Financial institutions as harms reducers

Promoting gambling management tools in banking apps

BIT

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Acknowledgements

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Contents

List of abbreviations

EGM	Electronic gaming machines
FCA	Finance Conduct Authority
GMT	Gambling management tool
GRFH	Gambling related financial harms
MCC	Merchant Category Code
RCT	Randomised Control Trial

Executive summary

Gambling-related financial harm has a widespread impact across the UK, significantly affecting individuals, families, and communities. Banks are uniquely positioned to help customers manage gambling spending through gambling management tools (GMTs) such as spending limits and transaction blocks. However, many customers remain unaware of these tools or face barriers to using them.

This study examined whether behaviourally-informed messages sent through a major UK bank's mobile app (Danske Bank) could encourage customers to use GMTs and reduce gambling-related financial harm. We conducted a randomised controlled trial with 9,701 bank customers who had spent at least £150 on gambling in a rolling 30-day period.

Methodology

We randomly assigned customers to receive one of two in-app messages or no message (control group). Both messages promoted the bank's existing gambling management tools: spending limits and transaction blocks.

- **Message 1 ("Free tools"):** A straightforward awareness message: "Did you know we offer free tools to help you manage gambling spending?"
- **Message 2 ("How much spent"):** A self-reflection message: "How much do you think you spend on gambling each month? Most people underestimate..."

We tracked gambling spending for 11 weeks after sending the messages and monitored whether customers set up gambling management tools.

Key findings

The messages successfully captured customer attention, with 64% of customers opening their message. However, very few customers went on to set gambling management tools:

- **Control group:** 1.0% set a tool
- **"Free tools" message:** 1.1% set a tool
- **"How much spent" message:** 0.8% set a tool

These differences were not statistically significant.

We observed modest reductions in weekly gambling deposits among customers who received messages:

- **"Free tools" message:** 1.2% reduction in weekly gambling deposits
- **"How much spent" message:** 3.0% reduction in weekly gambling deposits

However, these reductions were not statistically significant. The ranges of plausible effects include both meaningful reductions and small increases, so we cannot be confident that the messages caused these changes.

While no individual result reached statistical significance, we observed consistent directional effects across multiple measures. Both messages showed:

- Slight increases in gambling management tool uptake
- Reductions in gambling deposits
- Similar patterns in net gambling losses

The observed reductions in gambling spending are not statistically distinguishable from zero in this study. This may reflect either a true null effect or insufficient precision to detect smaller but practically meaningful differences. The directional consistency across measures provides some confidence that genuine effects may exist, but a larger study would be needed to confirm this.

Implications

Based on our findings, banks could consider in-app methods for customers to set and alter blocks and limits without contacting bank staff. This addresses the main barrier we identified: high engagement but low conversion to tool usage.

Given the small effect sizes observed but without statistical significance, we recommend several steps before concluding whether banking communications are effective:

- **Larger sample sizes** to improve statistical power for detecting smaller effects
- **Longer tracking periods** to capture delayed responses
- **Testing messages** on multiple occasions that draw clearer analogies

- **Better outcome measures** by linking gambling spend data to broader financial wellbeing indicators

Conclusion

While this study did not demonstrate statistically significant effects, it provides valuable insights into both the promise and limitations of bank-based communications for reducing gambling-related financial harm. The high engagement rates and consistent directional effects across outcomes suggest potential for meaningful impact, but implementation barriers must be addressed first. Most importantly, this research demonstrates that banks can engage customers on gambling-related issues without causing complaints or distress, supporting their role as partners in harm reduction efforts.

1. Introduction

Background

What is gambling related financial harm?

Gambling-related financial harm (GRFH) affects individuals, families, and communities, at different levels of severity. At lower levels, individuals may lose discretionary spending or savings, while more severe cases involve accumulating debt, seeking additional income sources, or reducing spending on important but non-immediate expenses like insurance and healthcare. In extreme cases, individuals struggle to afford necessities such as food and housing.

These financial impacts often create wider consequences including relationship strain, health problems, and long-term economic instability. The effects can persist for years, leading to poor credit ratings, persistent poverty, and disadvantage that affects entire families.[1] While this research primarily focuses on mitigating financial harm, interventions that help individuals manage their gambling spending may also contribute to reducing other interrelated harms.

