



Applying behavioural insights to design better safer gambling tools

Part 1: Anchoring

January 2021

Contents

| | |
|---|-----------|
| Contents | 1 |
| Who this report is for | 2 |
| List of figures | 4 |
| List of tables | 5 |
| 1. Executive summary | 6 |
| 2. Project background | 11 |
| 2.1 About this project | 11 |
| 2.2 Gambling in GB: A snapshot | 12 |
| 2.3 Gambling harms: What we know | 14 |
| 2.4 The impacts that behavioural insights could have on safer gambling | 14 |
| 2.5 Why this work is important | 16 |
| 3. How behavioural insights can inform the design of deposit limit tools | 17 |
| 3.1 Safer gambling tools: What we know about monetary limit setting | 17 |
| 3.2 The ‘anchoring effect’ in online gambling | 19 |
| 4. The trial we conducted, and what we found | 22 |
| 4.1 The interventions we tested | 22 |
| 4.2 Trial implementation | 23 |
| 4.3 Our findings | 25 |
| 4.4 Limitations and constraints | 30 |
| 5. Recommendations, reflections, and next steps | 32 |
| 5.1 Key recommendations and insights | 33 |
| 5.2 Outstanding questions for how behavioural science could improve the effectiveness of deposit limits | 36 |
| Appendices | 38 |
| A1. Trial recruitment material | 38 |
| A2. Trial sample considerations | 39 |
| A3. Trial outcome measures, and observation period | 42 |
| A4. Additional findings | 43 |
| Endnotes | 55 |

Who this report is for

This report details our continued work — funded by GambleAware, and supported by the Gambling Commission — to conduct field trials with major gambling operators (i.e. testing an intervention in a live business environment with real customers). The report provides valuable evidence based insights for the following groups:

- the gambling industry
- policy makers and regulators

1. The gambling industry

This first trial was implemented in partnership with a leading gambling operator, bet365, who committed time and resources to the project. Gambling operators control much of the experience of their customers. They have direct access to some of the most important leverage points for behaviour change, and to the data that can evidence where safer gambling interventions do (and do not) prevent or minimise harm effectively. This report shows how deposit limit tools (self-imposed caps that customers can place to limit how much money they can gamble with) can be designed and tested to work more safely for customers. The Betting and Gaming Council trade body has published [commitments](#) about improving safer gambling standards and our research clearly points towards a change that will meet that aim. As evidenced in this project, working collaboratively with researchers is both feasible and productive for all involved, and we urge gambling operators to give strong consideration to working on similar kinds of field trials going forward. Independent researchers will ensure that the trials are evaluated robustly to produce evidence that will give the industry the opportunity to *demonstrate* its progress. There are opportunities to work together to test what works to prevent and reduce gambling harm without negatively impacting the user experience for customers.

Key takeaways

- The findings clearly show that deposit limit tools should move away from having customers choose a limit from lists containing very high denominations
- Ideally, no denominations should be visible, and customers should instead enter their choice of deposit limit via using free text entry
- This core recommendation does not *constrain* choices for the customer, but is likely to improve the harm-reduction efficacy of deposit limit tools

2. Policymakers and regulators

Ensuring the public feels empowered by policy, not disenfranchised, can be challenging. For policy makers, this report demonstrates how testing what works can create targeted, effective policy. Specifically, this trial finds that redesigning deposit limit tools (i.e. using free-text boxes rather than dropdown options) can lead some people to set lower deposit limits - arguably, more in line with their preferences. It is a key recommendation of this report that all operator deposit limit tools should be updated in line with these findings. It also highlights the need for further measures (such as those trialed in our earlier work, detailed in Chapter 2) to increase the use of tools such as deposit limits.

Take-up of such tools is low both in the context of the current trials and more generally, as discussed later in the report, and greater effort needs to be put into people benefiting from them. Lastly, we emphasise that this set of results is merely scratching the surface of what can be tested and iterated to ensure people can gamble safely. Policymakers should prioritise commissioning causal evaluations in the field and build an evidence base of 'what works' with urgency.

Key takeaways

- Our evidence indicates that deposit limit tools should avoid presenting people with arbitrarily high denominations. On that basis, it is recommended that operators are required to enact this change via license conditions and codes of practice, or encouraged to do so through reputational incentives
- Operators could do more to highlight these tools, and facilitate their uptake
- Urgently prioritise commissioning causal evaluations to ensure policy is evidence-based and what works is scaled across industries.
- Require gambling industry to participate in independent evaluations, committing appropriate resources to doing so

List of figures

| | |
|--|----|
| Figure 1. Overview of trial arms | 8 |
| Figure 2. Comparison of average daily deposit limits set across control and treatment groups | 8 |
| Figure 3. Comparison of amount deposited over 30 days across control and treatment groups among users who set a deposit limit | 9 |
| Figure 4. Results from a previous Behavioural Insights Team field trial with Sky Betting and Gaming | 15 |
| Figure 5. Financial ‘anchors’ when placing a deposit | 19 |
| Figure 6. Typical deposit limit screens offered by online operators | 21 |
| Figure 7. Trial arms | 22 |
| Figure 8. Redesigned versions of the deposit limit tool tested in the trial | 24 |
| Figure 9. Comparison of average daily deposit limits set across control and treatment groups | 27 |
| Figure 10. Proportions of trial customers in each treatment group who opted to remove deposit limit during the trial. | 28 |
| Figure 11. Comparison of amount deposited over 30 days across control and treatment groups among users who set a deposit limit | 30 |
| Figure A1. Website pop-up recruitment prompts received by customers targeted for the trial | 38 |
| Figure A2. Overall uptake of deposit limits observed in the trial | 42 |
| Figure A3. Average increase in deposit limits from Day 1 to Day 30 for each treatment group | 52 |
| Figure A4. Average amounts staked over 30 days for each treatment group | 54 |

List of tables

| | |
|---|----|
| Table 1. Summary statistics for each type of deposit limit set by customers in the trial | 27 |
| Table 2. Summary statistics for amounts deposited over 30 days by customers in the trial | 29 |
| Table A1. Balance Checks of gender and age on treatment | 41 |
| Table A2. Further summary statistics for each type of deposit limit set by customers in the trial | 44 |
| Table A3. Effect of treatment on log of deposit limits | 45 |
| Table A4. Effect of treatment on size of deposit limit quartiles | 46 |
| Table A5. Effect of treatment on log of deposit amount | 48 |
| Table A6. Primary outcomes multiple comparisons adjustments | 48 |
| Table A7. Effect of treatment on Net winnings | 50 |
| Table A8. Secondary outcomes multiple comparisons adjustments | 50 |
| Table A9. Effect of treatment on probability of removing deposit limit | 51 |
| Table A10: Effect of treatment on difference in deposit limits | 52 |
| Table A11: Effect of treatment on stakes over 30 days | 53 |

1. Executive summary

In the period April 2019 – March 2020, people in Great Britain lost £5.68bn gambling online, an increase from £2.24bn in the period April 2014–March 2015.¹ For many people, this will have been more money than they intended to, or could afford to, lose. Deposit limit tools — which cap the amount of money customers are able to deposit each day, week or month — are offered by all major, licensed remote gambling companies in Britain. In our research for Phase 1 of the Remote Interventions programme, the Behavioural Insights Team (BIT) found that making it easier to sign up for safer gambling tools increased their uptake but did not have an impact on gambling behaviours (see our report [here](#)). Our behavioural audit of platforms and tools identified several potentially risky practices: deposit limit tools, for example, are typically presented in ways that risk steering people towards setting *higher* limits. Here, in Phase 2 of this project, we investigate whether this is true and how behavioural science-informed solutions can provide safer, more impactful tools for people who gamble. Here, we detail the first of two field trials — the first of their kind with a British online operator — to determine whether reducing the numerical anchors that people see when setting deposit limits could in-turn impact gambling behaviours.

This report details the findings from one of two field trials the Behavioural Insights Team has conducted under Phase 2 of the Remote Interventions programme commissioned by GambleAware. A second report detailing the remaining field trial will follow in 2021.

Project background ([Chapter 2](#))

Over half of gambling spend in Great Britain (excluding lotteries) is now online.² The lockdown caused by Covid-19 has led to further increased online gambling (including National Lottery products) for some. In May 2020, 68% of those more ‘engaged’ in gambling (i.e. those who have participated in three or more gambling activities in the last four weeks) had increased either the amount of time or money they spent on at least one gambling activity.³

Currently, almost 400,000 people in Britain experience ‘problem gambling’ (340,000 adults aged 16+, and 55,000 young adults aged 11-16 years old) and a further 1.75m are considered to experience low-to-moderate levels of gambling harm.⁴ Growing concern has led many to call the situation a public health issue.⁵ Alongside a combination of industry reforms, efforts by financial institutions, and increased access to essential support services likely required to tackle these issues, safer gambling tools are a low-cost and low-effort *preventative* measure that can minimise harm.

The research question broadly underpinning our work on Phase 2 of the Remote Interventions programme commissioned by GambleAware’s “Can behavioural insights be used to reduce risky play”? In the current context: does making simple changes to how a deposit limit tool is presented to customers — changes that are sensitive to what psychology research tells us about how people make choices — affect what kinds of limits people set?

BIT's research during Phase 1 (2018) of the Remote Interventions programme showed that applying these insights, even as small changes, can have a substantial impact on the *uptake* of such tools, by simply reducing the number of steps involved with setting these tools up.⁶ Unfortunately, this did not have an impact on customers' actual gambling behaviours. Here, in Phase 2, we go one step further to design more ambitious trials targeting gambling behaviours. This phase consists of two trials that focus on 'what works' to reduce risky play. The trial presented in this report investigates how the monetary values shown when choosing a deposit limit affect the size of the chosen deposit limit. The second trial in this project will explore the value of adding commitment devices to the process of setting a deposit limit. Results for this second trial will be published in Part 2 of this report, due in 2021.

Applying behavioural insights to improve deposit limits tools ([Chapter 3](#))

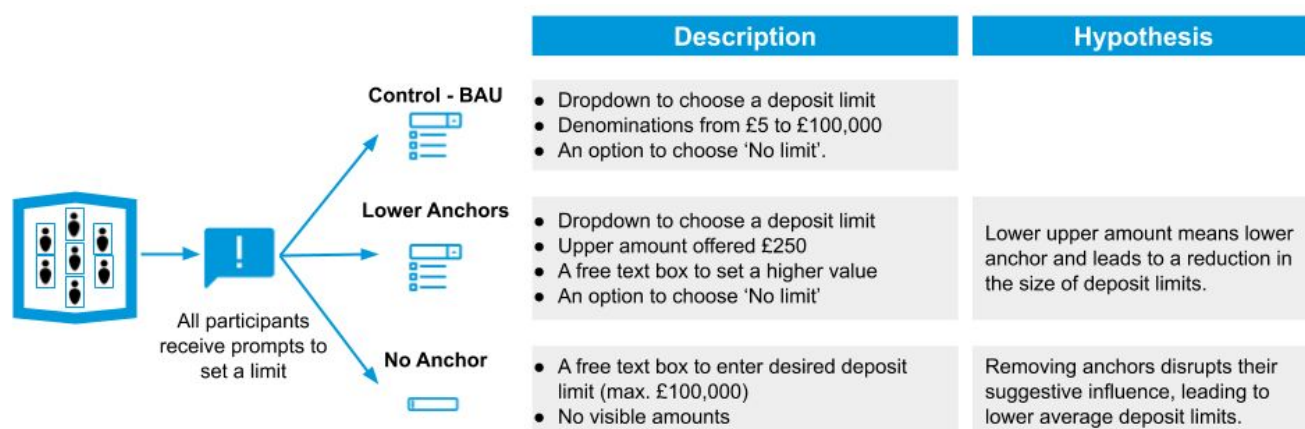
Deposit limit tools are relatively uniformly presented across the gambling industry in the UK. Customers are presented with a dropdown menu with amounts ranging from £5 to £1,000, £5,000, £10,000 and even into £100,000s. The aim of this trial was to investigate whether the way in which industry-standard deposit limit tools are typically presented may influence the choice of limit customers make.

Specifically: we hypothesised that the high amounts commonly found in these menus (alongside limited customisation at lower amounts) lead customers to select higher deposit limit amounts and, in turn, spend more money gambling. In behavioural science literature, this is known as an 'anchoring' effect, where people's choices or judgements are over-reliant on prior information we receive, even if the information is irrelevant.⁷

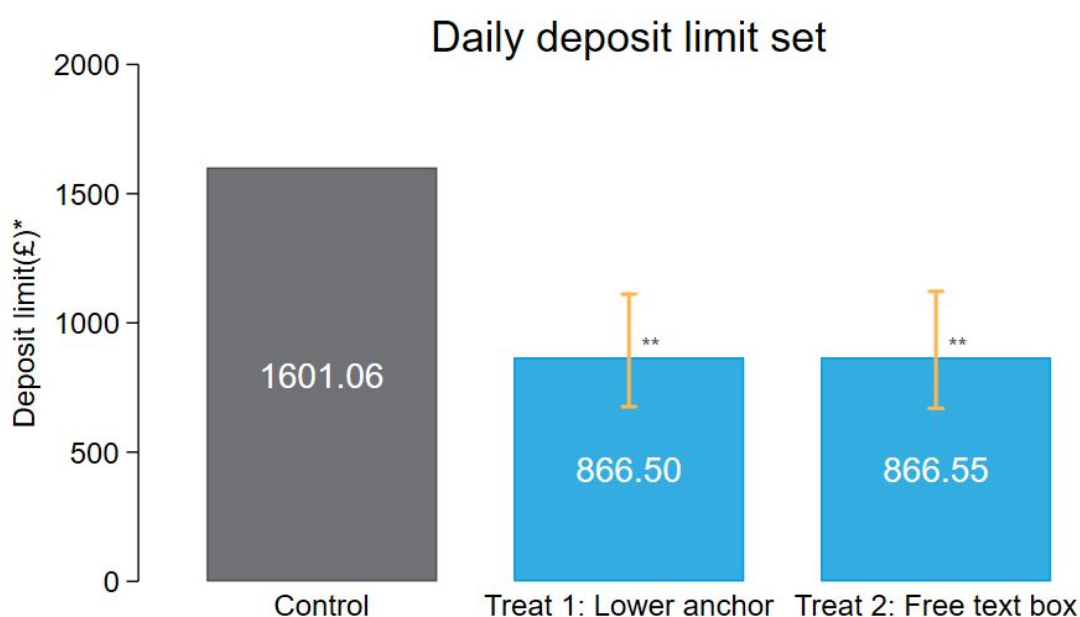
The trial we conducted and what we found ([Chapter 4](#))

To understand whether this design aspect of deposit limits influences gambling behaviours, we ran a trial inviting 45,000 existing bet365 customers (one of Britain's largest online gambling operators) to set deposit limits, with 4% of those invited doing so. Recruitment took place between March and April 2020, with the intervention and observation period running April to May 2020.

