COMPETITIVE MARKETS AND CONSUMER WELFARE

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DO BEHAVIORALLY INFORMED POP-UP MESSAGES CURB **PROBLEMATIC GAMBLING BEHAVIOR?**

Consumers increasingly gamble online and problematic gambling behavior is on the rise. There is an interest in using online interventions on gambling sites to reduce problems with execissive gambling in using online interventions on gambling sites to curb problem gambling. This article outlines results from two large field experiments designed to test the effects of behaviorally informed information remedies.

The article concludes that none of the interventions significantly reduced how much players spend, measured by turnover, on the platform.

Read the article ↓

1. Executive summary

The Danish Competition and Consumer Authority (DCCA) has tested the effect of four different pop-up messages on Danish consumers' gambling behavior in a field experiment. The experiment was run on behalf of the Danish Gambling Authority and in collaboration with SPILLEBRANCHEN - the industry organization for gambling operators on the Danish market.

The experiment included four different pop-up messages.

1. The reality check: A pop up appears and informs players on their activity for every hour of continuous play
2. The healthy gambling attitudes: Pop-ups convey information on healthy gambling attitudes.
3. The high-activity warning: A pop-up warns players with high activity and prompts them to take a self-assessment test.
4. The activity statement: Fortnightly pop-ups inform players about the period's wins and losses.

These were tested in two separate field experiments with two online gambling operators focusing on either casino-style games or sports betting. The experiments ran from 5 to 8 weeks, and the analysis builds on data from 14,153 participants.

None of the interventions had any significant effect on the amount players betted, the time they spent playing or the number of bets they placed. This lack of effect holds for the entire player population as well as for high-volume players (defined as players above the 75th percentile in turnover), who are more likely to experience negative outcomes from gambling.

The failure by any of these pop-up messages to influence player behavior is, at least in part, due to the nature of the environment. Gambling sites contain lots of information and are designed to catch and hold players attention. This makes it less likely that periodical, unobtrusive information pop-ups will influence players' behavior within such an environment, regardless of their content.

The failure of these interventions, as well as those of other similar information-based interventions in past underscores the importance of testing these types of remedies in gambling markets prior to implementation.

2. Digital gambling markets and consumer welfare

When Danish consumers gamble it increasingly happens online. Online gambles, including bets and casino-style games (but also online lottery games), made up 59 pct. of the gross gambling income in 2020, almost doubling from 31 pct. in 2012.[1]

When gambling takes place in an online environment there are certain qualitative differences from more traditional land-based gambling. The most important difference is that online gambling is far less restricted by time and place, meaning that players have access to gambling at any time of the day and regardless of where they are physically. Other noticeable differences include that online gambling is more anonymous, has less frictions around cash transfers and allows gambling firms to create personalized experiences.

These developments correspond to general trends in digital markets, and while each can be seen as advantageous, offering consumers' easier access with less hassle, it has also been argued that they can lead to excessive and uncritical consumption[2].

While online gambling has risen the number of consumers who exhibits problematic gambling behavior has also increased.[3] Rambøll estimates that the share of all Danish consumers (between ages 18-79) who experience problems with gambling has effectively doubled from 5.2 pct. in 2016 to some 11 pct. today. As seen in figure 1 increases in the number of consumers with mild or moderate gambling problems drive this shift, while the increase in consumers with serious problems is insignificant.

Taken together the two trends suggest a need to help consumers curb their problematic gambling behavior, but also that these solutions must work online where most of the gambling takes place.

Figure 1: **Share of cases with problematic gambling behavior among all adult Danish consumers (18-79) in 2016 and 2021**

	2016	**2021**
Mild	3.6 pct.	6.5 pct.
Moderate	1.2 pct.	3.7 pct.
Serious	0.4 pct.	0.7 pct.

Note: Source is Rambøll (2022): Prævalensundersøgelse af pengespil og pengespils-problemer i Danmark 2021.

Today online gambling operators are under a wide range of obligations, both legal and voluntary, that aim to help players regulate their gambling. Some of these obligations are technical in nature, e.g. that players have to register before gambling,[4] while others are more behavioral, e.g. that

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1   Rambøll (2022): Prævalensundersøgelse af pengespil og pengespilsproblemer i Danmark 2021.