GRFH is both significant and widespread. According to the Gambling Commission's 2023 survey, among British adults who had gambled in the previous 12 months, 9.7% had bet more than they could afford, 5.7% felt their gambling caused financial problems, and 3.3% had borrowed money or sold items to fund their gambling.[2] Research with UK banks reveals a strong relationship between gambling expenditure and financial distress, with higher gambling spending consistently linked to worse

[1] Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2015). Understanding gambling related harm: A proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health,* 16, 1-23.

[2] Gambling Commission (2024) *Gambling Survey for Great Britain - Annual report (2023): Official statistics*

financial outcomes.[3,4,5] In 2022/23, 60% of callers to the National Gambling Helpline, operated by GamCare, reported gambling-related debt, and 76% reported broader financial difficulties. These harms extend beyond those who gamble, with 47% of 'affected others' seeking support from GamCare also reporting financial difficulties.[6]

Relationship between gambling spend and gambling related financial harm

Gambling expenditure is a strong predictor of harm,[7] but the relationship is complex and not always linear. Research has identified expenditure thresholds for low-risk gambling, beyond which the likelihood of harm increases significantly.[8,9] However, banking data shows varying patterns of risk. Some individuals who spend heavily on gambling have the financial means to sustain it but experience a decline in wealth over time while others, despite spending less, exceed their financial capacity.[10,11]

[3] Muggleton, N., Parpart, P., Newall, P., Leake, D., Gathergood, J., & Stewart, N. (2021). The association between gambling and financial, social and health outcomes in big financial data. *Nature Human Behaviour*, 5(3), 319-326.

[4] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 1: Analysis of Monzo customer data*

[5] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 2: Analysis of HSBC UK customer data.*

[6] GamCare(2024) *Gambling Related Financial Harm: The Impact Report*

[7] Markham, F., Young, M., & Doran, B. (2014). Gambling expenditure predicts harm: Evidence from a venue-level study. *Addiction*, 109(9), 1509-1516.

[8] Currie, S. R., Hodgins, D. C., Casey, D. M., el-Guebaly, N., Smith, G. J., Williams, R. J., & Schopflocher, D. P. (2017). Deriving low-risk gambling limits from longitudinal data collected in two independent Canadian studies. *Addiction,* 112(11), 2011-2020.

[9] Dowling, N. A., Youssef, G. J., Greenwood, C., Merkouris, S. S., Suomi, A., & Room, R. (2021). The development of empirically derived Australian low-risk gambling limits. *Journal of Clinical Medicine,* 10(2), 167.

[10] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 1: Analysis of Monzo customer data*

[11] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 2: Analysis of HSBC UK customer data*.

Gambling management tools to protect consumers

A range of stakeholders, including financial institutions and gambling operators, provide gambling management tools (GMTs) to help individuals manage their gambling and reduce the risk of financial harm. While banks and other financial firms offer GMTs under the FCA's[12] Consumer Duty regulations – requiring them to consider the needs of vulnerable customers[13] – gambling operators also provide similar and complementary tools.

Financial institutions primarily focus on limiting gambling-related transactions. Common GMTs offered by UK banks include:

1. Transaction freezing: Customers can block debit card transactions with gambling merchants.
2. Spending limits: Customers can set a rolling 30-day limit on gambling transactions, choosing their own spending cap.

The availability of GMTs varies among UK financial firms; approximately 19 offer transaction freezing, and 4 of these also provide spending limits.[14,15] Similarly, activation methods may differ, including online banking, phone, or in-branch setup. As a result, consumer access remains inconsistent, limiting the potential impact of these tools in preventing gambling-related financial harm.

While banks play a key role in protecting consumers, they are not solely responsible for reducing gambling-related financial harm – addressing this issue requires action from multiple stakeholders. Gambling operators also offer GMTs. Some are similar to those provided by banks, while others focus on different aspects of gambling behaviour. Tools frequently provided include:

- Financial tracking: Providing information on the amount of money a customer is spending with specific operators.
- Time-based limits: Restricting or tracking the time spent on gambling activities.

[12] The FCA (Financial Conduct Authority) regulates the financial services industry in the UK. Its role includes protecting consumers.
[13] FCA(2024) *Consumer Duty implementation: good practice and areas for improvement*
[14] Gambling Commission (2025) *Block gambling payments with your bank*
[15] GamCare (2023) *Everything You Need to Know About Bank Gambling Blocks*

- Exclusion tools: Blocking access to specific games, operators, or entire brand families.[16]