The participants were randomly allocated into one of three trial groups, as outlined below. Each group was presented with one of three versions of a deposit limit tool: the business-as-usual version, or one of two variants that presented either a) lower numerical anchors, or b) removed all numeric anchors from the process using a free text box rather than a dropdown menu.

Figure 1. Overview of trial arms.

Two primary outcome measures were used to compare the groups: 1) the deposit limit that participants set, and 2) the amount of money deposited in their account in the next 30 days (acting as a proxy indicator for financial harm). As customers could opt to set deposit limits for different time periods (daily, weekly, and monthly), we standardised our analysis by converting the deposit limits set by customers into an equivalent *daily deposit limit*, and log transformed this data to minimise the effect of outliers. **We found that the absence of a high anchor would likely almost halve the average daily deposit limit players set themselves.** As shown in Figure 2, we estimate that our interventions lead to daily deposit limits that are 45% lower than the control in the lower anchor condition, and 46% lower in the free text box condition.

Figure 2. Comparison of average daily deposit limits set across control and treatment groups

n = 1,731

** p < 0.01, * p < 0.05, + p < 0.1

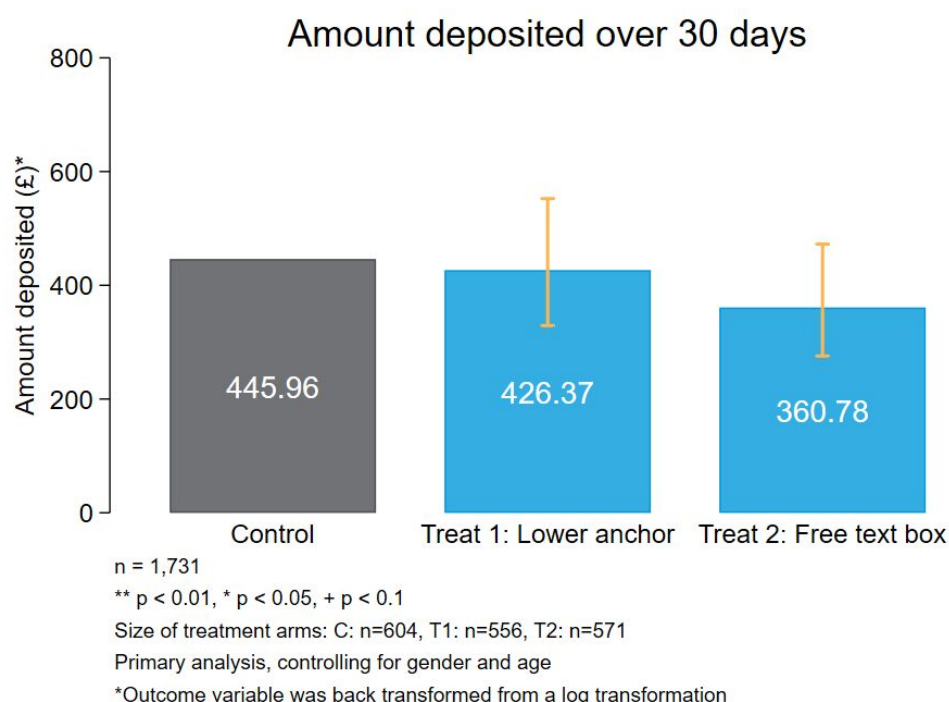
Size of treatment arms: C: n=604, T1: n=556, T2: n=571

Primary analysis, controlling for gender and age

*Outcome variable was back transformed from a log transformation

The second primary outcome measure concerned amounts deposited. **Compared to the control group (average deposits of £445.96 in 30 days), we estimate that the lower anchor intervention leads to a 4.4% reduction in deposits (£426.37), while the free text group intervention leads to an 18% reduction in deposits (£360.78).** These differences were not statistically significant, likely owing to the small number of limit setters in the trial. In individual financial terms, the difference between the control arm and free text box arm, at just over £85 a month, is equivalent to around £1020 per year. **This amount would be enough to cover almost all of what are considered the most common unexpected costs that families tend to face each year.**⁸

Figure 3. Comparison of amount deposited over 30 days across control and treatment groups among users who set a deposit limit



As mentioned above, only 4% of the targeted sample set a deposit limit in our trial (1,731 of 45,000). Several factors will have contributed to this, that, unfortunately, were not possible to rectify during the trial period. This includes how BIT were given access to a restricted sample – namely only *existing customers currently without deposit limits*. Including newly-registered customers, who are directly confronted with the option to set a deposit limit upon registration, would have likely increased the proportion of customers setting deposit limits. According to bet365, around 50% of newly-registering customers set a deposit limit when they sign up. In addition, it was not possible to remove all intermediary steps to accessing the deposit limit tool from the trial recruitment process (e.g. it was not possible to allow customers to directly access the deposit limit tool via a hyperlink in a recruitment email).

Recommendations (Chapter 5)

Recent reviews by the National Audit Office, the Public Accounts Committee, and a Lords Select Committee all underlined the need for a much stronger evidence-based approach to

gambling policy.^{9 10 11} This report offers the gambling industry and policy makers specific, practical and evidence-based recommendations for improvement.

Based on the results of trial one we recommend the following:

1. Redesign deposit limit tools so that customers setting deposit limits are presented with a free text box with no visible amounts or suggested minimum/maximum monetary amounts on display.

2. Increase the uptake of deposit limit tools. Less than 5% of customers in our trial opted to set limits, slightly lower than the 9% of people using limits as reported by the Gambling Commission.¹² It is not surprising that the percentage is lower in our trial, since our sample only includes players who did not hold a deposit limits, either because they were unaware of the option or because they chose not to set one. Operators should test how to increase the uptake of deposit limits — particularly around reducing friction, and onboarding new customers — and share insights to drive uptake across the industry.

3. Urgently direct more research funding towards causal evaluation of ‘what works’ to prevent gambling-related harms that can be scaled across the industry. Alongside funding, the Gambling Commission should require operators to work with independent researchers to design, develop and evaluate new safer gambling interventions; to evaluate existing safer gambling tools among other facets of gambling services and products across all customer groups, particularly new users (e.g. when, and how to promote safer gambling tools).

2. Project background

Chapter summary

- Great Britain is home to the largest regulated gambling market in the world.
- Gambling harm is a complex and multifaceted problem. Growing concern about gambling harm has led to calls for it to be treated as a public health issue.
- Behavioural science can help to understand and address gambling harm by generating a realistic understanding of how people's environments and their internal biases shape their gambling behaviour.
- This project aims to improve the design of safer gambling tools — in particular, deposit limits — and provide evidence-based recommendations to inform gambling policy.

2.1 About this project

The research detailed in this report was commissioned as part of GambleAware's ongoing Remote Interventions programme. The overall aim of this programme is to produce evidence and insights that identify how online gambling operators might reduce harmful gambling behaviour. You can find BIT's previous contributions to this programme [here](#) and more information on current research projects [here](#).

In this project we focus specifically on a common form of safer gambling tool that is offered by nearly all online gambling operators: deposit limits. Customers can voluntarily choose to set a deposit limit, whereby they manually restrict the amount they can deposit into their gambling account in a given time frame.

Prior work conducted by the Behavioural Insights Team (BIT) for the Remote Interventions programme (detailed later) highlighted potential behavioural flaws with how these tools tend to be offered to customers. For example, we revealed players have difficulties accessing these tools or, even when activated, the tools fail to limit risky play because they are too easy to circumvent. The current project sets out to build on this work by asking the more ambitious research question of "Can behavioural insights be used to reduce risky play?", particularly through designing better safer gambling tools. Behavioural insights concerns understanding how people make choices and decisions in the real world (see section 2.4 for a detailed explanation). Two large-scale field trials were conducted in a live business environment with a major gambling operator. This means we used an actual online gambling website and their real customers to test how well various designs of safer gambling tools work. Both trials involve testing deposit limit tools that have been redesigned using insights from behavioural science. The objective of this work is to produce evidence around specific ways that deposit limit tools should be constructed, so that they can best protect customers from experiencing harms.

The first of two field trials is described in this report. A second report will follow later in 2021, covering the second field trial investigating commitment devices. In this report we describe the experimental work we ran and its findings, and insights on our experiences working with the industry to implement an ambitious field trial with real gambling customers.

2.2 Gambling in GB: A snapshot

Great Britain is home to the largest regulated gambling market in the world, and an industry that experienced profits of over £14bn in 2019-2020, and employed 76,000 people.^{13 14} The industry has grown significantly in Great Britain since the mid-2000s, seeing its gross value add to the economy double since 2010 (from £4.3bn - £8.7bn), with a similar doubling in industry tax receipts to the Treasury (from £1.5bn to £3bn).^{15 16}

Online gambling accounts for £5.7bn (39.9%) of the industry's overall gross gambling yield: a 154% increase in sub-sector profits compared to 2015.¹⁷ A 2018 review of the online gambling industry by the Gambling Commission indicated that in the year to March 2017 there were almost 23 million active online gambling accounts in Britain, being used by approximately seven million individual customers.¹⁸

What are the odds?

Gambling in Britain



Britain has the **biggest regulated gambling market in the world**. The gross gambling yield (total money wagered minus total money won) was **£14.2bn** last year (Oct 18 - Sept 19).



If you randomly meet a British adult on the street, **chances are almost 50:50** that they have gambled in the past four weeks.



About 1 in 5 adults gamble online (a 6pp increase since 2015). Half of them use their **mobile phone** for gambling and **15% gambled at work**.



Over half (**56%**) of those with an online gambling account have **more than one account**, and 20% of those aged 18-24 have five or more accounts.

44% of online gamblers are **prompted to spend money** on a gambling activity **due to adverts that they see**.



It is estimated that **395,000 people have problem gambling behaviour**, and a further 1.8m are suffering low or moderate levels of harm.

Almost 5m people in the UK are negatively impacted by someone else's problem gambling behaviour.

Sources

1. Edison Investment Research. (2019). Online gaming sector: Diversification and scale for online success.
2. Gambling Commission [Industry Statistics](#) (November 2020).
3. Gambling Commission. (2020). [Gambling participation in 2019: Behaviours, awareness, and attitudes](#).
4. NatCen Social Research. (2018). [Gambling behaviour in Great Britain in 2016: Evidence from England, Scotland and Wales](#).
5. NatCen Social Research. (2020). [Treatment needs gap analysis in Great Britain: Synthesis of findings from a programme of studies](#).

2.3 Gambling harms: What we know

The UK's National Audit Office recently points to figures from the Gambling Commission estimating that 395,000 people in Britain are classed as 'problem gamblers' - those experiencing more significant harms due to pathological gambling behaviour. A further 1.8m are considered to be suffering low or moderate levels of gambling harm. In contrast, a recent national YouGov survey conducted as a part of GambleAware's Treatment and Needs Gap Analysis estimated as many as three times more people registering scores on the Problem Gambling Severity Index (PGSI, a clinical measure of pathological gambling) compared to the Commission's reporting, and a survey estimates assessment report suggested the real values are likely to lie somewhere between both analyses. Still other research has highlighted how various prevalence surveys - often using the same clinical measure of problem gambling, but differing in sampling methods - often diverge in their estimates.²⁰ There have been recent calls for a new British Gambling Prevalence Survey to be conducted, with the last having been run in 2010.

Gambling harm is a complex and multifaceted issue, with recent research characterising harm as 'adverse impacts from gambling on the health and wellbeing of individuals, families, communities and society'.²¹ Research by Wardle et al. highlights that gambling harms comprise negative impacts on financial wellbeing, mental and physical health, and on relationships, particularly immediate family and friends.²² The experiences and behaviours of people with problem gambling are estimated to negatively impact six other people on average by, for example, elevating conflict and impairing mental health, or by causing financial detriment within the family.²³ More recent research on the population in Great Britain specifically estimates that 7% of the population — almost five million people — have been negatively impacted by another's problem gambling behaviour in these ways.²⁴ It has also been estimated that gambling harms ultimately cost the UK public purse between £260m and £1.6bn a year.²⁵ This includes £40m-£150m for mental health care provision, £140m-£610m for inpatient services, £40m-£160m for Jobseekers Allowance and lost productivity, £10m-£60m for homelessness assistance, and £40m-£190m for incarcerations. Growing concern about gambling harm has led to calls for it to be treated as a public health issue.²⁶

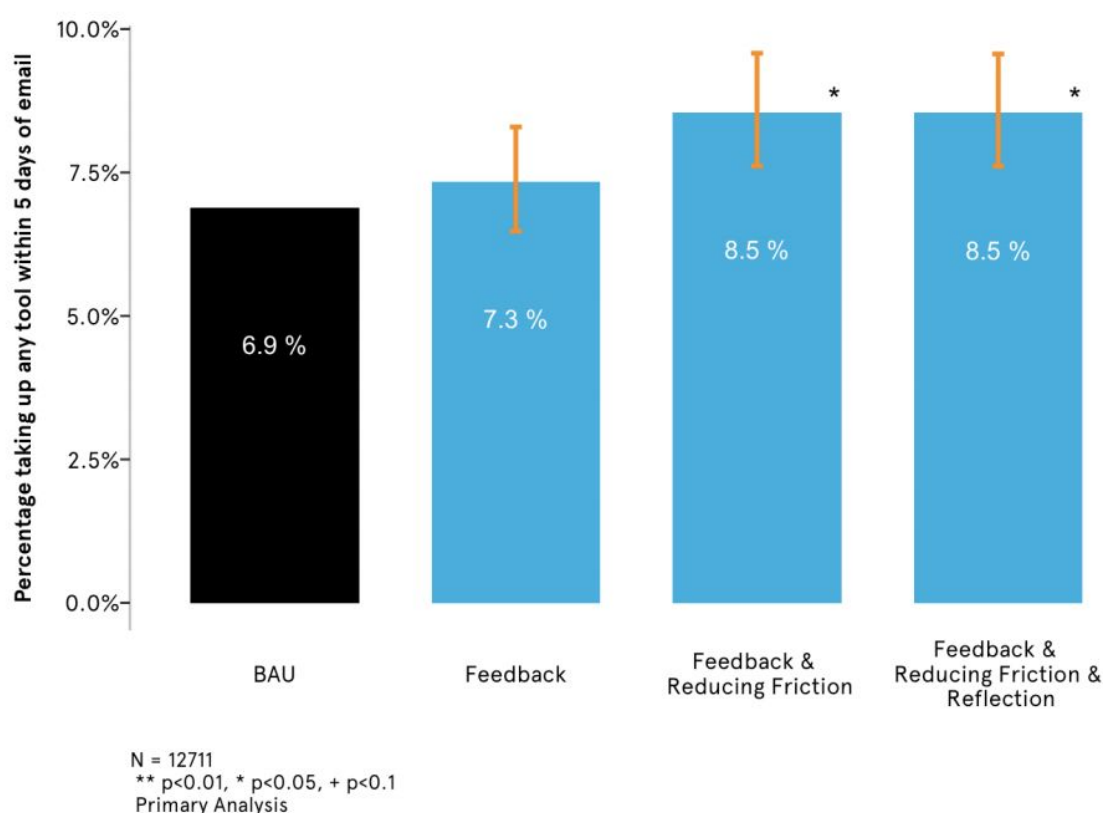
2.4 The impacts that behavioural insights could have on safer gambling

Put simply: behavioural insights concerns understanding how people make choices and decisions in the real world. Taking psychology and economic theory as its basis, behavioural science explains how peoples' environments and internal biases can lead people towards choices or decisions that may not be in their best interests.²⁷ For example, our previous field trials with major online gambling operators (see below), illustrated how simple changes to email communications to customers led to significant increases in the number of customers opting to set limits.