2   KFST (2020): New opportunities and challenges for consumers in digital markets

3   In this context, problematic gambling behavior and its severity is estimated by a nationally representative application of the PGSI (problem gambling severity index) screening tool. The PGSI is the standardized measure of at risk behavior in problem gambling. It is a tool based on research on the common signs and consequences of problematic gambling.

4   Bekendtgørelse om onlinekasino (2019) kapitel 2

firms must display a timer allowing players to assess the duration of their current gambling session.[5]

> **Box 1: SPILLEBRANCHEN's code of conduct**
>
> Members of SPILLEBRANCHEN adhere to a code of conduct with the explicit aim to reduce or minimize problematic gambling habits. The code of conduct is a product of a collaboration between the gambling industry and regulators and represents a set of voluntary initiatives that go beyond national legislation.
>
> The code of conduct outlines 25 of these types of initiatives, prohibitions and intentions that gambling operators, who are members of SPILLEBRANCHEN, must adhere to. One of these initiatives is the use of a "reality check".
>
> The code states that:
> "To direct players' attention to the time and money spent on the platform, gambling operators must periodically provide players with clear messages detailing their wins and losses as well as the length of the current active session. Messages containing information on time and money spent must be visible long enough for players to adhere to the information. These messages must be accepted by the player before the session can continue, and the player must be given a choice on whether to continue or quit the session when accepting the message."

While there may be good, intuitive justifications for using behavioral tools to regulate problematic gambling behavior, there is a distinct lack of empirical evidence for their effectiveness, especially within online environments. This article outlines results from two large randomized field experiments designed to test the effects of information-based interventions, i.e. pop-up messages, on gambling behavior.

3. **The experiments**

The DCCA established a collaboration with two gambling firms (the operators), both active on the Danish market, to test the efficacy of different information-based interventions. The design of the interventions mimicked either existing untested interventions, or interventions that had demonstrated an effect on players' behavior offline (e.g. in lab experiments or analogue casinos), but that remained untested in online gambling environments.

In total, the experiments test four interventions.

Figure 2. **The reality check**
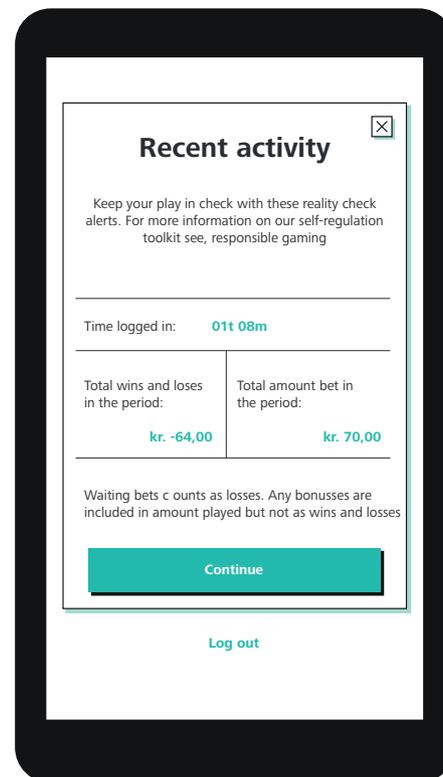
The reality-check pop-up was activated when players had played continuously for one hour. The pop-up contained information on the amounts played and the win/loss during the last hour of play. It also linked to the website's "responsible gambling section" where players could access different tools for self-regulation. The player had to actively dismiss the pop-up to continue gambling.
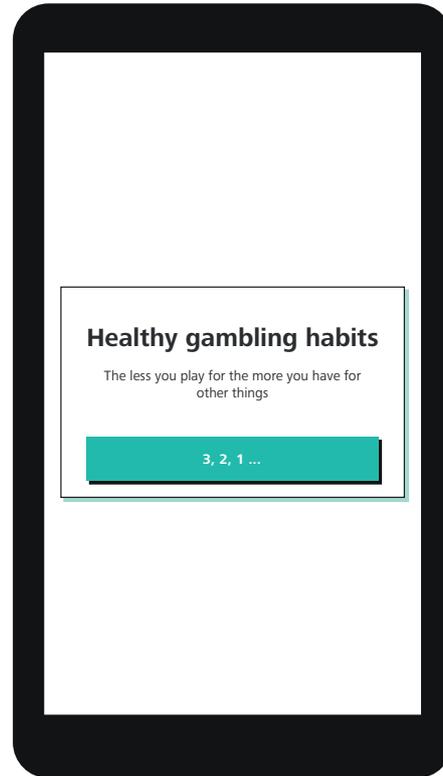
Figure 3. **The warning**