Factors influencing gambling tool use and effectiveness

Several factors influence whether people use GMTs. Many are unaware of available banking controls or do not fully understand their purpose and benefits[17,18] and studies show that prompting can significantly increase uptake.[19] Accessibility is a key factor, with some individuals facing challenges such as digital exclusion, decision overload from too many options, or difficulties in locating, activating, or customising these tools due to unclear navigation, technical issues, or a lack of guidance.[20,21] Stigma and a perceived lack of relevance are major barriers to the use of GMTs, as many individuals view these tools as interventions only for those at high risk of gambling harm or as an admission of a problem, deterring them from engaging with them as preventative measures.[22, 23, 24]

Some people also find ways to bypass restrictions by using alternative payment methods or multiple bank accounts.[25,26] Finally, promoting GMTs can backfire, by increasing feelings of guilt or distress among those struggling with gambling related harm.[27]

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[16] BIT(2024) *Behavioural Audit of Gambling Management Tools*
[17] Gambling Commission (2021) *How the consumer engages with safer gambling opportunities*
[18] Gambling Commission (2024) *Customer awareness and use of gambling management tools*
[19] Ivanova, E., Magnusson, K., & Carlbring, P. (2019). Deposit limit prompt in online gambling for reducing gambling intensity: A randomized controlled trial. *Frontiers in Psychology*, *10*, 639.
[20] Responsible Gambling Commission (2022) *Gambling digital tools*
[21] DCMS (2023) *High Stakes: Gambling Reform for the Digital Age*
[22] Responsible Gambling Commission (2022) *Gambling digital tools*
[23] Ivanova, E., Magnusson, K., & Carlbring, P. (2019). Deposit limit prompt in online gambling for reducing gambling intensity: A randomized controlled trial. *Frontiers in Psychology*, *10*, 639.
[24] Gambling Commission (2024) *Customer awareness and use of gambling management tools*
[25] Money and Mental Health Policy Institute (2022) *Raising the stakes: Overcoming barriers to tackling gambling-related harm*
[26] BIT (2023). *Gambling Management Tool Survey*
[27] DCMS (2023) *High Stakes: Gambling Reform for the Digital Age*

Addressing the evidence gap

GMTs aim to support customers in managing gambling behaviours and so lowering the risk of financial harm. However there is limited evidence on the most effective ways to encourage GMT uptake. Additionally the effectiveness of GMTs in reducing harm also remains an area of active investigation, with research showing mixed but generally positive results.

Systematic reviews have not found strong evidence that deposit limits alone reduce gambling-related harm,[28,29,30] but other studies highlight their benefits. The "TalkBanStop" pilot evaluation (which included merchant code blocking as one of the three gambling management tools) demonstrates GMTs make gambling less accessible thereby reducing the urge to gamble.[31] A Gambling Commission survey found that 80% of tool users cut back on their gambling time or spending.[32] Research suggests that offering a spending limit in addition to a gambling block encourages more people to use them, particularly those at lower risk.[33] Additionally reframing GMTs as useful for everyday financial management can help overcome stigmatisation.[34] Importantly, many consumers respond positively when gambling operators promote these tools, - "It makes them [operators] seem to care more about their customers,"[35] suggesting banks may similarly benefit from such promotion.

To contribute to this evidence base, the research presented in this report explores how behaviourally informed messages can encourage the uptake of financial GMTs and examined whether the corresponding uptake of these tools helped to reduce GRFH.

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[28] Ladouceur, R., Blaszczynski, A., & Lalande, D. R. (2012). Pre-commitment in gambling: A review of the empirical evidence. *International Gambling Studies*, *12*(2), 215-230.
[29] Ladouceur, R., Shaffer, P., Blaszczynski, A., & Shaffer, H. J. (2017). Responsible gambling: a synthesis of the empirical evidence. *Addiction Research & Theory*, 25(3), 225-235.
[30] Drawson, A. S., Tanner, J., Mushquash, C. J., Mushquash, A. R., & Mazmanian, D. (2017). The use of protective behavioural strategies in gambling: A systematic review. *International Journal of Mental Health and Addiction*, *15*, 1302-1319.
[31] Stow et al. (2022) *Final Evaluation of the TalkBanStop Pilot*
[32] Gambling Commission (2024) *Customer awareness and use of gambling management tools*
[33] BIT(2023) *Can spending limits in a banking app support safer gambling?*
[34] Responsible Gambling Commission (2022) *Gambling digital tools*
[35] Gambling Commission (2023) *Exploring consumer journeys using customer-led tools*

Key objectives and approach

BIT partnered with a leading UK retail and corporate bank to investigate the effectiveness of behaviourally informed bank communication interventions to reduce GRFH. We ran a three-arm randomised control trial (RCT) to assess the impact of two behaviourally informed messages - delivered via the bank's mobile app - on weekly gambling deposits. We compared these to a control condition where no message was sent.