BIT's previous research with gambling operators

BIT's earlier work for GambleAware's Remote Interventions programme delivered some of the first pilot field trials with GB-based operators aimed at making gambling safer.²⁸ In one such trial, we took a standard email communication sent by a major UK online operator — Sky Betting and Gaming — and tested several variants redesigned on the basis of behavioural insights. A key finding was that emails containing a direct hyperlink to safer gambling tools led to a 1.6 percentage point increase in the number of people setting deposit limits versus a standard email containing no such direct link - an increase of 23.2% in absolute terms.

Figure 4. Results from a previous BIT field trial with Sky Betting and Gaming



Compared to the 'business as usual' (BAU) email received by customers - where 6.9% of recipients opted to set limits — two of our redesigned emails saw 8.5% of recipients opt to set limits, a statistically significant impact

Importantly, this previous work clearly demonstrated that behavioural insights could play an important role in promoting safer gambling. It also showed a willingness from the industry to work collaboratively to test new ideas aimed at encouraging customers to stay in control. Encouraged by this work, Phase 2 of this project, i.e. the current work, set out to design and implement more ambitious field trials to test more comprehensive changes in an online gambling environment. In particular, we set out to establish whether changes informed by

behavioural insights to the functionality of standard deposit limit tools would significantly affect how people use these tools.

2.5 Why this work is important

Recent reviews of the current legislative and regulatory landscape by the National Audit Office, the Public Accounts Committee, and a Lords Select Committee have all underlined the need for a much stronger evidence-based approach to gambling policy.^{29 30 31}

Our trials come at a time when there is increasing onus on the industry to demonstrate tangible progress with respect to player protections, and against the backdrop of an impending review into the UK's 2005 Gambling Act by the government.³² Our aim is to provide concrete evidence about what simple changes — informed by a scientific approach to evaluation — can be made to standard safer gambling tools to improve their effectiveness in minimising harm.

The findings from the trial reported here will also speak directly to both the Gambling Commission's, and the industry's Betting and Gaming Council's aims to protect people who gamble, and reduce harms.

“...not enough is known collectively about which of these activities and programmes designed to prevent gambling harms should be extended or applied in order to achieve maximum impact.”

[National Strategy to Reduce Gambling Harms](#)

“Protect and empower our customers: introduce new player protections in product design and customer engagement, making it easier for people to gamble safely”

[UK Betting and Gaming Council Safer Gambling Commitments \(#4\)](#)

3. How behavioural insights can inform the design of deposit limit tools

Chapter summary

- Deposit limit tools cap the amount of money customers are able to deposit in a given time period.
- However, despite their prevalence, little is known about how their design may influence how people use these tools.
- Behavioural science offers guidance in this area. For example, the psychological impact of the 'anchoring effect' means that peoples' choices can be influenced by numbers presented to them.
- We hypothesised that the high amounts currently presented in dropdown menus of standard deposit limits tools — e.g. values of £1,000 and up to £100,000 — subconsciously cause people to select higher deposit limit amounts.
- We conduct the first field trial of its kind with a British operator to determine whether reducing the anchors that people see when setting deposit limits could in-turn impact risky play.

3.1 Safer gambling tools: What we know about monetary limit setting

The landscape of safer gambling tools

Broadly, the tools available to customers wishing to control their gambling behaviour fall into three categories

1. *Safer gambling tools offered by operators* - British operators offer a standard suite of safer gambling tools that comprise tools such as on-screen notifications on play time, or amount spent. Others offer self-assessment tools, and budget calculators. Common across all remote British operators (and mandated by regulations) is the provision of monetary deposit limits - caps that customers can self-impose to restrict their spending.
2. *Self-exclusion platform* - GAMSTOP is a platform that acts as a hard block, preventing someone from accessing all Gambling Commission licensed remote operators with a single request. This tool is generally designed for use by people experiencing significant harms due to pathological gambling. GAMSTOP allows users to self-exclude from multiple online operators for a minimum of 6 months. This service — while undoubtedly valuable — came in for early criticisms around loopholes that allowed users to easily re-register with online operators and continue to gamble.^{33 34} Our previous work with major British operators found that 0.1% - 6% of customers make use of self-exclusion-type tools.³⁵

3. *Bank transaction gamble blocks* - related to the above, most major UK banks now offer 'gambling blocks' - a hard limit that prevents any electronic transfers from a bank account into a gambling account. The block remains active until a user opts to lift it, generally requiring a 48-hour lead time. These tools are effective where available, but recent research has highlighted some behavioural shortcomings including inadequate cooldown periods.³⁶

Broader research on financial behaviour supports the idea of setting monetary limits to control spending: people who actively set budgetary limits are less likely to carry debt, for example, and those who stay within their pre-committed budgets also experience less financial worry.^{37 38} Even simpler money management behaviours, such as *mental accounting* (i.e. deciding on expenditures by thinking about spending and saving in distinct categories, such as groceries, going out and holidays, without necessarily separating the money into distinct accounts or pots for each category), or actively opting to not carry cash/bank cards are associated with better financial outcomes.^{39 40}

A review of the evidence on how effective gambling deposit limit tools are reveals some promise, but also a lack of comprehensive and high-quality evidence.³⁸ While the evidence suggests that on-screen monetary spend reminders can help people stick to pre-committed spending limits, the studies reviewed did not test these tools on real gambling websites with actual players but often relied on students participating in lab experiments.^{41 42} Other work that has analysed real online gambling behaviour showed that setting monetary limits significantly reduced losses, however, the analysis focused only on the top 10% most intense players in the sample, rather than *all* limit-setters.⁴³ Otherwise, research indicates some mixed findings, with setting monetary limits being associated with reduced gambling spend, but not necessarily associated with reduced losses (a common marker of harmful gambling).^{44 45}

What is clearer is that monetary limits are the most widely-used form of safer gambling tool as self-reported by people.⁴⁶ Around 50%-80% of land-based players (i.e. people gambling at venues as opposed to online) report using these tools.^{47 48} Online, recent research from Finland indicates around 45% of newly-registering customers set limits if prompted at registration, with this proportion ranging from 22% - 38% for customers prompted at other salient touchpoints such as just before, or just after making a deposit (and only around 7% of unprompted customers opting to set limits).⁴⁹ Around 90% of the top 50 global online gambling sites offer limit setting tools, (as do all major operators in the UK).⁵⁰ A recent study indicates that 48% of deposit limit users do so because it allows them to feel in control of their gambling behaviour, with 68% of users doing so in order to limit their spending.⁵¹ Furthermore, people explicitly find them helpful: 79% of limit setters state that they find these tools useful, however, as many as 45% of users fail to stick to their limits.⁵² This may indicate that such limits should perhaps be 'stickier', for example by making it more difficult for people to either remove their limit, or to breach it.

At an individual level there are likely to be a multitude of psychological and situational factors that may explain why people fail to stick to their monetary limits.⁵³ Another important factor concerns the specific *design* and *functionality* of these kinds of monetary limit setting tools.

How someone interacts with an interface is an important driver of financial behaviour, as BIT's previous work has shown.⁵⁴ By extension, the typical design of deposit limit setting tools may not only influence adherence, but also what kinds of limits people set. In the next section we detail a particular design element common amongst online operators that we hypothesise may undermine the effectiveness of deposit limit tools.

3.2 The 'anchoring effect' in online gambling

As part of BIT's earlier research on safer gambling, we carried out in-depth reviews of several major British online operator platforms.⁵⁵ A key finding from those reviews was that customers are exposed to a range of pre-set financial values when interacting with their preferred sites. Many operators offer suggested stakes, for example, when placing a bet, or 'quick deposit' functions that allow customers to choose an amount from a range of values (see Figure 5). Behaviourally, we know that many people display a bias in their choices or judgments whereby they over-rely on the first piece of information they receive, even if it is random or irrelevant: this information becomes a reference point (an 'anchor') for making decisions.⁵⁶

Figure 5. Financial 'anchors' when placing a deposit

The screenshot shows a web interface for 'Account Registration' with three steps: 1. SELECT AMOUNT, 2. REGISTER ACCOUNT, and 3. START BETTING. Below the steps, there is a section titled 'Fast, Simple Registration with PayPal'. It includes a 'Currency' dropdown set to 'GBP', a 'PayPal' logo, and an 'Amount to Deposit' section with four buttons: '20.00', '50.00', '100.00', and '200.00'. Below these buttons is a text input field labeled 'or enter another amount' with a 'Limit 10 - 5000' note. A green button labeled 'CONTINUE TO PAYPAL' is at the bottom.

Source: <https://www.onlinebetting.org.uk/banking/paypal.html>

Background on the anchoring effect

The phenomenon of 'anchoring' was first introduced by two eminent psychological researchers, Tversky and Kahneman in 1974.⁵⁷ They showed that people who first saw a large random number were more likely to give higher numerical estimates about the number of African countries in the UN. Since then the influence of anchors on subsequent decisions and behaviours has been demonstrated in many different settings such as estimating probabilities and forecasting, legal judgements, purchasing decisions and

valuations, negotiations and others.⁵⁸ The anchoring effect is one of the most enduring and robust discoveries in the behavioural science academic literature.⁵⁹

Anchoring is also common in a range of everyday choice scenarios such as credit card repayments.⁶⁰ Minimum monthly card repayments that are normally made salient to card holders can act as an anchor resulting in lower repayments.⁶¹ BIT's research has shown that changing *how* credit card repayment options are displayed — such as offering a slider interface instead of a free text box with a pre-entered minimum amount — significantly increased how much people opted to repay.⁶²

When setting limits, customers are typically asked to choose their limit from a broad range of numerical denominations, often going into tens of (and sometimes hundreds of) thousands of pounds. Figure 6 below presents some illustrative examples of deposit limit tools as they generally appear on online operators' platforms.

Given anchoring bias, there is a clear behavioural design risk present with typical deposit limit tools as seen below. Exposure to high denominations when setting deposit limits may influence customers to set *higher* limits. Setting higher limits is likely to contribute to riskier play: our prior predictive modelling of risky play found that the most important predictor of risky play is the amount of money people stake when betting.⁶³ To investigate this further, we conducted the first field trial of its kind with a British operator to determine if *reducing* the anchors that people see when setting deposit limits could in-turn impact risky play.

Figure 6. Typical deposit limit screens offered by online operators

bet365 MEMBERS Contact Us
Live Chat | 08000 288 365 | Email | Web Message

Bank My Account History Bet Credits **My Gambling Controls** Messaging

< Deposit Limits

This facility enables you to limit the amount of money that you are able to deposit online into your account on either a 24 hour, 7 day and/or 30 day basis.
These amounts may be revised downwards at any time but any increase will only be implemented 24 hours after the request. Our Customer Services staff will be available to provide any further information required but are unable to override limits set by you.
Your existing deposit limits are:

24 Hour
Please select

7 Day
Please select

Please select

- £5
- £25
- £50
- £100
- £150
- £250
- £500
- £1,000
- £2,000
- £2,500
- £5,000
- £10,000
- £20,000
- £50,000
- £100,000

Your Paddy Power account

Email Address

Password Show

Security question
Father's first name?

Security answer

Paddy Power Account Currency:
UK Sterling (GBP)

Please note that once you have selected a currency you will not be able to change it at a later date.

Set a deposit limit?
Set a limit on the amount you can deposit for a period you choose. This will reset at the end of each frequency limit.

Set a frequency limit
Daily

Limit amount (GBP)
Select

- 10000
- 1000
- 500
- 200
- 100
- 50
- 20
- 10
- 5

Other companies within the Group:

Settings

ENABLE 2FA

Deposit limits

20
Please select
No Limit
20
50
100
200
250
500
1000
2000
5000
10000
20000
30000
50000
75000
99000

Daily

No Check

Source: BetVictor

4. The trial we conducted, and what we found

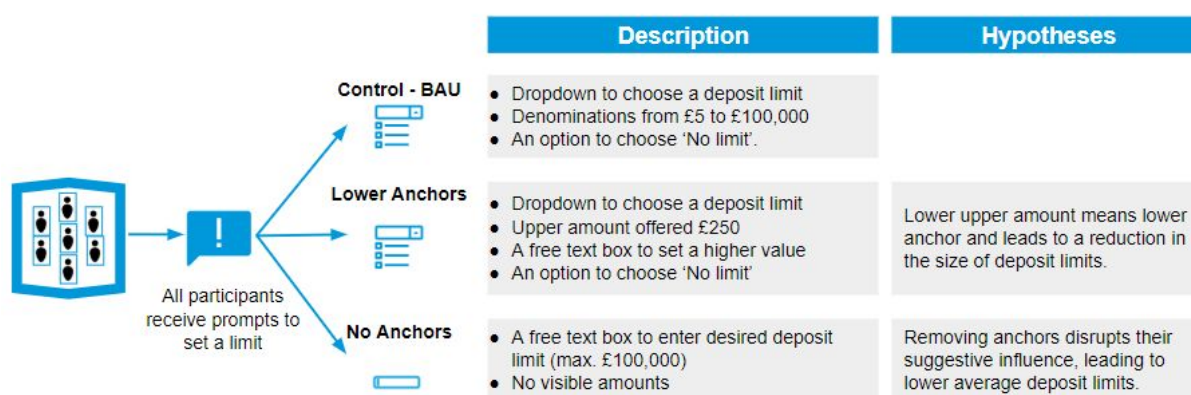
Chapter summary

- We conducted a field trial with a major online British gambling operator and evaluated three different versions of a standard deposit limit tool
- 45,000 existing customers without deposit limits were randomly invited to set a limit between January and April 2020. 1,731 of these customers set a deposit limit (4%).
- Our findings show that industry-standard deposit limit tools — those with high anchors — lead people to set higher limits. Presenting lower values reduced the average deposit limit selected by around 45% (from an average daily limit of £1,601 to around £867).
- While we also observed a downward trend in amounts deposited in the treatment groups vs. control, the limited sample size means we cannot confidently assert this as due to our intervention

4.1 The interventions we tested

In this trial, we investigated the impact of changing the denominations visible to customers who wished to set a deposit limit. The business-as-usual (BAU) approach was compared against two variants: A) presenting deposit-limit setters with *lower* numerical anchors and B) completely removing any numerical anchors from the process. Participants — customers of bet365, a major British gambling operator — were randomly allocated to receive one of the three variants as part of their normal interactions with the operator's site. Figure 7 illustrates the three versions of the deposit limit tool used in the field trial.