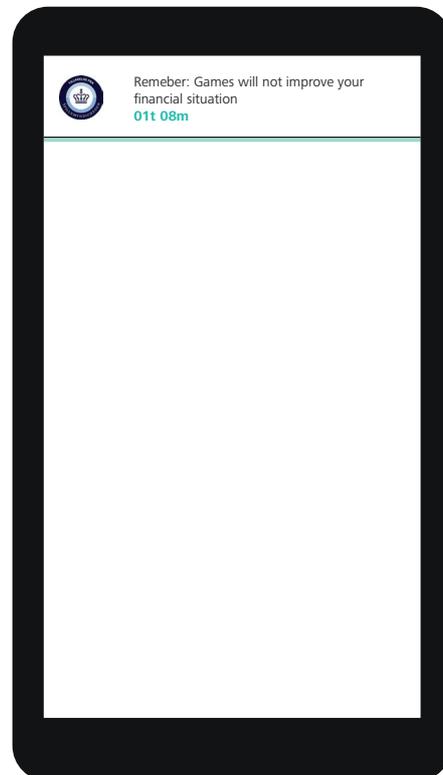Figure 4. **Healthy gambling habits information**

Casino

Gambling
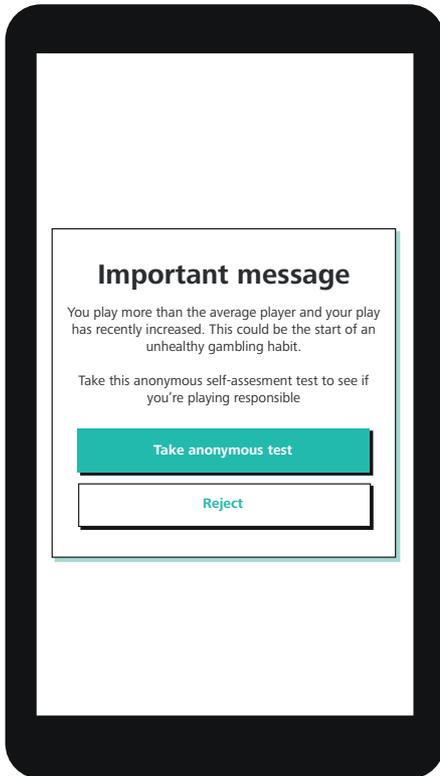
The warning message was activated once during the experiment if players met specific criteria. Specifically, they had to be in the 70th percentile for time played and 50th percentile for number of sessions (calculated on pre-experiment data), as well as increased their time played or number of sessions by 70 pct. relative to the previous week. These relative criteria were chosen to avoid setting a pre-specified absolute level of "acceptable" spending. If players met these criteria, the pop-up would appear upon login. The pop-up encouraged player to take a gambling self-assessment test (as offered by the operator). The pop-up message had to be actively dismissed before the player could initiate gambling.

The healthy gambling habits information pop-up offered players information on attitudes that have been demonstrated to help curb unhealthy gambling behavior[6]. The attitudes were translated into messages encouraging players to adopt the attitude. In experiment 1 these messages were shown on loading screens before a game was launched (see fig. 4). To reduce the risk that players felt spammed by the information the pop-ups were activated with a 33-pct. chance every time the player launched a new game. In experiment 2 the healthy gambling information was displayed in a banner centered at the top of the players screen, and cycled through the different messages on fixed time intervals (see fig. 5).