The study was guided by three primary questions:

1. Does communicating about gambling blocks and limits via a bank's app ("in-app message") influence gambling spend among its customers?
2. How does setting up a GMT affect subsequent gambling deposits?
3. Which in-app message is most effective at encouraging the adoption of GMTs?

The intervention aimed to promote the adoption of GMTs and the study examines their impact on customer behaviour and GRFH in the short to medium term. Accordingly, the study was focused on a pair of target behaviours:

1. Setting a GMT
2. Reducing gambling spending over a 12 week period

How the report is structured

The remainder of the report is organised as follows: Section 2 covers the design and selection of in-app messages, Section 3 outlines the methodology, and Section 4 presents the results, which inform the discussion and recommendations in Section 5. Appendix A provides a detailed evidence review; Appendix B includes supplementary trial communication materials, while Appendix C-E provides technical details of the methodology and data analysis.

2. Communication design

Approach for intervention design and selection

BIT worked closely with its banking partner to co-design the messaging and visuals for the in-app communications used in the two trial intervention arms. The development process followed a structured, multi-stage approach:

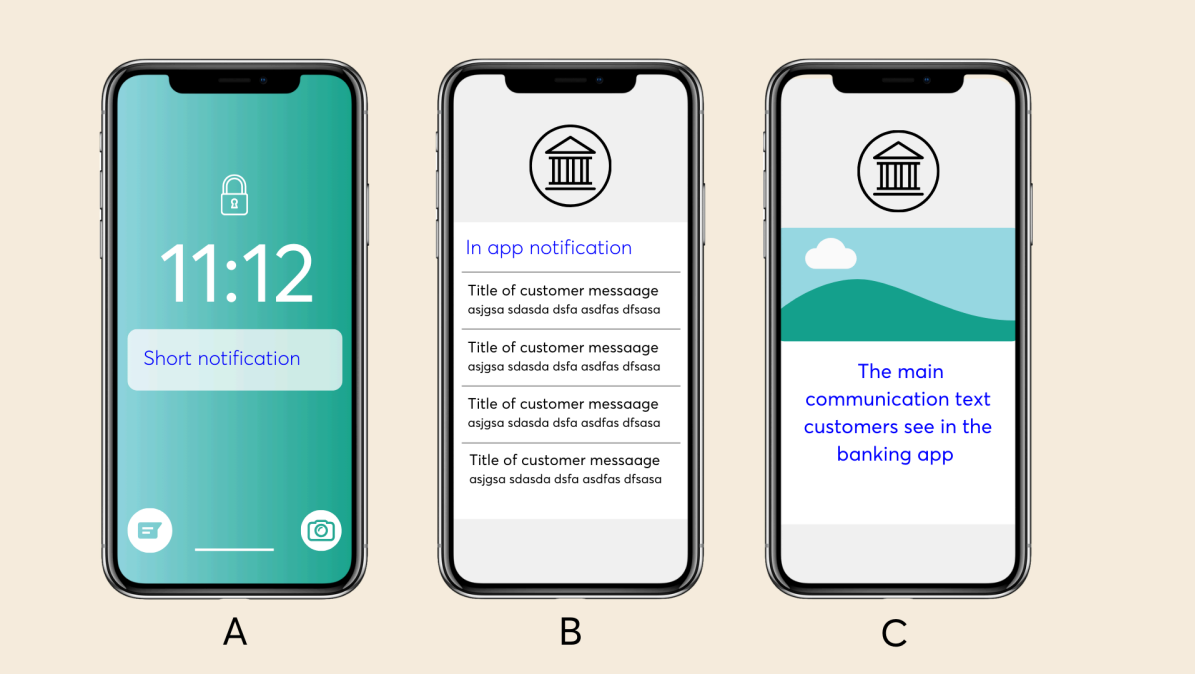
1. Establishing design principles
2. Designing and longlisting messages
3. Gathering feedback and refining messages
4. Final selection

The in-app communications were designed to align with the bank's standard message hierarchy: Typically, when customers receive a message from their bank, they first see a short notification on their smartphone home screen (see Figure 1.A).[36] Upon opening their app's inbox, they can view the preheader (see Figure 1.B),[37] and clicking on this opens the full in-app message (see Figure 1.C). BIT followed this same structure and so designed a short notification, preheader, and full in-app message.

[36] The short notification is identical for both intervention arms.