Figure 7: Trial arms



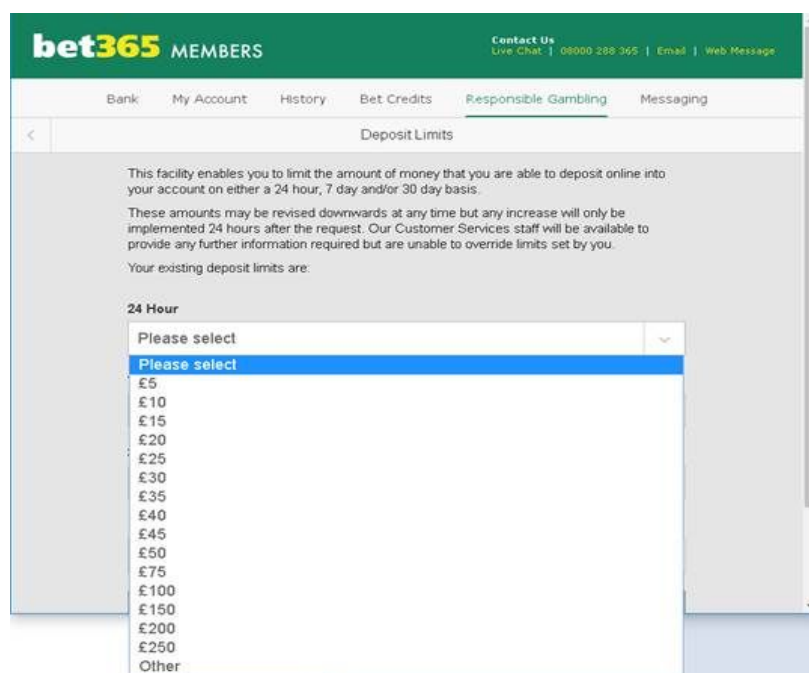
In the BAU (control condition), no changes were made to the operator's existing deposit limit selection page. That is, customers chose a deposit limit for up to three different time periods - 24 hours, 7 days, and/or 30 days - by selecting an amount from a dropdown menu that offered a list of increasing denominations (see Figure 8, below). Note that the amounts shown in the dropdown menu did not differ by time period: whether customers set a 24 hour, 7 day or 30 day limit, they always saw the same dropdown menu.

In the 'Lower Anchors' variant, the key difference from the BAU control condition was the values displayed in the dropdown menu: the largest denomination visible was £250 compared to £100,000 in the BAU condition. This particular upper limit anchor was chosen based on our previous work in Phase 1 of the Remote Interventions Programme having indicated that average daily stakes of £200+ were a significant predictor of higher scores on the Problem Gambling Severity Index. We chose an upper anchor slightly above this figure so as to afford some flexibility to those customers opting for weekly, or monthly limits over daily limits. The third arm ('No Anchors') had no dropdown menus of suggested amounts.

4.2 Trial implementation

Existing bet365 customers without deposit limits were randomly selected for inclusion in the trial, conducted between January and April of 2020. Those randomly targeted to participate in the trial received a series of prompts inviting them to set a deposit limit. Prompts were in the form of pop-up messages (automatically appearing on login to the site), with one such prompt per week and a maximum three prompts in total. Customers who did not set a deposit limit within two days of seeing the first pop-up next received an email prompt to do so, followed by two subsequent login prompts. Images of these prompts can be found in Appendix A.1. An overview of the key limitations of the trial can be found in section 4.4, later in this chapter.

Customers were randomised before they were prompted to set a deposit limit, due to technical limitations on the part of the operator. Those who followed the prompt were shown one of three versions of the deposit limit page, as described in Figure 7 above (N = 1731). Figure 6 on page 21 shows the bet365 business-as-usual deposit limit screen (N = 604). Figure 8 below shows the two redesigned variants tested alongside this.

Figure 8. Redesigned versions of the deposit limit tool tested in the trial


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Bank | My Account | History | Bet Credits | Responsible Gambling | Messaging

< Deposit Limits

This facility enables you to limit the amount of money that you are able to deposit online into your account on either a 24 hour, 7 day and/or 30 day basis.

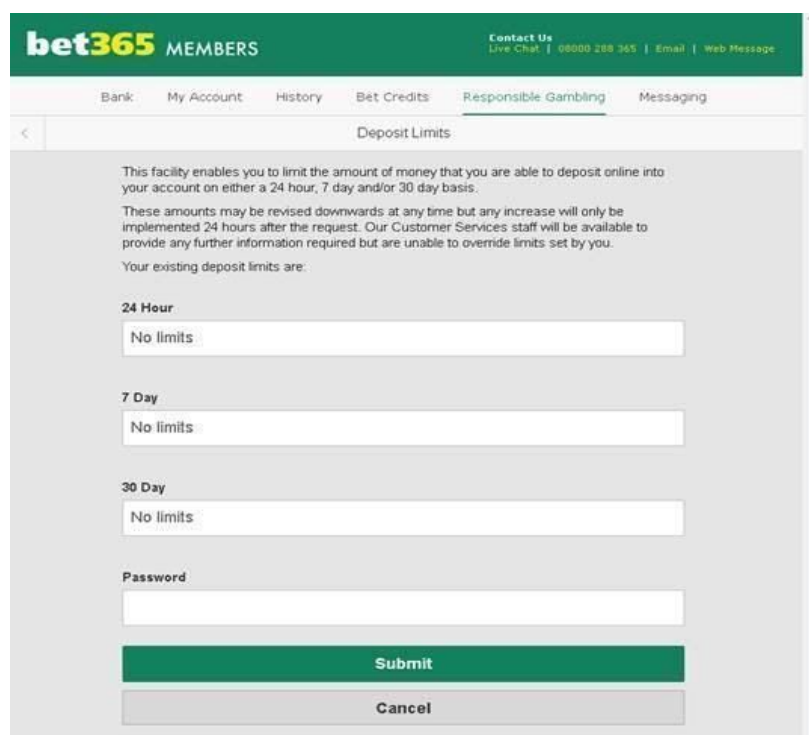
These amounts may be revised downwards at any time but any increase will only be implemented 24 hours after the request. Our Customer Services staff will be available to provide any further information required but are unable to override limits set by you.

Your existing deposit limits are:

24 Hour

Please select

- Please select
- £5
- £10
- £15
- £20
- £25
- £30
- £35
- £40
- £45
- £50
- £75
- £100
- £150
- £200
- £250
- Other

(A) Lower anchors


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Live Chat | 08000 288 365 | Email | Web Message

Bank | My Account | History | Bet Credits | Responsible Gambling | Messaging

< Deposit Limits

This facility enables you to limit the amount of money that you are able to deposit online into your account on either a 24 hour, 7 day and/or 30 day basis.

These amounts may be revised downwards at any time but any increase will only be implemented 24 hours after the request. Our Customer Services staff will be available to provide any further information required but are unable to override limits set by you.

Your existing deposit limits are:

24 Hour

No limits

7 Day

No limits

30 Day

No limits

Password

Submit

Cancel

(B) Free text

For the 'Free text' treatment arm (N = 571, with the remaining N = 556 comprising the 'Low anchor' group), no dropdown menus were available under the three limit period options, with customers instead simply typing their limit of choice into a free text box. This arm shared the same maximum limit (£100,000) as the others, but this limit was not explicitly visible

on-screen, thus meaning all numerical anchors were removed from view. Customers in all arms could set a maximum limit of £100,000.

As is standard for bet365, across all variants customers could choose to *lower* an already-set deposit limit with immediate effect, however, choosing to *increase* a set limit required a 24-hour lead time, and for the user to reconfirm their decision after this delay.

4.3 Our findings

Below we summarise the key details on who took part in the trial; what we assessed; and what the primary findings were. In each instance we provide additional detail, and technical specifications in the report appendices. The trial had two primary outcomes:

1. *The size of the deposit limit set by a customers*
2. *The amount (£) deposited into the gambling account in the 30 days after setting a limit (a proxy indicator of financial harm)*

4.3.1 Trial sample

In total, 45,000 existing bet365 customers without deposit limits received the invites to set a limit. Of these, 1,731 customers (4%) elected to set a deposit limit, demonstrating that the uptake of deposit limits in the trial was low. Relative to those customers who opted *not* to set limits, limit setters were a) significantly older (mean age of 39.42 years vs. 35.05 years); b) were more engaged with their account during the observation period, having logged in to their bet365 account a significantly higher number of times (mean total logins of 38.65 vs. 32.89); and c) staked significantly more during the observation period (mean total stakes of £1572.45 vs £1326.36).

The low uptake reduces the ‘statistical power’ of the trial, that is: with fewer people in the trial, changes in the outcomes need to be larger in order for us to be confident that the interventions are really driving those changes.

Despite the overall low uptake of deposit limits in the trial, uptake was similar across all three trial arms. Randomisation of customers across both intervention treatment arms produced balanced groups regarding age and gender. Further details on these checks are found in Appendix A.2.

We observed each customers’ behaviour over the 30-day period from which they set a deposit limit. Beyond the two primary outcomes detailed below, we also assessed a range of secondary, and exploratory outcomes which are detailed in Appendix A.3 and A.4. Note that all analyses conducted on the sample were pre-specified in a trial protocol developed in advance of the trial, as is standard practice at BIT. Full details on corrections applied for multiple statistical tests are given in Appendix A3 and A4.

How we present findings

To aid comparison and interpretation we typically present our key findings in graph form, with fuller specifications of the statistical analyses underpinning the findings provided in the appendix.

In our graphs we display:

- a) For the control group, the actual observed result;
- b) For the treatment groups: a statistical estimate of what would have happened to the control group if we had treated it, based on the observed data. In some instances it may be necessary to transform the observed data for the purpose of computing the estimates, which we then back-transform for the purpose of the graph. This will often mean that the graphs show estimated values for the treatment groups that are different from the observed values for those groups, but this merely reflects the transformation process.

4.3.2 Key finding 1: High anchors lead customers to set higher deposit limits

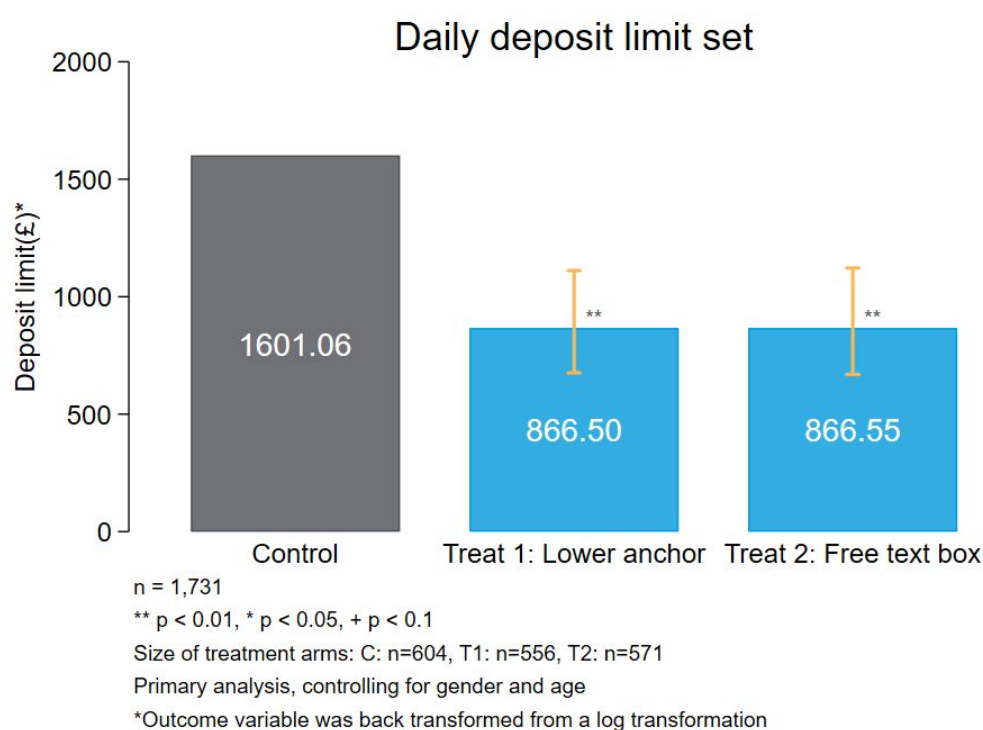
Our first analysis finds that *removing* high anchors from view would lead to an estimated reduction in the size of deposit limits by around 45%.

The first primary outcome measured the size of the initial deposit limit set by customers across each of the three trial arms. Customers can set concurrent daily, weekly, and monthly deposit limits if they wish. To simplify the analysis, we converted weekly and monthly deposit limits into equivalent daily limits; we took the *lowest* limit out of a customer's daily, or converted weekly/monthly limits as that customer's initial deposit limit. To illustrate: if on day one of the observation period customers set a daily limit of £10 and a weekly limit of £50, we took their initial deposit limit as £7.14 ($£50 \div 7 < £10$). From there, we calculated the average initial deposit limit set by each of the three groups in the trial. Table 1, below, provides initial summary statistics showing the average observed initial deposit limit for each group.

Table 1. Summary statistics for each type of deposit limit set by customers in the trial

| Outcome | Treatment arm | N | Median (£) | Mean (£) | SD (£) |
|-----------------------|------------------------------|-------|------------|----------|---------|
| Size of deposit limit | Control | 604 | 14.3 | 1601.1 | 9,441.7 |
| | Treatment 1: Lower anchor | 556 | 8.3 | 230.81 | 2,526.7 |
| | Treatment 2: Free text box | 571 | 7.1 | 308.78 | 4,213.0 |
| | All players who set deposits | 1,731 | 8.3 | 734.7 | 6,274.2 |

There was significant skew in these data on account of some customers setting very high deposit limits. In Table 1 this is most clear for those in the control condition, where average deposit limits are substantially higher. In light of this, for our analysis to determine the estimated size of the impact our interventions would have on deposit limits the actual amounts of the deposit limits shown in Table 1 were log transformed to mitigate the impact of outliers. This means that the observed values for the treatment groups in Table 1 are analysed on the log scale which we then convert back to their original form (a pound amount) to aid overall interpretation. Our analysis involved regression analysis to estimate the degree to which we would expect the size of the deposit limit observed in the control group to change for each type of treatment. Figure 9, below, shows the findings of this analysis, with the full regression model specification provided in appendix A4.