Figure 5. **The activity statement**
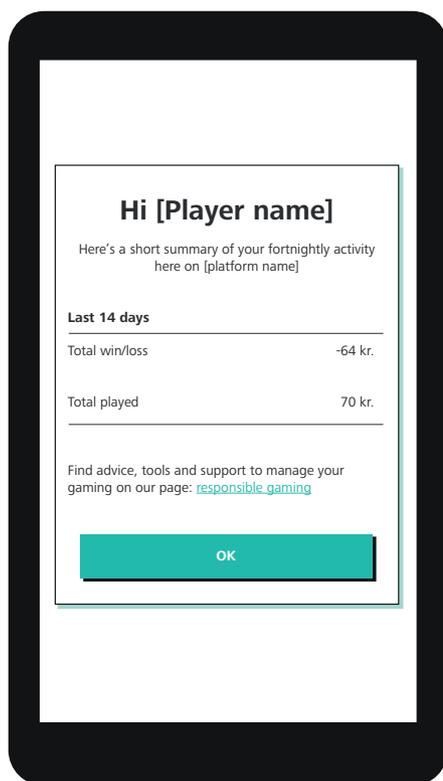
The activity statement offered players a summary of their activity on the platform for the preceding 14 days, which included information on the amount spent as well as their net result (wins minus losses). The activity statement was shown on login fortnightly and players had to actively dismiss it before they could initiate any gambles.

The interventions were designed to be noticeable but unobtrusive. The principal aim was to test the effect of the information provided by the different intervention, without adding more friction to process than was needed to deliver the information.

In practice that meant that players could dismiss the interventions easily. It also meant that none of the interventions appeared in critical parts of the user flow such as when players made payments, had to login or at similar critical parts of the user journey.

For each of the two experiments the DCCA provided operators with a conceptual design, similar to figures 2-6 above, and the operator then converted these designs to match their visual identity. The DCCA approved all final versions before launching the experiments.

Both operators, being part of SPILLEBRANCHEN, already employed a version of the reality check (see box 1). This is in line with the association's voluntary code of conduct for members. SPILLEBRANCHEN agreed to suspend the code of conduct requirement for the duration of the experiment. This made it possible to test how the absence of the reality check affected players, but also how the reality check performed relative to other, similar, interventions.

Experiment 1: *Casino games*
Experiment 1 focused on casino-style games (slot machines, blackjack, roulette and similar) and tested three interventions, the reality check, the healthy gambling habits and the warning. The experiment ran from October 7 to December 2 in 2020, which is roughly 8 weeks.

The casino operator randomized players into four groups, one for each intervention and one without any intervention. The operator also provided the DCCA with player data before (6 weeks), during (8 weeks) and after (1 week) the experiment to test for differences over time well as the relative difference between the intervention groups.

To be included in the experiment players had to have been active before and during the intervention period. Additionally, outliers defined as players with the top 1 % turnover based on pre-experiment data were removed. This left n= 11.064 players in the final analysis. See figure 6 for more details on the main experimental parameters.

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6   These healthy gambling attitudes were: 1) The less you gamble, the more money you have for other things. 2) Do not gamble as a way to make money 3) If you win several bets in a row, there is no reason to expect that it will continue 4) In gambling there is no system to predict whether you will win. 5) Even if you're having a lucky day, you should not bet more than usual

Figure 6. **Parameters for experiment 1**

	Before	Experiment
Data	6 weeks	8 weeks
Gr. 1 intervention	Reality check	No intervention
Gr. 2 intervention	Reality check	Reality check
Gr. 3 intervention	Reality check	Healthy gambling habits
Gr. 4 intervention	Reality check	warning

Experiment 2: *Betting games*
Experiment 2 focused on betting games (e.g. sports bets) and tested three interventions, the reality check, healthy gambling habits and the activity statement. It ran on the betting operator's platform for 44 days from January 1. 2022 to February 13. 2022.

The operator randomized players into four groups, one for each intervention and one without any intervention. The randomization was done through cookies on the players devices. The gambling operator also provided the DCCA with player data before (5 weeks) and during (5 weeks) the experiment to test for differences over time and the relative difference between groups. Players with no activity in both periods were excluded. Because the intervention groups were linked to individual players through cookies, some players were exposed to more than one intervention, which happened if they accessed the operator's website through different devices (e.g. tablet, phone and pc).

