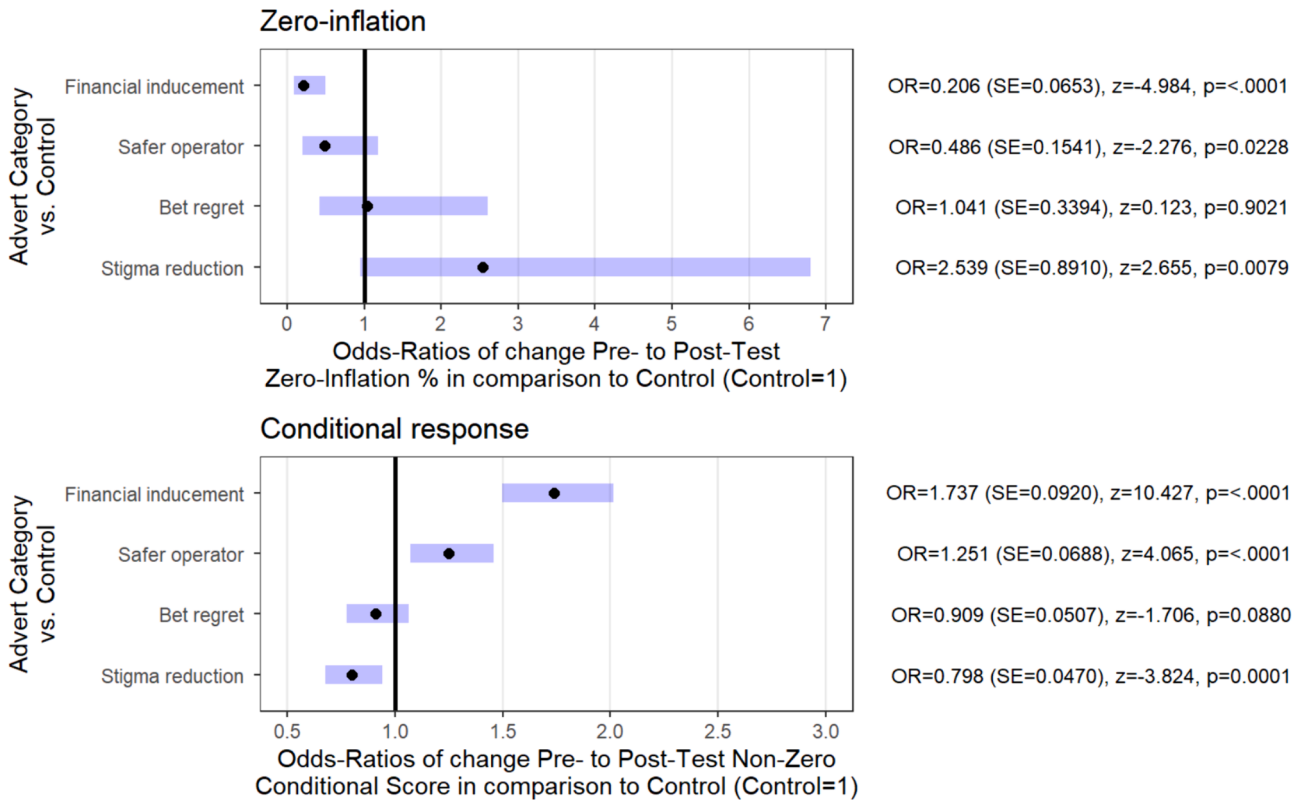

Fig. 1. Change in urges to gamble from pre-test to post-test for each treatment advert category in comparison to control. Top panel: zero-inflated component, or the probability to respond with a zero. Bottom panel: conditional response component, or the GUS score conditional on not answering with a zero. Results shown as Odds Ratios. OR = 1: no difference from control. OR > 1: increased more than control. OR < 1: decreased more than control. Bars are the 99.5 % confidence interval around the means.

Table 3
Slope of PGSI scores on change of GUS scores from pre-test to post-test for each advert category from Model 2.

Advert category	Zero-inflation			Conditional response		
	b (SE)	z	p	b (SE)	z	p
Control	−0.035 (0.084)	0.417	0.677	−0.016 (0.008)	2.032	0.042
Stigma reduction	**0.389 (0.215)**	**3.115**	**0.002**	−0.016 (0.008)	1.966	0.049
Bet regret	0.120 (0.108)	1.108	0.268	**−0.031 (0.008)**	**4.094**	**0<.0001**
Safer operator	0.065 (0.088)	0.740	0.460	−0.004 (0.008)	0.555	0.579
Financial inducement	0.032 (0.098)	0.330	0.742	0.010 (0.007)	0.1525	0.156

Note: Significant comparisons at p < 0.005 are highlighted in bold.

separately modeled their probability of reporting zero urges (zero-inflation) and positive urges (conditional response). As hypothesized, the safer gambling adverts shown by operators, with all of their usual branding, significantly increased gambling urges compared to the control condition. Contrary to our initial hypothesis, the stigma reduction charity adverts led to a significant reduction in gambling urges, a reduction which the interaction model showed occurred strongest among gamblers experiencing high levels of harm as measured by the PGSI. This evidence of effectiveness provides an important data point for the continual evolution of improved safer gambling adverts. However, the evaluation showed that the bet regret adverts had no significant effect on gambling urges, showing that non-industry design is not sufficient condition for safer gambling adverts to necessarily be effective. As expected, financial inducement adverts led to a significant increase in gambling urges, a finding which can be added to the literature on gambling advertising's effects on attitudes and behavior (Balem et al., 2021; Browne et al., 2019; Newall, Allami, et al., 2023; Newall et al., 2019; Torrance et al., 2021; Wardle et al., 2022).