Figure 9. Comparison of average daily deposit limits set across control and treatment groups

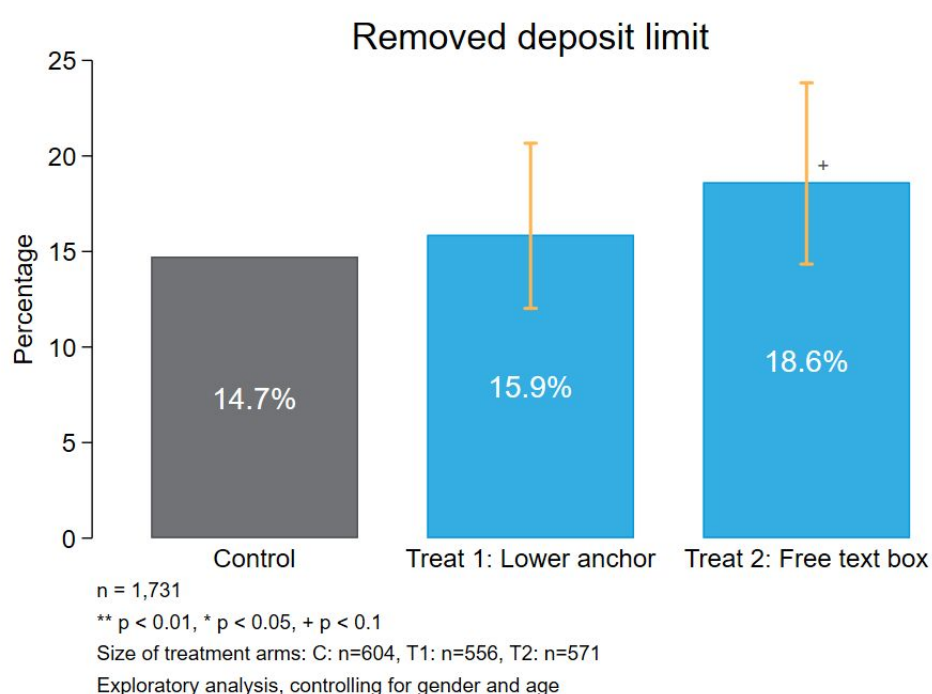
From

Figure 9, the bars representing the two treatment groups show amounts as back-transformed from the analysis, and reflect the estimated reductions we would expect the treatments to have on the baseline deposit limit of £1601.01. Error bars for each treatment represent 95% confidence intervals. In other words, Figure 9 tells us that while an individual in the Control group would be expected to set a deposit limit of £1601.06, we estimate that this same individual would set an initial deposit limit that was 45% lower (£866.50, 95% CI = £682.38 : £1119.82) if exposed to the lower anchor intervention, and 46% lower (£866.55, 95% CI = £674.62 : £1127.61) if exposed to the free text box intervention. Despite the trial having low statistical power, each comparison against the BAU group was statistically significant, indicating that the differences between each group were unlikely due to chance, and the differences were likely driven by the interventions.

Additional analyses determined that differences between the treatment arms and the control group were largest for those setting higher deposit limits. In real terms: being in either treatment arm was associated with a statistically significant £33 reduction in the size of deposit limits particularly for those customers setting limits falling in the 75th percentile of all limits set. Further details on all of the above statistical analyses are in Appendix A.4.

Amongst those customers who set deposit limits, we also conducted an exploratory analysis of how likely customers in each group were to have *removed* their chosen deposit limit over the observation period. Figure 10 (error bars for each treatment represent 95% confidence intervals), below, indicates that only marginally more customers in the lower anchor arm, 15.9% (95% CI = 12.2% : 21.1%), removed their deposit limits by day 30, which was a non-significant difference. Those in the second treatment arm were marginally more likely again with just under 1 in 6 (18.6%, 95% CI = 14.3% - 23.94%) of these customers opting to remove their deposit limits, however, this was also a non-significant difference compared to the control arm. Additional detail on this analysis can be found in Appendix A4.

Figure 10. Proportions of trial customers in each treatment group who opted to remove deposit limit during the trial.



Deposit limit *removers* were significantly different from non-removers in terms of demographics, and other behaviours. Specifically, limit removers:

- Were more likely to be male
- Were significantly younger (35 vs. 40 years old)
- Logged in to their bet365 significantly more often (45 times vs. 37 times)
- Staked significantly more during the observation period (£2051 vs. £1073)
- Lost significantly more during the observation period (£248 vs. £79)
- Deposited significantly more during the observation period (£768 vs £310)

4.3.3 Key finding 2: Removing high anchors from deposit limit tools may lead customers to deposit less

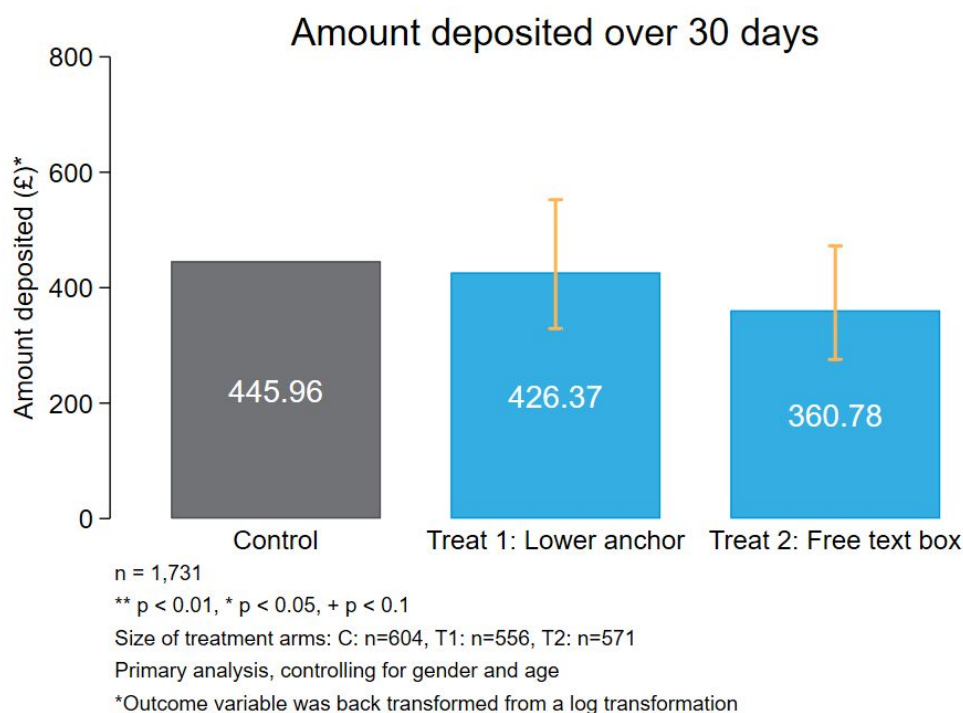
The second primary outcome assessed the actual amount of money customers deposited into their betting accounts over the 30 day observation period following having set an initial deposit limit. Of interest was whether setting lower deposit limits would translate into lower actual deposits. This outcome reflects the total amount of money that the customers have put into their gambling account, which can be used as a proxy of (financial) harm. Again, we compared the average across each group, this time in terms of total deposits made.

Table 2. Summary statistics for amounts deposited over 30 days by customers in the trial

| Outcome | Treatment arm | N | Median (£) | Mean (£) | SD (£) |
|-------------------------------|------------------------------|--------|------------|----------|---------|
| Amount deposited over 30 days | Control | 14,327 | 100.0 | 398.9 | 1,133.1 |
| | Treatment 1: Lower anchor | 14,298 | 100.0 | 423.3 | 1,453.3 |
| | Treatment 2: Free text box | 14,377 | 100.0 | 401.9 | 1,183.9 |
| | All players who set deposits | 43,002 | 100.0 | 408.0 | 1264.4 |

The analysis to determine the estimated impact our interventions would have on deposited amounts follows the same procedure as outlined earlier, including that the observed values were log-transformed for the analysis. Figure 11 shows how each group compared on this outcome, with the estimated values for the treatment groups having been back-transformed. Again, error bars for the treatment groups represent 95% confidence intervals.

Figure 11. Comparison of amount deposited over 30 days across control and treatment groups among users who set a deposit limit



An individual in the Control group is estimated to deposit an average of £445.96 in 30 days. We estimate that the same individual would deposit 4.4% less into their account (£426.37, 95% CI = £338.81 - £568.00) if exposed to the lower anchor treatment, and 18% less (£360.78, 95% CI = £278.61 - £477.60) if exposed to the free text box treatment. The largest observed difference in total monthly amount deposited — between the control arm and free text box arm — is just over £85, equivalent to around £1020 per year. This amount would be enough to cover almost all of what are considered the most common unexpected costs that families tend to face each year.⁶⁴

Despite these downward trends, these comparisons were not *statistically significant*, meaning we cannot rule out that these findings are due to chance. More specifically, the small sample size, due to only 4% of customers who were targeted for the trial having actually set deposit limits, reduced the statistical power of the analysis.

Further details on this specific statistical analysis are in Appendix A.4.

4.4 Limitations and constraints

Below we outline some of the limitations and constraints faced by the trial, and offer some discussion on their potential impacts. Broadly, these limitations and constraints fall into two overarching categories: a) the sample analysed, and b) intervention implementation.

4.4.1. Sample limitations

Sample limitations for our trial can be considered at two levels: sample size, and potential issues of selection bias.

On sample size: while less than 5% of the almost 43,000 bet365 customers targeted opted to set limits, this is comparable to a similar and previous trial BIT conducted with a major UK online operator, which saw an average of around 4% uptake of deposit limits, and to other online gambling research involving a similar sample size of $N = 47,000$, in which 1.2% of customers set limits.^{65, 66} To try and ensure the trial captured a larger group of limit setters we originally suggested drawing from a much larger recruitment sample (targeting around $N=150,000$ customers), and recruiting from both new, and existing customers alike, however, neither of these were possible. Not targeting newly-registered customers, in particular, explains why we observed low uptake, as early discussion with bet365 had highlighted that approximately half of all new customers opt to set a deposit limit. Targeting new customers was not possible owing to technical complexities.

A further limitation of targeting only *existing customers without deposit limits* is that *such customers may differ from an “average” bet365 customer in terms of how they think, act, and feel with respect to their gambling, and their use (or non-use) of safer gambling tools*. As such, we have to accept that the sample of customers in our trial may be biased, and likely does not reflect a more broadly representative group of bet365 customers. This means that interventions may have proved less attractive to the targeted customers, and the trial ultimately targeted customers who were harder to convince to set a limit, having likely turned down previous prompts to do so.

4.4.2 Intervention implementation constraints

There were a number of instances where the full vision for how the trial should be implemented could not be met.

Firstly, it was not possible to make the recruitment process as frictionless as hoped with respect to facilitating customers in the trial to set a limit. We had aimed to include a direct link to the deposit limit tool as part of the email prompt in the current trial. This was not possible on technical grounds. BIT's previous research (see section 2.4) indicates that reducing the number of steps a customer needs to take between engaging with an email prompt and engaging a safer gambling tool significantly increases the rate of uptake.

Secondly, it was not possible in every instance to present the trial materials exactly in-line with our suggestions. For example, it was not possible to change the header message contained within login prompts (“Only gamble what you can afford to lose”), or change the visual emphasis of the displayed text (e.g. through bolding) (see figure A.1 in the Appendices), which may have undermined the prompts' saliency. Additionally, in the no anchors treatment arm, the default message displayed for each deposit limit was “No limit”, (see Figure 8 (b) on pg.24) which could not be changed. Despite the removal of numerical anchors, this message may have nonetheless acted as a verbal anchor that influenced limit setting.

Finally, regarding trial prompts, our preference was to display the login prompts soliciting customers to set a deposit in a more timely fashion (e.g. on a number of successive logins), however, instead they were staggered over a three week period. Staggering these notices to one per week over three weeks may have made it more likely that these notices were overlooked, or failed to appreciably affect customers' thinking about engaging with the tool.

4.4.2 Implications

The limitation of sample size in the trial is most evident for our primary outcome on amounts deposited where our analysis did not detect a difference between the groups that ran into hundreds of pounds. While our analysis of this outcome indicates that the deposit limit interventions had no effect on amounts deposited, it remains possible that the available sample was too small to afford enough precision for this outcome. A larger sample would have been able to detect smaller differences in the size of the deposit limits set by customers, or amounts deposited, and allow greater precision with respect to how impactful these interventions are. Despite this, our final sample of $N = 1731$ was still sufficient to detect that our intervention would likely have a significant effect on real-world deposit limits chosen by customers.

Regarding sample selection, being limited to existing customers without deposit limits leaves an open question — and opportunity for future research — around how impactful our interventions may be on limit-setting behaviour among a more widely-representative group of gambling customers. Future research aiming to build on, or replicate the interventions trialled here can help establish the wider robustness of our findings by — where possible — targeting all types of customer. Additionally, trialing these interventions on customers of different online operators would also add to this picture, and give a better reflection of the generalisability of our findings.

The various intervention implementation constraints may have impacted the saliency of our attempts to drive deposit limit uptake, and the ease of engaging with the tools, which in practical terms may have also hampered recruitment. Future trials could look to further facilitate access to deposit limit tools through, for instance, ensuring all means of invitation to set a limit involve direct, one-click access to the limit tool. Prompts to encourage setting deposit limits could also be varied to be deployed at other, perhaps more salient touch points — not simply upon login to one's account — such as when placing a bet, or during the process of making a deposit.

5. Recommendations, reflections, and next steps

Chapter summary

- We recommend that:
 - a. Deposit limit tools should not present *any* anchors. Customers should be presented with a free text box with no visible or suggested minimum/maximum monetary amounts on display.
 - b. Operators should conduct more tests on how best to increase the uptake of deposit limit tools - particularly around reducing friction, and onboarding new customers - and share their insights.
 - c. More research funding should be — as a priority — directed towards causal evaluations (involving both new, and existing customers) that will yield insights that can be scaled across the industry.
- We also present reflections on some key outstanding questions around how behavioural science could further improve safer gambling tools.

5.1 Key recommendations and insights

This study is — to our knowledge — the first to test the efficacy of deposit limit tools involving real customers of a major gambling operator in Britain. We offer three key recommendations based on the trial's primary findings. The recommendations are variously targeted at gambling operators, policymakers, and other stakeholders.