Players exposed to more than one intervention were excluded from the analysis. Additionally, players with the highest pre-experiment turnover (top 1 %) were excluded as outliers. This left 3,089 players for the final analysis. Figure 7 outlines the main parameters for experiment 2.

Figure 7: **Main parameters for experiment 2**

	Before	Experiment
Data	5 weeks	5 weeks (33 days)
Gr. 1 intervention	Reality check	No intervention
Gr. 2 intervention	Reality check	Reality check
Gr. 3 intervention	Reality check	Healthy gambling habits
Gr. 4 intervention	Reality check	Activity statement

4. **Data, methodology and hypotheses**
For both experiments, the operators provided the DCCA with daily player data as well as data indicating whether and when intervention activation happened for the specified periods.

This data included:

- Amount spend (in DKK)
- Number of unique games/bets
- Time spent on the platform
- Logins to the platform
- Amount paid into the platform
- Number of payments to the platform
- Intervention activation

Data was aggregated to daily averages before and after the intervention and analyzed using a first difference model. This allows an estimate of the overall impact of the different interventions on player behavior over the experimental period. The appendix contains the full model specification.

The model was set up to test a series of hypotheses about the effectiveness of the interventions relative to a control with no intervention. The dependent variable is the amount spend (turnover), since this is the most direct measure of "harm".

While there are many other important outcome variables (time spent, number of bets, etc.) reducing the number of bets or time spent on the platform is less important, if this does not also mean that players spend less overall.

The hypotheses were:

• Removing the reality check will increase gambling propensity.
• Exposing players to information on healthy gambling habits reduces gambling propensity.
• Exposing players to a warning on high gambling activity decreases gambling propensity among casino players.
• Exposing players to a fortnightly activity statement decreases gambling propensity among betting players.

These four hypotheses focus on the interventions' effect on the entire sample, which means that the results can be interpreted as the net effect from adopting the interventions, on average, for the population at large.

However, if an intervention is designed to curb problematic gambling behavior it is important to test how it specifically affects players who are at risk of experiencing problems. The Problem Gambling Severity Index (PGSI) is a widely used screening tool available for identifying these, but players are not screened routinely on the PGSI by operators. Additionally, it was infeasible to implement a PGSI screen as

part of the experiment, since this would require changes to the operators' terms and conditions. Even if a PSGI screen could be implemented there was no formal way to force players to complete it, which would lead to a high risk of self-selection as well as missing variable bias in the analysis.

Therefore, a secondary round of analysis tested the interventions' effect on high-activity players specifically.

Here, the high-activity specification simply means players above the 75th percentile defined by pre-experiment turnover. This specification is not perfect. For instance, it does not distinguish between players with vastly different economic starting points. One player may play for more than he/she can afford but not reach the 75th percentile if he/she has a low starting point, while another, wealthier player could be above the 75th percentile but never experience any problems.

Even with these limitations, the 75th percentile cut off represents a reasonable proxy for players who are more likely to exhibit a problematic gambling behavior for two reasons. The first reason is that a high level of spending is a central element in the PGSI. While players can have different economic starting positions the 75th percentile cutoff represents a level of spending that is more likely to cause financial distress for average or below average income players. The second reason is that turnover is highly correlated with other variables such as time spent or number of bets placed. As a robustness check the high-activity analyses were all run using number of bets as an alternative classifier and outcome variable, these are found in the appendix.

Both operators were members of SPILLEBRANCHEN, which means that they were voluntarily committed to using the "reality check" intervention on their sites when the experiments commenced. This means, that players would have routinely seen this intervention prior to the start of the experiment, where it was suspended for the no intervention as well as the two alternative intervention groups. While this makes the "reality check" a natural point of comparison, since it represents the default, the analysis instead uses the "no intervention" group as the control, since this is more in line with the hypotheses.

The appendix contains an alternative specification, where results are estimated relative to the "reality check" group. This alternative specification finds no relevant difference in results.