The significant detrimental effect of the operator safer gambling advert was in part due to gambling urges falling in the control condition, rather than operator safer adverts leading to an increase in gambling urges in isolation. In absolute terms, gambling urges remained stable after watching the operator safer adverts, in comparison to a natural tendency of gambling urges to reduce over time. This mirrors related findings from previous research, where engaging in an academic study about gambling has potentially initiated self-reflection, and reduced self-reported levels of gambling expenditure over a period of weeks (Rockloff et al., 2024). This is an aspect of conducting online studies about gambling that should be subject to further research.

The present work has various implications for policy. It shows that non-industry design is not sufficient to guarantee effectiveness, due to the different results seen across the bet regret and stigma reduction campaigns. Involvement of experts-by-experience may be a more important contributor to effectiveness (Ortiz et al., 2021), as the stigma reduction campaign received this input during its design. These are important factors for the UK government to consider, as the

development of related independently-designed safer gambling messages formed one of the White Paper's recommendations (DCMS, 2023). Australia is another jurisdiction that has recently introduced independently-designed safer gambling messages (Chapman & Priestly, 2022), and this suggests that the further design of messages and related informational interventions in that jurisdiction could also benefit from expert-by-experience input. Ideally, any safer gambling intervention should be evaluated independently prior to delivery, in addition to the retrospective evaluation done here. Evaluation prior to delivery helps to ensure that any material that is publicly-released is effective, and prior evaluation also strengthens an experiment's internal validity, as it means that any findings cannot have been influenced by variable levels of prior exposure.

This study also has various implications for future research. First, it demonstrates a simple experimental paradigm that can be used to evaluate safer gambling adverts. We have openly shared the experiment's materials and analysis code, making it easy for other researchers to reuse this paradigm to investigate other safer gambling adverts. Future research should use this paradigm to test completely novel and experimentally-controlled safer gambling adverts, as numerous aspects of the actual adverts used in this study might have driven the observed effects – such as the branding or colors used. The paradigm could also be used to evaluate the educational materials created by other stakeholders, such as other charities beyond GambleAware or treatment providers. Novel types of safer gambling advert could also be tested. Future research could also draw from extant public health literature that tests effectiveness of mass communication appeals to inform harm-prevention strategies in gambling (Abroms & Maibach, 2008). For example, fear-based appeals have been shown effective in some other public health domains (Witte & Allen, 2000), but have been subject to much less research in gambling (Munoz et al., 2010; Mutti-Packer et al., 2022). The present paradigm could for example be used to test previous suggestions that fear-based appeals may not work on male at-risk gamblers (De Vos et al., 2017). Knowledge from other domains of public health research may also help in the development of novel effective adverts, which could make use of hard-hitting messages. Although gambling urges do predict PGSI scores (Smith et al., 2013) and gambling episodes (Hawker et al., 2021), the present findings could be extended to explore other dependent variables, such as behavior in a simulated gambling task.

This study is subject to various limitations. The study involved just a single exposure to each advert, while repeated exposures are common in actual environments. Multiple patterns could plausibly follow from repeated exposure. First, the relatively small effects from informational interventions might only become detectable after repeated exposures (Dijkstra & Bos, 2015). More complex non-linear relationships are also conceivable, such as when a single exposure might trigger urges, but that positive impacts on attitudes and intentions could emerge with repeated exposures. Another conceivable non-linear relationship is that of an effective message wearing-out over repeated exposures, as has been seen in tobacco (Woelbert & d'Hombres, 2019). This last relationship would suggest that even effective campaigns should be updated over time to prevent message fatigue. A longitudinal design to test these potential relationships is warranted, and is in principle feasible on crowdsourcing platforms, although like all longitudinal designs a certain degree of participant attrition is likely (Kothe & Ling, 2021).

As another limitation, gambling urges are just one potentially-relevant dependent measure. Other dependent measures such as knowledge of safer gambling tools may well see positive effects after viewing operator-led safer gambling adverts, and this could be important given their relatively low rates of use (Heirene et al., 2021). An evaluation of all relevant dependent measures, such as for example rates of seeking-out harm-reduction information (Newall, Hayes, et al., 2023), is needed to perform an ideal global evaluation of any safer gambling intervention. Participants were recruited from a crowdsourcing platform and paid a small amount of money for their time, so this study may not reflect how gamblers respond to various adverts in naturalistic environments (Pickering & Blaszczynski, 2021; Russell et al., 2021). Participants were gamblers presently resident in the UK, and so some results may have been influenced by participants' variable level of exposure to these adverts outside of the study. Future research could address this limitation by for example running a replication study on participants resident in another English-speaking jurisdiction, such as the USA or Australia. Safer gambling adverts can also have effects on people who are not presently gambling or on children, and future research should therefore explore relevant dependent measures among these groups. The measurement of PGSI scores after exposure to the advert video was another potential limitation. Even though our analyses show that PGSI scores were not influenced by the individual advert category shown, future research should consider measuring PGSI during a separate session to avoid any potential exposure effects. Finally, qualitative research, including "think-aloud" research (Gaboury & Ladouceur, 1989), conducted with gamblers across the full spectrum of harm could help to better understand why for example the bet regret adverts were not effective and yet the stigma reduction adverts were.

The present work has therefore extended the literature on the independent evaluation of safer gambling interventions to a new domain, that of safer gambling advert TV adverts.

Disclosures

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CRediT authorship contribution statement

Philip Newall: Writing – original draft, Conceptualization. **Leonardo Weiss-Cohen:** Writing – review & editing, Formal analysis, Conceptualization. **Jamie Torrance:** Writing – review & editing, Software, Conceptualization. **Yakov Bart:** Writing – review & editing, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data freely available online

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