Key recommendation 1: We recommend that customers setting deposit limits are presented with a free text box with no visible or suggested minimum/maximum monetary amounts on display.

We recommend that this be implemented across the industry as part of social responsibility code provisions under the Gambling Commission's License Conditions and Codes of Practice (LCCP). This will ensure a) customers across all British regulated remote operators have access to a *standardised* deposit limit tool, and b) preserves the competitive landscape for operators and creates a fairer playing field. This would greatly expand the potential for evaluating the impacts these tools have, not only at the point of choosing a limit, but on subsequent gambling behaviour.

This recommendation speaks clearly to point five of the Betting and Gaming Council's Safer Gambling Commitments, which calls to 'create a positive culture...where safer and well-controlled gambling is the norm', through 'sharing best practice to raise safety standards across the industry'.⁶⁷ **In place of LCCP provisions we alternatively recommend that the Gambling Commission regularly updates the public regarding which operators have yet to remove high anchors from their tools.** This approach would not only address recent calls on the Commission to utilise reputational incentives, but also give the industry scope to demonstrate proactive progress in lieu of active regulation.⁶⁸

While we acknowledge that this trial does have limitations in terms of sample, as the first trial of its kind in the UK it should stand as a starting point to begin further building out the evidence base on safer gambling interventions. In light of this, we also recommend that any change to regulation that mandates operators to change their deposit limits should be monitored by the Commission so as to evaluate impacts on player behaviours over time.

Key recommendation 2: Operators should embed what works to increase the uptake of deposit limits (e.g. reduce friction by ensuring ease of access), continue to test what works, and share these insights.

This trial provides clear evidence on how deposit limit tools can be designed such that customers choose lower limits. However, it remains the case that many customers do not engage with these kinds of tools. The Gambling Commission indicates that in 2019, an average of 9% of people who have gambled in the previous four weeks used any kind of “financial limit” (though it is unclear if this refers only to deposit limits, or includes other limits such as stake limits).⁶⁹ Less than 5% of people in our trial opted to set limits, which is broadly in line with what other research has found.^{70 71} This is despite the fact that a majority of people who gamble (70%+) consider these tools to be useful.⁷²

BIT’s previous work shows that making it easier for people to directly access deposit limit tools increases their uptake.⁷³ Therefore, we recommend that operators conduct testing into how best to prompt non-limit setters to set meaningful monetary limits.

There is some evidence that non-limit setters avoid these tools as they perceive them to be specifically for those who have gambling problems.⁷⁴ Elsewhere, evidence shows that as much as 42% of people are simply unaware of the availability of these tools.⁷⁵ More testing is needed to determine how the content, timing, and channel of prompts affect uptake. BIT’s previous research has shown how to reduce friction in accessing tools to drive uptake: we saw significantly increased uptake of deposit limits when email solicitations contained direct hyperlinks to deposit limit tools. Additionally, there may be opportunities around newly-registering customers. At present, online operators typically encourage new customers to set limits by presenting their standard deposit limit tool either as part of the registration process, or just after, which we encourage. However, much more can be done to build on the limited research around the impact of these kinds of prompts at different points in the customer journey, and message framing.^{76 77}

Getting these kinds of prompts right and increasing the uptake of deposit limit tools is of value to operators and their customers alike. Customers who voluntarily set limits when prompted are more likely to still be actively betting with an operator one year later compared to who don’t set limits.⁷⁸ With the right deposit limit tools in place, these customers will be better protected, without a risk that they may take their business elsewhere.

Key recommendation 3: We recommend that more research funding is directed - as a priority - towards causal evaluations that will yield insights that can inform policy and be scaled across the industry.

Regarding safer gambling tools, again this recommendation speaks directly to the Betting and Gaming Council's fifth safer gambling commitment on sharing best practices for safer gambling, and particularly on 'developing an open-source collaboration repository for all gambling companies to access safe gambling tools'.

The academic literature is still relatively new, with the vast majority of peer-reviewed studies coming in the last 10 years alone.⁷⁹ Additionally, regulators and the industry are often reticent to implement changes to safer gambling initiatives on the grounds of lacking evidence.⁸⁰ More recently in the UK, a review of the current regulatory landscape by the Public Accounts Committee noted that both the Gambling Commission and DCMS showed similar apprehensions about instigating change.⁸¹

Much more work is needed to test robustly and independently the impacts of various facets of online gambling using randomised controlled trials in live business environments. Only then will robust, independent evidence exist to inform policies, practices and procedures. Such trials would help to inform the specific and most effective safer gambling tools, for example, operators should provide to customers, and how these tools should operate. The approach could also be used to test factors around game design; customer interactions; and the impact of different kinds of offers on subsequent behaviour. To these ends, we strongly recommend that operators work with independent researchers to design, test and share results from trials measuring the impact of safer gambling tools. Further research like that reported here will ensure that people are served by the best-in-class safer gambling tools no matter where they gamble online.

Some key outstanding areas where additional research is required include:

- **Interface design:** How might different interfaces influence if and how safer gambling tools are used? This trial has revealed that dropdown menus for deposit limit setting may be problematic due to anchoring effects and suggests free text boxes as the better alternative. But the positive or negative impact of alternative interfaces remains untested.
- **Timely prompts and helpful information:** When is the best time to motivate people to use safer gambling tools? And how can individual play metrics such as time and money spent, as well as gains and losses, be presented so as to best-inform at-risk of gambling harm around when to use safer gambling tools?

The current work shows the potential for how such field trials could benefit harm reduction in the industry, but there must be willingness from the industry to carry forward this work. **We therefore also recommend that the Gambling Commission should look to require operators regularly to complete field trials aimed at independently evaluating their safer gambling practices.** To facilitate this, the Commission should — where possible — agree to, for example, review and possibly reduce the number of requests on operators, or extend deadlines, on specific conditions that safer gambling field trials are completed efficiently. This should, of course, take consideration of regulatory compliance and other safer gambling initiatives that may be ongoing.

5.2 Outstanding questions for how behavioural science could improve the effectiveness of deposit limits

We have learned there is promise in making deposit limit tools more effective in reducing gambling spending by avoiding anchoring effects. But our work reveals changing anchors alone will not be sufficient, and there remain other possibilities for behavioural insights to inform the design of these tools:

- **Take up.** Only about 1 in 25 people in our trial set a deposit limit, although they received prompts to do so. Behavioural science and experimentation can inform the design of prompts in order to make them as compelling and easy to act on as possible.
- **Realistic limits.** We learned that even with lower or no anchors, the average deposit limits set in our trial were high. Future work should explore how to assist people in setting realistic limits that work best in terms of offering freedom of enjoyment *and* sufficient protection.
- **Sticking to limits.** Low deposit limits are only effective in reducing harm if people do not breach them. Our efforts to encourage people to set (lower) limits should therefore also take into account how the design of deposit limit tools can assist people in sticking to their limits over time. Additional analysis of the current trial (see Appendix A4), indicates that people in our treatment groups increase the size of their limits later in the trial period, although this is not statistically-significant. Future work to build better deposit limit tools should focus on what limits people choose to set, how best to help them maintain control and stick to their limits.

To influence all three, it is valuable to know *why* people choose to set limits. People who don't set limits typically believe a) that they don't need them as they can control their gambling without a deposit limit, and b) that deposit limits are only for people with gambling problems.⁸² But the way the tools are presented could have an impact on their usage: 'self appraisal' messaging encouraging people to reflect on, appraise, evaluate and 'self-regulate' may be more effective in changing behaviour than messages informing them of risks.⁸³

Where the trial presented in this report intervened on *how* people set limits, our next trial will look to encourage people to think about *why* they set limits.

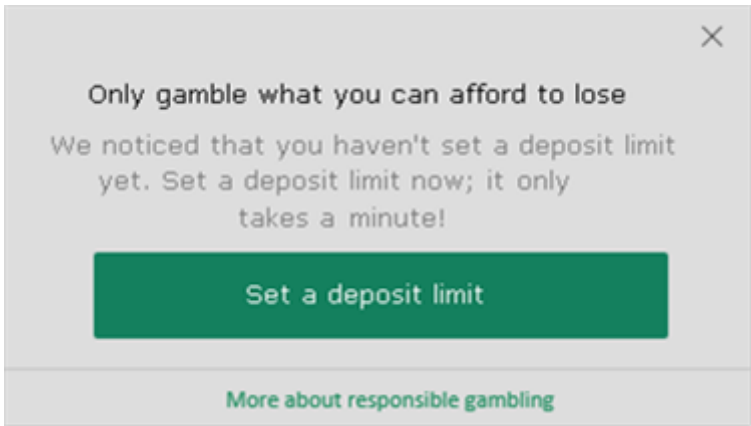
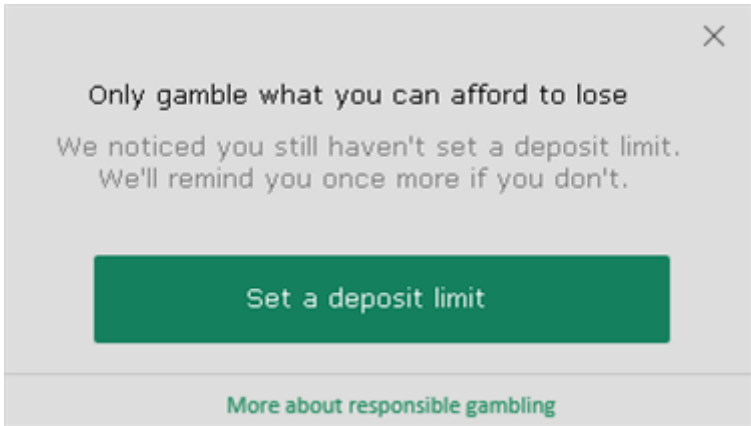
We will test how two forms of so-called 'commitment devices' (choosing from a list of reasons for why they are setting a limit and a text box where people can write down advice they'd give to someone who is thinking about setting a deposit limit) influence the take up and size of deposit limits and potentially how well players stick to their limits. If working as intended, the advice-giving prompt would act as a self-persuasion tool. Evidence shows that self-generated advice produces more powerful and long-lasting behaviour change than prompts that suggest how people should behave.⁸⁴

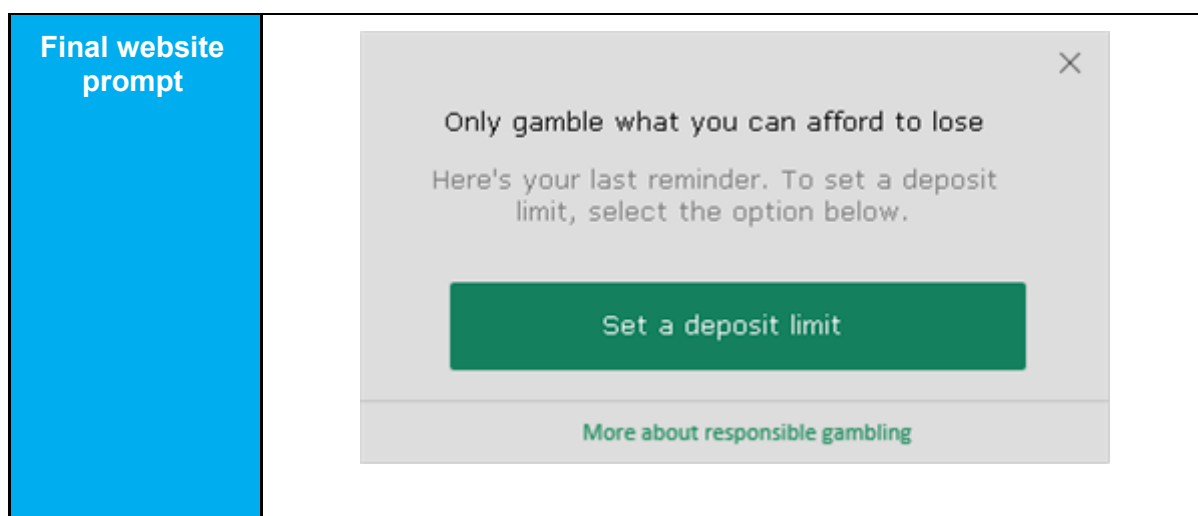
Appendices

A1. Trial recruitment material

The 45,000 existing customers chosen randomly by bet365 to be targeted for the trial each received a series of prompts aimed at encouraging them to set a deposit limit. In total, customers could receive three pop-up messages upon login to their bet365.com account, and one email prompt. Table A below shows the three login pop-up prompts displayed in the trial.

Figure A1. Website pop-up recruitment prompts received by customers targeted for the trial

| | |
|-----------------------|---|
| First website prompt |  A grey rectangular pop-up window with a close button (X) in the top right corner. The text inside reads: "Only gamble what you can afford to lose" followed by "We noticed that you haven't set a deposit limit yet. Set a deposit limit now; it only takes a minute!". Below the text is a large green button labeled "Set a deposit limit". At the bottom, there is a link that says "More about responsible gambling". |
| Second website prompt |  A grey rectangular pop-up window with a close button (X) in the top right corner. The text inside reads: "Only gamble what you can afford to lose" followed by "We noticed you still haven't set a deposit limit. We'll remind you once more if you don't.". Below the text is a large green button labeled "Set a deposit limit". At the bottom, there is a link that says "More about responsible gambling". |



Customers received one such prompt per week over a 30 day recruitment period. In addition, people who did not respond to the first login prompt by setting a limit received an email prompt two days later:

"Hi [Name],

Many bet365 players set deposit limits and we encourage all our members to do so. We've noticed that you haven't set one yet. Click here to set your own limit.

Deposit limits help you stay in control of how much you're playing, and protect you from spending more than you can afford. We encourage you to set one too. It only takes a minute.

*Thank you,
bet365"*

Two promising areas of future research may be to examine the effect of varying the frequency of these pop-ups (e.g. occurring upon each login) and the messenger signing off in the email (e.g. from a named executive or employee to make the email more personal).

Customers continued to receive prompts until either (a) they had set a deposit limit, or (b) they had received all prompts.

A2. Trial sample considerations

Sample size targets, and power calculations

The target sample size for the trial was based on power calculations conducted on the basis of baseline data provided to us by bet365. These data included 261,401 customers who had set deposit limits.¹ The trial first targeted 15,000 existing customers without deposit limits and

¹ Power calculations are a statistical technique which can be used to estimate how many participants should be recruited to ensure the effectiveness of the intervention can be assessed.

was extended to 45,000 existing customers due to low uptake of the deposit limits. Below we set out some assumptions which shaped our power calculations:

Sample size. The number of observations will depend on the number of players who set deposit limits. We therefore calculate the minimum detectable effect size (MDES) for a range of values. 45,000 bet365 players will be randomised into the trial .