5. Results
Experiment 1 – *Casino players*

Figure 8 outlines the results from the experiment with the entire population of casino players.

As seen from figure 8 none of the intervention effects reach statistical significance at the 0.05 level[7] except for the high activity warning. However, the effects from this intervention are in the opposite direction of the hypothesis, since players in the group had a significantly higher turnover. This suggests that the interventions either did not have any significant effect on player behavior or in fact led to an increase in play.

Figure 8. **Change in turnover relative to the control (group 1)**

Groups	Intervention	Effects (turnover)
Gr. 1 (n=2682)	None (control)	
Gr. 2 (n=2803)	Reality check	4.5 pct. (p: 0.26)
Gr. 3 (n=2722)	Healthy gambling habits	0.3 pct. (p: 0.94)
Gr. 4 (n=2857)	High activity warning	8.9 pct. (p: 0.02)

Note: Figure 8 lists the effects of the interventions in the full casino sample. Effects are measured as the change in turnover, compared to the control (group 1). The estimate for group 2 indicates that, relative to the control, players in group 2 increased their turnover by 4.5 pct. in the treatment period.

This pattern repeats for high activity players. The results for that segment can be seen in figure 9.

Figure 9. **Change in turnover relative to the control (group 1) for players above the 75th percentile based on pre-experiment turnover in the casino sample.**

Groups	Intervention	Effects (turnover)
Gr. 1 (high activity) (n=699)	None (control)	
Gr. 2 (high activity) (n=689)	Reality check	-9,7 pct. (p: 0.23)
Gr. 3 (high activity) (n=679)	Healthy gambling habits	-0,8 pct. (p: 0.92)
Gr. 4 (high activity) (n=699)	High activity warning	-3,0 pct. (p: 0.70)

Note: Figure 9 lists the effects of the interventions in the high activity casino sample. Effects are measured as the change in turnover, compared to the control (group 1). The estimate for group 2 indicates that, relative to the control, players in group 2 decreased their turnover by 9,7 pct. in the treatment period.

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7   In figure 8, this is shown by the reported p-values all being above 0.05. p-values represent the probability of seeing the observed effect, under the assumption that the null hypothesis is true, ie. that the there is no real difference between groups. Following standard conventions, the DCCA uses a cutoff for significance at 0.05.

Experiment 2 – *betting players*
The results for the entire population of betting players can be seen in figure 10.

Figure 10. **Change in turnover relative to the control (group 1)**

Groups	Intervention	Effects (turnover)
Gr. 1 (n=777)	None (control)	
Gr. 2 (n=776)	Reality check	2.1 pct. (p: 0.72)
Gr. 3 (n=770)	Healthy gambling habits	5.5 pct. (p: 0.34)
Gr. 4 (n=766)	Fortnightly activity statement	4.6 pct. (p: 0.43)

Note: Figure 10 lists the effects of the interventions in the full betting sample. Effects are measured as the change in turnover, compared to the control (group 1)). The estimate for group 2 indicates that, relative to the control, players in group 2 increased their turnover by 2.1 pct. in the treatment period.

Again, none of the results from experiment 2 come out statistically significant for the entire player population, and similar results are found for high activity players, as can be seen in figure 11.

Figure 11. **Change in turnover relative to control (group 1) for players above the 75th percentile based on pre-experiment turnover in the betting sample.**

Groups	Intervention	Effects (turnover)
Gr. 1 (high activity) (n=200)	None (control)	
Gr. 2 (high activity) (n=180)	Reality check	-3.9 pct. (p: 0.74)
Gr. 3 (high activity) (n=186)	Healthy gambling habits	8.3 pct. (p: 0.48)
Gr. 4 (high activity) (n=206)	Fortnightly activity statement	-11.4 pct. (p: 0.32)

Note: Figure 11 lists the effects of the interventions in the high activity betting sample. Effects are measured as the change in turnover, compared to the control (group 1)). The estimate for group 2 indicates that, relative to the control, players in group 2 decreased their turnover by 3.9 pct. in the treatment period

6. Discussion

The results from both experiments demonstrate none of the intended causal effect on player behavior from any of the interventions, including from removing the existing reality check. This means that none of the hypotheses can be confirmed.