[37] Customers can opt out of receiving notifications from BIT's banking partner. Additionally, the content displayed on a customer's phone screen varies by device: Android users see minimal information, while iPhone users may see more, depending on their screen size.

Figure 1: Illustration of BIT's banking partner's standard in-app communications: A) Short notification; B) Preheader; c) Full in-app messages



Establishing design principles

As described in the Introduction, BIT conducted a targeted evidence review to identify barriers to GMT use that communications should address. These include lack of awareness, usability barriers, perceived lack of relevance and stigma (see also Appendix A).

BIT's EAST framework (Easy, Attractive, Social, Timely) provides a simple structure for designing effective interventions using behavioural insights.[38] We applied the following principals when designing the different communications interventions (see appendix B for full details):

- Make it **easy** to engage in the desired behaviour: Use plain language, avoid jargon, and provide clear step-by-step instructions to ensure understanding and ease of use.

[38] BIT (2024) *EAST Framework: Four Simple Ways to Apply Behavioural Insights*

- Make it **attractive** to engage in the desired behaviour**:** Tailor messages to user needs, highlight benefits (e.g., saving money, the tools are free), use engaging visuals, and incorporate self-reflection prompts.
- Consider the **social** context**:** Normalise tool usage by framing it as beneficial for everyone, leveraging social norms and avoiding stigmatising language.
- Deliver the intervention at **timely** moments**:** Deliver prompts when they are most relevant and actionable.
- **Additional considerations:** Reassure users that setting up tools will not affect their credit score and signpost support resources.

Designing and longlisting messages

Based on this desk research, BIT developed a range of potential messages. These were strengthened through a brainstorming session with team members experienced in bank communications and gambling research. This process resulted in a preliminary longlist of eight in-app messages for further development. Each full in-app message consisted of two key components:

1. A prompt designed to encourage the uptake of GMTs. These varied across messages, with the underlying ideas outlined in Table 1.
2. A clear explanation of the two GMTs that the banking partner provides, including how to set each up and where to seek further support. This component was consistent across all eight messages,

The full messages, their aims, the issues that they were intended to address and feedback received are provided in Appendix B.

Table 1: Ideas underlying message long-list

Prompt	Underlying idea
A	Normalising usage (seatbelt metaphor)
B	Future focus
C	Budget management tool
D	Raising awareness of free tools
E	Self-reflection of spend
F	Keeping options open
G	Normalising usage (roller coaster metaphor)

Gathering feedback and refining messages

BIT gathered feedback on the initial messages from two key groups: (1) a panel of individuals who gamble, including those with and without lived experience of gambling-related harm, and (2) academic advisors. This process helped refine the messages for clarity, appeal, and effectiveness while ensuring they avoided any unintended negative reactions.

The panel included 10 individuals who gamble regularly across various activities and 5 individuals with lived experience of gambling-related harm, recruited through a fieldwork participant recruitment agency and a gambling support provider, respectively. Participants represented diverse backgrounds in terms of gender, age, and ethnicity. BIT's academic advisors, Dr. Julia Levine and Prof. Mike Luca from Johns Hopkins Carey Business School, provided further insights.

Panel members assessed the potential effectiveness of each message in encouraging uptake of GMTs, suggested improvements to mitigate risks such as customer distress or complaints, and considered optimal timing and delivery. They also ranked messages on their clarity, engagement, and motivational impact.

Feedback was analysed thematically, integrating perspectives from both participant panels and academic advisors. This process identified the top three prompts for shortlisting and further refinement. The versions below reflect their wording before panel feedback.

Prompt D: Raising awareness of free tools

> Did you know we offer two free tools to help our customers manage their gambling spending? You can: …..

A simple, direct prompt explaining GMTs. Participants found it clear, supportive, and encouraged them to proactively control their finances. While some participants suggested a catchier slogan, its simplicity allowed the isolation of awareness as a motivational factor.

Prompt E: Self-reflection of spend

> Do you know how much time and money you spend on gambling every month?
>
> Many people underestimate how much they've spent gambling. That's why we offer free tools to help our customers plan and stay on track. You can: ….

This prompt encouraged individuals to consider their gambling spend and highlighted how many underestimate their spending. While it sparked reflection, some participants found parts of the wording slightly accusatory. Accordingly, adjustments were made to soften the language (see final version below).