Number of trial arms. The number of arms will be three.

Clustering. There is no clustering.

Significance level. This refers to the probability of incorrectly rejecting the null hypothesis. It is standard practice to set this value at 0.05 (two-tail).

Power. This refers to the probability of correctly detecting an effect and thus accepting the alternative hypothesis when it is true. It is standard practice to set this value at 0.80 or above.

Primary Outcome 1: Size of deposit limit

Unfortunately we did not have access to baseline data on this outcome as such we calculated power in terms of Cohen's D. Assuming 50% take up of deposit limits in the sample would mean the trial could detect a change of 0.05 standard deviations in the outcome. The 50% uptake assumption is based on discussions with bet365 that indicated that around half of all new customers opt to set a deposit limit. While our trial sampled only *existing* customers, it involved a direct solicitation to set a limit, as is the case with new customers.

With the trial recruiting only from existing customers who do not currently have deposit limits in place, there is a risk that uptake of the deposit limit offer is low. We therefore also calculated MDES based on lower rates of uptake. Assuming lower rates of uptake, the trial was powered to be able to detect changes in the order of 0.14 SD (5% uptake), 0.10 SD (10% uptake), and 0.08 SD (15% uptake).

Primary Outcome 2: Amounts deposited in 30 days after setting limit

Baseline data provided by bet365 showed that the distribution of deposits had a strong positive skew, which informed our decision to log-transform this variable for analysis. We used the delta method to obtain the mean and standard deviation of the log transformed distribution Y from the original distribution X:

$$Y = \ln(X) = \ln(347.59) = 5.85$$

$$y = x/X = 42.23/347.59 = 0.12$$

Our power calculations for this variable reflected the fact that we planned to conduct an intention-to-treat analysis on this outcome. This means that regardless of the number of players actually setting a deposit limit, the minimum difference between those allocated to a treatment group and those allocated to the control group that we will be able to detect would be £1.36. Given that the take-up of deposit limits was much lower than we anticipated when designing the trial and conducting power calculations, we conducted a post-hoc power calculation to establish the sample size of players who set limits required for our trial to be powered to detect the effect size we observed in treatment 2. The sample required to detect

a minimum detectable effect size of 18% is 9750. This number is much larger than the sample size in our trial (N=1731) and indicates that this analysis is indeed underpowered.

The total number of customers included in the trial data was just under the target (N= 43,002). The reason for this discrepancy is that bet365 indicated that observations from 1,998 customers (i.e. the difference between 45k and 43k) were excluded from the data they provided owing to corrupt, or incomplete data. Of these excluded customers, 34% (N = 672) were removed from the BAU arm, with 35% (N = 703), and 31% (N = 623) being excluded from the lower anchor, and free text arms respectively.

Randomisation and balance checks

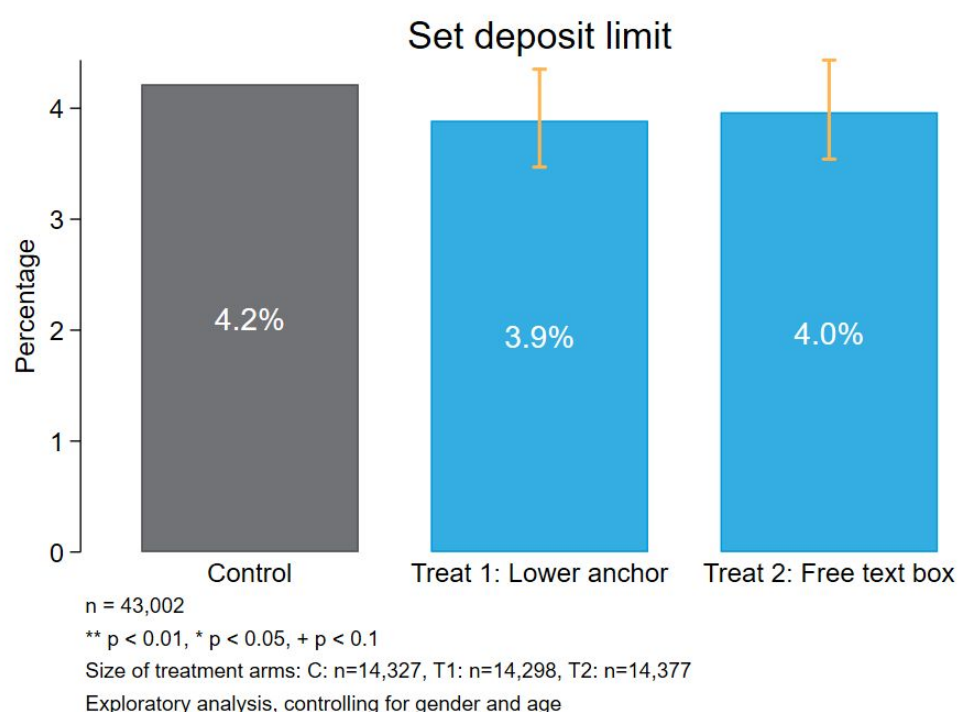
We conducted balance checks across the treatment groups across the observable characteristics of customers' gender and age. As Table A1 shows below, the treatment groups were balanced across gender and age.

Table A1: Balance Checks of gender and age on treatment

| | (1) | (2) |
|---|------------------|-------------------|
| | Gender | Age |
| Treat 1: Lower anchor | 0.129 (0.408) | 35.166 (0.746) |
| Treat 2: Free text box | 0.127 (0.661) | 35.216 (0.450) |
| Constant | 0.126 | 35.282 |
| Observations | N | 43,002 |
| Robust Standard Errors in Parentheses, p<0.1 +, p<0.05 *, p<0.01 ** | | |

Deposit take-up

Take-up of deposit limits was low in the sample. As shown in Figure A2, around 4% of customers in the sample set a deposit limit. One implication of this is that our trial may not have had a large enough sample to detect significant differences in outcomes (e.g. the amount deposited) across our treatment groups.

Figure A2. Overall uptake of deposit limits observed in the trial.

From Figure A2, we observed 3.9% (95% CI = 3.5% - 4.3%) uptake of deposit limits for treatment 1, and 4.0% (95% CI = 3.5% - 4.4%) for treatment 2.

A3. Trial outcome measures, and observation period

During the observation period of the trial, trial participants who opted to set deposit limits were monitored for 30 days from when they set their limit. The outcome measures we captured fall into three categories:

- **Primary** outcomes which provide the headline results of the trial
- **Secondary** outcomes which are of more peripheral interest relative to the primary outcomes
- **Exploratory** outcomes which are not directly related to the trial's research questions, and unlike the primary and secondary outcomes are not specified beforehand

It is important to limit the number of research questions and outcome measures examined in any one study. This is because the more statistical tests are run, the more likely it is that significant results will be discovered purely by chance. Therefore, we specified two primary outcomes and one secondary outcome. These were motivated by the trial's research question of whether reducing or removing the deposit limit anchors lowers the likelihood of problematic gambling. To account for the increased chance of significant results being the result of chance due to making multiple comparisons, we also adjusted the results from the primary and secondary analysis using the Hochberg step-up procedure. The Hochberg procedure reduces the threshold p-values must be smaller than for an effect to be found statistically significant according to the number of comparisons made within each group of outcomes (i.e. primary and secondary outcomes). We do not adjust for multiple comparisons

for the exploratory outcomes as they only evaluate outcomes for evidence of promise and the findings should only be interpreted as exploratory.

Hochberg step-up procedure: The p-values are ranked from smallest to largest and the threshold for statistical significance is adjusted according to this rank. Where the lowest threshold is assigned to the smallest p-value. The original threshold (i.e. 0.05) is divided by the number of outcomes (i.e. 4) to determine the lowest threshold ($0.05/4 = 0.0125$). The thresholds are subsequently increased uniformly by adding 0.0125 for each rank, so that the threshold for the largest p-value is compared to the 0.05. The p-values must be smaller than their assigned threshold for the findings to remain statistically significant after accounting for multiple comparisons.

Our final primary and secondary outcome measures were:

- 1) **Primary outcome - Size of deposit limit(s) set.** We tracked changes in customers' choices across all three limit types (24 hour, 7-day, and 30-day). We hypothesised that removing high anchors from the process would lead customers to set lower deposit limits, and reduce their potential exposure to higher losses.
- 2) **Primary outcome - Total amount (£) deposited over 30 days.** This reflects the total amount of money that the customers have put into their gambling account, which can be used as a proxy of (financial) harm.
- 3) **Secondary outcome - Net winnings over 30 days.** This was calculated as the total payout(s) of a bet(s) minus the amount(s) staked to play the bet(s). Given that customers, on average, lose money playing, average net winnings are expected to be negative. However, lower amounts deposited, lower amounts staked, or amounts staked on less risky games could contribute to a lower negative net winnings figure. For these reasons, net winnings can be seen as a reasonable proxy for risky play.

We also conducted analysis for the following **exploratory** outcome measures:

- 4) **The likelihood of customers removing their deposit limits** to see whether this differed across the trials' arms and customers in these groups
- 5) **Differences between the first and last deposit limit** to see whether this differed across the trials' treatments
- 6) **The natural logarithm of stakes after 30 days** and how these were affected by the treatment, in order to provide insights into the intervention's effects on risk-taking

A4. Additional findings

Primary outcome 1: Size of deposit limit set

This outcome refers to the choice of deposit limit those enlisted into the trial opted to set. Customers could set daily, weekly, and monthly deposit limits. To standardize the analysis, we converted all types of limits set by the customer into a daily limit equivalent (see. pg. 26 for a fuller explanation of this approach).

Table A2: Further summary statistics for each type of deposit limit set by customers in the trial

| Deposit limit type | Treatment arm | N | Median (£) | Mode (£) | Mean (£) | SD (£) |
|--------------------|------------------------------------|------|------------|----------|----------|-----------|
| 24 hours | Control | 430 | 100 | 25 | 6658.2 | 23,298.9 |
| | Treatment 1: Lower anchor | 387 | 50 | 100 | 442.8 | 3,107.9 |
| | Treatment 2: Free text box | 387 | 50 | 20 | 1086.2 | 7,437.3 |
| | All players who set 24 hour limits | 1195 | 50 | 100 | 2882.8 | 14,957.0 |
| 7 days | Control | 421 | 100 | 25 | 6735.3 | 22,442.5 |
| | Treatment 1: Lower anchor | 351 | 50 | 100 | 624.0 | 5,539.0 |
| | Treatment 2: Free text box | 384 | 50 | 50 | 925.8 | 5,409.3 |
| | All players who set weekly limits | 1156 | 100 | 100 | 2949.9 | 14,504.5 |
| 30 days | Control | 390 | 250 | 100 | 38,922.3 | 120,700.1 |
| | Treatment 1: Lower anchor | 274 | 175 | 250 | 2189.6 | 12,479.0 |
| | Treatment 2: Free text box | 358 | 200 | 100 | 3466.9 | 12,959.2 |
| | All players who set monthly limits | 1022 | 200 | 100 | 16,654.4 | 77,184.8 |

The impact of the interventions on the size of deposit limits was estimated using the OLS regression below. The outcome variable was log transformed to account for the highly right-skewed distribution of the outcome variables, where the mean is much higher than the median value. This transformation reduces the disproportional weighting of outliers in the regression and models a multiplicative treatment effect instead of an additive treatment effect. The coefficients are transformed back into monetary values when presented in bar graphs to make them easier to interpret. Only individuals who set a deposit limit will be included in this analysis.

$$\ln L_i = \delta + T_i \delta_1 + X_i \delta_2 + v_i$$

Where:

$\ln L_i$ is a log of customer i 's first deposit limit size, deposit limits will all be translated to daily limits. We choose to log the variable because the values of mean and median in baseline data provided by bet365 prior to the trial indicated that the distribution of deposits is positively skewed;

T_i is a vector of treatment dummies indicating individual i 's treatment allocation. The treatment variable is included as a categorical variable where control=0, treatment 1=1 and treatment 2=2 ;

X_i is a matrix of customer i 's demographic characteristics. The demographic covariates included are gender and age. Gender is a binary variable and age a categorical variable with the following categories 18-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70+; and

v_i is heteroskedasticity robust error term.

Table A3, below, provides the results of the analysis on the first primary outcome: the effect of treatment assignment on the log of size of deposit limits. Customers setting a deposit limit with a screen displaying a lower anchor (treatment 1) set deposit limits approximately 45%² lower than participants who used the control screen. Similarly, customers in treatment 2 (who entered their deposit limit using a free text box) also set deposit limits 46% lower than the players in the control group. These effects were statistically significant for both treatment arms ($p < 0.01$).

Table A3: Effect of treatment on log of deposit limits

| | Customers who set deposit |
|---|---------------------------|
| Treat 1: Lower anchor | -0.605** |
| | (0.126) |
| Treat 2: Free text box | -0.607** |
| | (0.134) |
| Female | 0.472* |
| | (0.181) |
| N | 1731 |
| Control_mean | 3.16 |
| Robust standard errors in parentheses | |
| + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$ | |

Exploratory analysis: Size of deposit limit - Quantile regression

² The percentage decrease is equal to $1 - \exp(-\beta)$, in this case $1 - \exp(-0.605) = 0.454$

Table A4 presents the results of a quantile regression on the size of deposits. The largest difference between the customers is observed at the 75th percentile, where being in either treatment arm is associated with a statistically significant £33 reduction in the 75th percentile of deposit limits (treatment 1: $p=0.043$ & treatment 2: $p=0.042$). This indicates that the effect of our intervention on reducing the size of deposit limits was most apparent among customers setting higher limits.

The median size of deposit limit was also lower for players in the treatment arms. This finding is not significant for treatment 1 ($p=0.051$) and significant for treatment 2 ($p=0.046$). Finally, we do not observe a noticeable difference between the treatment arms and the control arm at the 25th percentile.

Table A4: Effect of treatment on size of deposit limit quartiles

| | Q1 | Median | Q3 |
|------------------------|-------------------|--------------------|----------------------|
| Treat 1: Lower anchor | 0.000 (0.427) | -4.702+ (2.407) | -33.333* (16.495) |
| Treat 2: Free text box | -0.476 (0.424) | -4.762* (2.387) | -33.333* (16.354) |
| N | 1731.00 | 1731.00 | 1731.00 |
| Control_quantile | 3.57 | 14.29 | 100.00 |

Robust standard errors in parentheses

+ $p<0.10$, * $p<0.05$, ** $p<0.01$

Primary outcome 2: Amount deposited over 30 days

As a reminder, the total amount (£) deposited over 30 days reflects the total amount of money that the customers have put into their gambling account, which can be used as a proxy of (financial) harm.