There are several possible explanations for why the interventions failed to influence player behavior.

One explanation is that players simply did not notice the interventions. The design and implementation of the pop-ups and messages was handled by the operators' UX (user experience design) teams and in line with other types of platform-to-player information activities on the two platforms. The interventions were designed to be noticeable, including requiring active dismissal for those interventions that came in the form of a pop-up, but not disruptive.

The interventions could have been designed to be more disruptive, e.g. by reappearing continuously, being harder to dismiss or by being embedded into critical website actions such as payments. However, this would have made it impossible to distinguish between the effect generated by pop-up (the effects on players' beliefs) and the effect of the added friction (irritation and frustration). Due to the nature of the field experiment, it was not feasible to implement manipulation checks, i.e. parts of the experiment that test whether players notice and understand the intervention. This would have required the operator to e.g. survey players on the platform or construct additional pop-ups, both of which would have had its own methodological problems. As such, it cannot be ruled out that the lack of effect is due to a failure of attention.

A second potential explanation is that the interventions failed to affect player behavior because the hypotheses that informed each of their designs are wrong. For example, the information provided in the healthy gambling habit intervention could already be known to players. Alternatively, it could be that simply exposing players to the information was insufficient for the formation of new beliefs about healthy gambling.

The hypotheses could be wrong in general or specifically for digital markets, where the context is often radically different from more traditional brick- and mortar-based gambling. This is a plausible explanation because previous field and online experiments have also found a lack of effect from similar types of information-based interventions regardless of how prominent intervention was presented to players[8][9].

Some of the interventions used in these experiments build on past research where similar remedies have demonstrated significant effects on gambling behavior (e.g. the activity statement[10] or the high activity warning[11]). However, those experiments took place in controlled settings and included players who had volunteered to partake in an experiment.

8   Newall, Philip WS, et al. "Evaluation of the 'take time to think' safer gambling message: a randomised, online experimental study." Behavioural Public Policy (2023): 1-18.

9   Behavioural Insights Team (2018), 'Can Behavioural Insights be used to Reduce Risky Play in Online Environments?'

10   BETA (2020): Better choices – enhancing informed decision-making for online wagering consumers

11   Peter, Samuel C., et al. "A meta-analysis of brief personalized feedback interventions for problematic gambling." Journal of Gambling Studies 35 (2019): 447-464.

Other interventions (e.g. the healthy gambling habits and the reality check) have not been tested in controlled experiments but nonetheless represent common interventions in gambling markets either due to industry standards or because operators are legally required to use them[12].

The absence of effect from any of the four interventions demonstrates how difficult it is to influence player behavior in digital gambling markets through the use of information-based remedies alone. Digital gambling sites as well as apps are well designed domains that afford heavy demands on their users' attention.[13] This means that there is a high risk that occasional, non-invasive information remedies simply cannot compete with the rest of the choice architecture when it comes to grapping and retaining players' attention long or effectively enough to induce meaningful changes in their behavior.

7. Conclusion

The last decade has seen a rise in consumers who exhibit mild or moderate problematic gambling behavior or experience adverse outcomes from gambling beyond their means. One strategy (among many others) to counteract this trend has been to use information-based remedies to influence player behavior, often in the form of information notices and pop-ups integrated directly into the digital gambling sites.

The DCCA has tested four unique information notices in a large field experiment in collaboration with two gambling providers, and found no effect on player behavior from any of the interventions.

This demonstrates that information-based remedies may have a limited impact on player behavior, especially in within "busy" commercial domains with large demands on players' attention.

Finally, the article demonstrates that testing, and particular field tests, offer a valuable resource for regulators and firms alike when it comes to test information-based remedies within the gambling market in the future.

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Artiklen er skrevet af specialkonsulent Johannes Jonatan Schuldt- Jensen og souschef Andreas Maaløe Jespersen, der begge er ansat i Forbrugerpolitisk Center i Konkurrence- og Forbrugerstyrelsen.