The impact of the interventions on deposited amounts was estimated using the OLS regression below. The outcome variable was log transformed using the following transformation $\ln(Z_i + 1)$. We added +1 as the outcome can take a value of 0 and equals 0, while is undefined. The log transformation is used to reduce the impact of outliers in the rightly skewed distribution of the outcome variables, where the mean is much higher than the median value. This transformation reduces the disproportional weighting of outliers in the regression and models an approximately multiplicative treatment effect instead of an additive treatment effect. The coefficients are transformed back into monetary values when presented in bar graphs to make them easier to interpret.

$$\ln(Z_i + 1) = \beta_0 + T_i\beta_1 + X_i\beta_2 + \omega_i$$

Where:

Z_i is customer i 's total deposited amount calculated over the 30 day measurement period. We choose to log the variable because the values of mean and median provided by bet365 indicate that the distribution of deposits is positively skewed. We add 1 to avoid excluding those with total of zero;

T_i is a matrix of treatment dummies indicating individual i 's treatment allocation. The treatment variable is included as a categorical variable where control=0, treatment 1=1 and treatment 2=2;

X_i is a matrix of customer i 's demographic characteristics. The demographic covariates included are gender and age. Gender is a binary variable and age a categorical variable with the following categories 18-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70+; and

ω_i heteroskedasticity robust error term.

Table A5 provides the results of the analysis for the second primary outcome: treatment assignment on amount deposited over 30 days. Column 1 displays the results for all customers in the trial and Column 2 displays results for the target population; the sub-group of customers who set deposit limits.

In Column 1, we observe no difference in the amount deposited by customers in treatment 1 and the control group. We do find that customers in treatment 2, on average, deposited 3% more than customers in the control group, but this difference is not significant ($p=0.20$). These findings are not surprising as only 4% of customers set deposit limits, which limited the potential impact of the intervention on amounts deposited.

The results highlighted in Column 2 are restricted to customers who set deposit limits. Customers who set limits using the lower anchor (treatment 1) on average deposited slightly less than customers in the control group. This finding is not significant ($p=0.90$). While customers who set the deposit limits using the free text box (treatment 2) were found to deposit 18% less customers who set deposit limits using the control screen, on average. This finding is not significant ($p=0.14$).

Table A5: Effect of treatment on log of deposit amount

| | (1) Full sample | (2) Customers who set deposit |
|------------------------|---------------------|-------------------------------------|
| Treat 1: Lower anchor | 0.002 (0.026) | -0.016 (0.132) |
| Treat 2: Free text box | 0.037 (0.026) | -0.201 (0.137) |
| Female | -0.573** (0.034) | -0.454* (0.177) |
| N | 43002 | 1731 |
| Control_mean | 4.27 | 4.16 |

Robust standard errors in parentheses

+ p<0.10, * p<0.05, ** p<0.01

Table A6: Primary outcomes multiple comparisons adjustments

| Comparison (Outcome and treatment arm) | P-values | 5% Adjusted Threshold | Significant at 5% level (Yes/no) with multiple comparisons adjustments |
|---|----------|--------------------------|---|
| Log of size of deposit limit - treatment 1 | <0.001 | 0.0125 | Yes |
| Log of size of deposit limit - treatment 2 | <0.001 | 0.025 | Yes |
| Log of amount deposited - treatment 2 | 0.144 | 0.0375 | No |
| Log of amount deposited - treatment 1 | 0.901 | 0.05 | No |

Secondary outcome: Net winnings over 30 days

Secondary analysis focused on the impact of interventions on customers' net winnings.

As a reminder: net winnings is defined as the total payout of a bet(s) minus the amount staked to play the bet. Given that players, on average, will lose money playing, we expected average net winnings in each condition to be negative. However, lower amounts deposited, lower amounts staked, or amounts staked on less risky games would be expected to

contribute to a lower negative net winnings figure. For these reasons, net winnings can be seen as a reasonable proxy for risky play.

This analysis includes all customers in the trial, regardless of whether they set a deposit limit or not. The model was specified as follows:

$$W_i = \gamma_0 + T_i\gamma_1 + X_i\gamma_2 + v_i$$

Where:

W_i denotes customers i 's total net winnings calculated over the 30-day measurement period (this is negative if the customer lost money, and reflects only the outcomes of bets and not deposits or withdrawals);

T_i is a matrix of treatment dummies indicating individual i 's treatment allocation. The treatment variable is included as a categorical variable where control=0, treatment 1=1 and treatment 2=2;

X_i is a matrix of customers i 's demographic characteristics. The demographic covariates included are gender and age. Gender is a binary variable and age a categorical variable with the following categories 18-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70+; and

v_i is the error term. We will use heteroskedasticity robust standard errors in our parameter estimates.

Table A7 provides the secondary results of the analysis: treatment assignment on net winnings. On average, net winnings were lower for customers in the treatment arms than for customers in the control group. We observe no significant effects of the treatment on net winnings (treatment 1: $p=0.23$ & treatment 2: $p=0.22$). As mentioned earlier, we cannot clearly interpret this outcome variable as net winnings are affected by gambling behaviours undertaken before the trial began. Additionally, net winnings are positive on average, which blurs the link between risky gambling and net winnings.

Table A7: Effect of treatment on Net winnings

| | Full sample |
|--|----------------------|
| Treat 1: Lower anchor | -5.802 (4.783) |
| Treat 2: Free text box | -4.119 (3.338) |
| Female | -11.525** (4.124) |
| N | 43002 |
| Control_mean | 25.03 |
| Robust standard errors in parentheses + p<0.10, * p<0.05, ** p<0.01 | |

Table A8: Secondary outcomes multiple comparisons adjustments

| Comparison (Outcome and treatment arm) | P-values | 5% Adjusted Threshold | Significant at 5% level (Yes/no) with multiple comparisons adjustments |
|--|----------|--------------------------|---|
| Total net winnings - treatment 2 | 0.217 | 0.025 | No |
| Total net winnings - treatment 1 | 0.225 | 0.05 | No |

Exploratory outcome 1: Removed deposit limits

This outcome concerned the likelihood of customers removing their deposit limits at any point during the 30 day observation period subsequent to a limit being set.

Table A9 provides the results on the effect of treatment assignment on removing deposit limits for customers who set limits. Column 1 presents the coefficients and column 2 the marginal effects. customers in treatment 1 were slightly more likely to remove their deposit limit by day 30 than customers in the control arm but this marginal effect is not statistically significant ($p=0.52$). The observed effect of treatment 2 on removing deposit limits is more pronounced with approximately 4% more customers in this group predicted to remove their deposit limit compared to the control. This marginal effect is not significant ($p=0.08$).

Table A9: Effect of treatment on predicted probability of removing deposit limit

| | (1) Removed deposit limits - Coefficients | (2) Removed deposit limits - Marginal effects |
|------------------------|--|--|
| Treat 1: Lower anchor | 0.108 (0.165) | 0.014 (0.021) |
| Treat 2: Free text box | 0.283+ (0.161) | 0.038+ (0.021) |
| Female | -0.887** (0.252) | |
| N | 1731 | 1731 |
| Control_mean | 0.15 | 0.15 |

Robust standard errors in parentheses. Note: The removed deposit limit outcome is equal to 1 if a customer had no deposit limit 30 days after setting a deposit and 0 if a customer had a deposit limit 30 days after setting a deposit limit. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Exploratory outcome 2: Differences between the first and last deposit limit

This outcome was an attempt to determine if those in each of the trial groups differed with respect to any changes in the size of their deposit limit between the observation period outset, and completion.

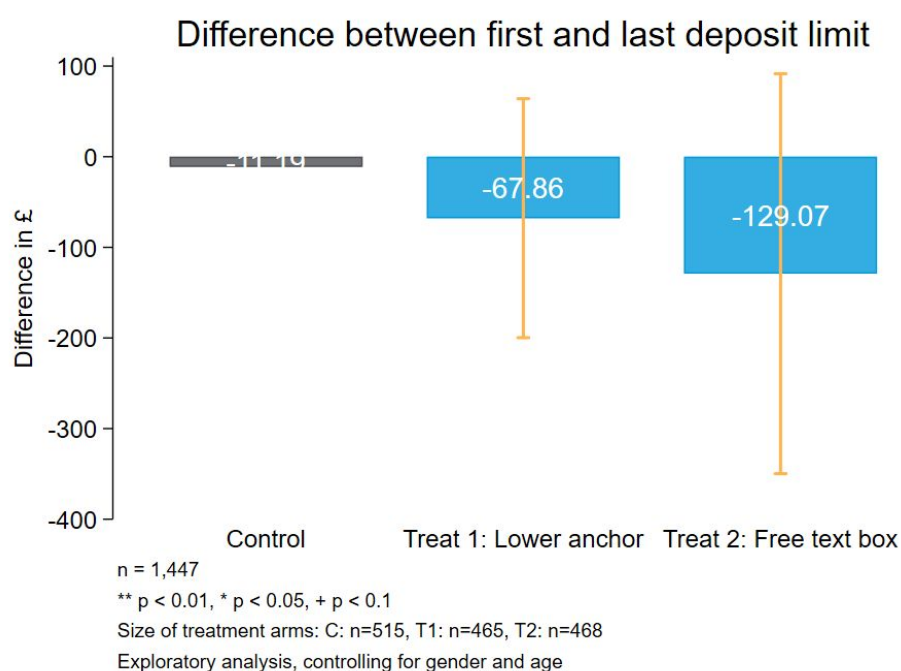
We also explore the effect of the intervention on the size of the deposit limit for the customers who did not remove their deposit limit (see Table A10 below). The outcome is the difference between the first limit set and the limit on day 30 and thus a negative coefficient represents an increase in deposit limits. On average customers in the treatment arms increased their deposit limits more than customers in the control arm. Neither of the observed effects are statistically significant (treatment 1: $p = 0.40$ & treatment 2 $p = 0.30$). Figure A3 shows the size of the difference between initial, and final deposit limits for each experimental group.

Table A10: Effect of treatment on difference in deposit limits

| | Customers who did not remove deposit limits |
|------------------------|---|
| Treat 1: Lower anchor | -56.896 (67.934) |
| Treat 2: Free text box | -117.457 |

| | |
|---------------------------------------|-----------|
| | (112.849) |
| Female | -193.000 |
| | (239.341) |
| <hr/> | |
| N | 1447 |
| Control_mean | -11.19 |
| <hr/> | |
| Robust standard errors in parentheses | |
| + p<0.10, * p<0.05, ** p<0.01 | |

Figure A3. Average increase in deposit limits from Day 1 to Day 30 for each treatment group.



From Figure A3: initial deposits by those in the lower anchor group were on average £67.86 smaller (95% CI = -£201.35 - £65.17), and those made by customers in free text box group on average £129.07 smaller (95% CI = -£350.01 - £92.72) than deposits made at the end of the observation period.

Exploratory outcome 3: Log of stakes over 30 days

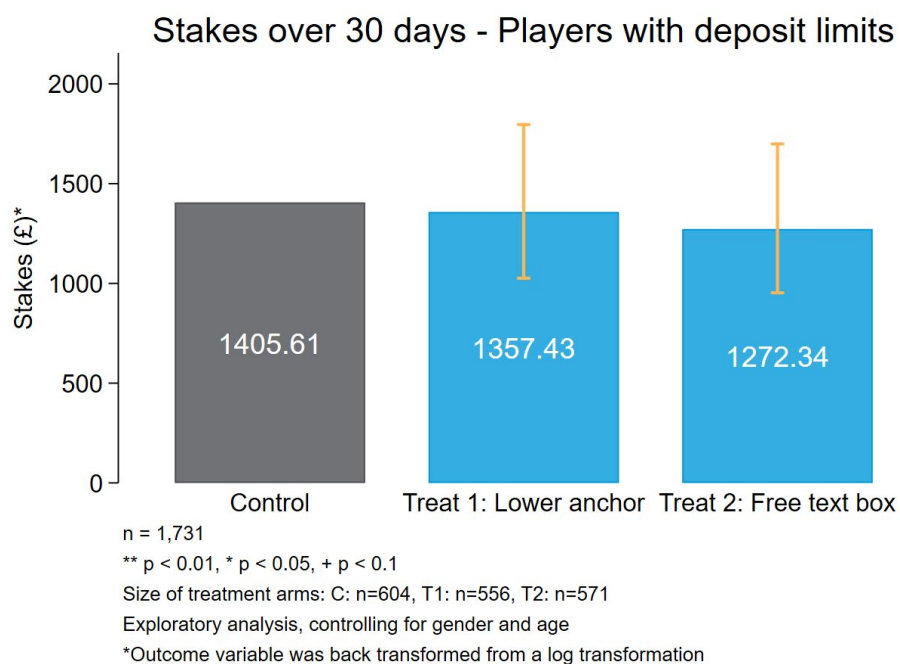
This outcome captured the natural logarithm of stakes made by customers during the 30 day observation period subsequent to having set a limit. Placing higher stake bets is generally indicative of riskier gambling.

Table A11 presents the results of the analysis investigating the relationship of treatment on stakes over 30 days. This analysis aims to supplement the net winnings analysis and provide some insights on the relationship between the intervention and risk taking. We present results for the full sample in Column 1 and the sub-sample of customers who set deposit limits in Column 2.

We observe only a small non-significant difference between the stakes for customers in the treatment groups and the stakes for the customers in the control group in the full sample. This is in line with the primary results observed on the amount deposited outcome. We find negative non-significant differences between the stakes of players in treatment 1 and treatment 2 compared to the control when we focus on the sub-sample of players who set a deposit limit (treatment 1: $p=0.82$ & treatment 2 $p=0.49$). The largest average reduction in stakes is observed with players in treatment 2, where the total stakes were on average approximately 10% lower than the average stakes in the control group. Figure A4 shows the average stakes made during the period for each of the three groups.

Table A11: Effect of treatment on stakes over 30 days

| | (1) Full sample | (2) Customers who set deposit limits |
|--|---------------------|--|
| Treat 1: Lower anchor | 0.026 (0.026) | -0.032 (0.143) |
| Treat 2: Free text box | 0.032 (0.025) | -0.101 (0.148) |
| Female | -0.698** (0.036) | -0.482* (0.200) |
| N | 43002 | 1731 |
| Control_mean | 5.20 | 4.98 |
| Robust standard errors in parentheses + $p<0.10$, * $p<0.05$, ** $p<0.01$ | | |

Figure A4. Average amounts staked over 30 days for each treatment group

From Figure A4: our findings suggested that compared to the control group, customers in the lower anchor group would be expected to stake an average £1357.43 over 30 days (95% CI = £961.43- £1687.87), while those in the free text group would be expected to stake an average of £1272.34 (95% CI = £889.64 - £1588.65).

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