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12 E.g in UK: Gambling Commission (2019), 'National Strategy to Reduce Gambling Harms, Volume 2021'

13 Behavioural Insights Team (2022): Behavioural Risk Audit of Gambling Operator Platforms findings report

Appendix

Data and model description

The model specification is a difference in differences estimator, that models the change in turnover between pre and post treatment, Δy_i conditional on the treatment group indicator T_i and post-treatment indicator P

$$\Delta y_i = \alpha P + \beta T_i P_i + u_i$$

To estimate the model, the data was aggregated to two periods (before and during intervention) for each respondent, to represent the average daily activity of the participant.

The models were run in R using the plm package. The code used to run the models were of the form: plm(log(average daily turnover) ~ treat1*during + treat2*during + treat3*during, data = data_two_periods, model = "fd"), where the "treat" variables are dummy variables indicating the different treatments, and "during" is a dummy variable indicating the intervention period. The p-values are based on heteroscedasticity robust standard errors estimated with the "vcovHC" function in R.

Results based on using the reality check as reference group

Casino

Figure A1. **Change in *turnover* relative to "reality check" (group 1)**

Groups	Intervention	Effects
Gr. 1 (n=2803)	Reality check (control)	
Gr. 2 (n=2682)	None	-4,5 pct. (p: 0.26)
Gr. 3 (n=2722)	Healthy gambling habits	-4,2 pct. (p: 0.28)
Gr. 4 (n=2857)	High activity warning	+4,4 pct. (p: 0.25)

Figure A2. **Change in *turnover* relative to "reality check" (group 1) for players above the 75th percentile based on pre-experiment turnover in casino sample**

Groups	Intervention	ffects
Gr. 1 (high activity) (n=689)	Reality check (control)	
Gr. 2 (high activity) (n=699)	None	+9,7 pct. (p: 0.23)
Gr. 3 (high activity) (n=679)	Healthy gambling habits	+8,9 pct. (p: 0.26)
Gr. 4 (high activity) (n=699)	High activity warning	+6,7 pct. (p: 0.41)

Betting

Figure A3. **Change in *turnover* relative to the "reality check" (group 1)**

Groups	Intervention	Effects
Gr. 1 (n=776)	Reality check (control)	
Gr. 2 (n=777)	None	-1,8 pct. (p: 0.79)
Gr. 3 (n=770)	Healthy gambling habits	+7,4 pct. (p: 0.28)
Gr. 4 (n=766)	Fortnightly activity statement	+0,1 pct. (p: 0.99)

Figure A4. **Change in *turnover* relative to "reality check) (group 1) for players above the 75th percentile based on pre-experiment turnover in betting sample**

Groups	Intervention	Effects
Gr. 1 (high activity) (n=180)	Reality check (control)	
Gr. 2 (high activity) (n=200)	None	-14,7 pct. (p: 0,28)
Gr. 3 (high activity) (n=186)	Healthy gambling habits	-2,1 pct. (p: 0,88)
Gr. 4 (high activity) (n=206)	Fortnightly activity statement	-12,7 pct. (p: 0,33)

Results based on alternative specifications for high activity players

Casino

Figure A5. **Change in *number of bets* relative to "reality check" (group 1) for players above the 75th percentile based on pre-experiment *number of bets* in the casino**

Groups	Intervention	Effects
Gr. 1 (75-100) (n=684)	Reality check (control)	
Gr. 2 (75-100) (n=701)	None	-0.0 pct. (p: 0.99)
Gr. 3 (75-100) (n=662)	Healthy gambling habits	-1.1 pct. (p: 0.87)
Gr. 4 (75-100) (n=718)	High activity warning	-1.4 pct. (p: 0.84)

Appendix

Betting

Figure A6. **Change in *number of bets* relative to "reality check" (group 1) for players above the 75th percentile based on pre-experiment *number of bets* in the betting sample**

Groups	Intervention	Effects
GGr. 1 (75-100) (n=179)	Reality check (control)	
Gr. 2 (75-100) (n=201)	None	-10.7 pct. (p:0.27)
Gr. 3 (75-100) (n=180)	Healthy gambling habits	-15.3 pct. (p:0.12)
Gr. 4 (75-100) (n=200)	Fortnightly activity statement	-8.6 pct. (p: 0.39)