Prompt G: Normalising usage

> You wouldn't ride a roller coaster without your safety bar on.
>
> Limits and blocks are the safety bars of gambling. They offer a layer of protection, helping you avoid overspending. They also safeguard your money if your debit card is ever lost or stolen. You can: …

This prompt compared GMTs to a roller coaster safety bar, making it relatable, memorable, and engaging. Participants appreciated its non-judgmental tone and how it captured gambling's highs and lows. While some questioned its relevance for those experiencing gambling harm, it generated minimal negative feedback and had strong visual potential.

Final selection

The banking partner's compliance and communications teams reviewed the shortlisted messages and selected prompts D and E to align with the bank's communication standards; further refinements were also made to the messages'

wording. The final messages selected, presented in Table 2, help test whether raising awareness alone is sufficient to encourage GMT usage (Prompt D- raising awareness of free tools) or if further behavioural elements like self-reflection enhance effectiveness *(*Prompt E- self-reflection of spend).

Due to the length constraints of the short notification, the same wording was used for both trial intervention arms. The preheaders summarised each message's prompt, framing it as a question to encourage reflection and a solution to generate interest.

Please see figure 2 for a mock up of the final messages.

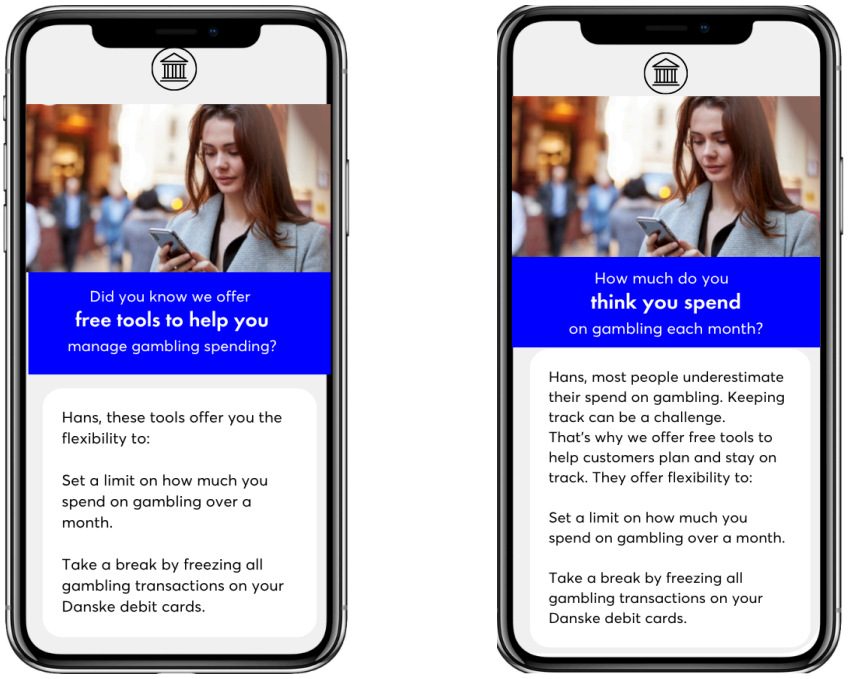
Table 2: Final communication messages

Short notification (both interventions)	
[Hans],[39] use our free tools to easily manage your gambling spending.	
Preheader: Intervention 1	**Preheader: Intervention 2**
[Hans], do you know about our free tools? They help you manage your gambling spending on your terms.	[Hans], how much do you spend gambling? Check out our flexible tools to help keep track.
Full in-app message: Intervention 1	**Full in-app message: Intervention 2**
Did you know we offer **free tools to help you** manage gambling spending?	How much **do you think you spend** on gambling each month?
[Hans], these tools offer you the flexibility to: **Set a limit** on how much you spend on gambling over a month. **Take a break** by freezing all gambling transactions on your [banking partner] debit cards.	Most people underestimate how much they spend on gambling. Keeping track can be a challenge. That's why we offer **free tools to help our customers** plan and stay on track. The tools offer the flexibility to: **Set a limit** on how much you spend on gambling over a month.

[39] Placeholder for the customer's name.

	Take a break by freezing all gambling transactions on your [banking partner] debit cards.
Message or call us to **set up your tool** today	
You can contact us by sending a secure message in the app* or by calling **xxxx.** **Both tools:** - Work at licensed gambling providers. - Are applied instantly, but it takes at least 72 hours to lift the limit or block. - Won't affect your credit score. **Need help choosing the right tool?** Click here or call us for more information about the tools or additional gambling support. We are here to help!	
You can contact us by sending a secure message in the app* or by calling **xxxx.** **Both tools:** - Work at licensed gambling providers. - Are applied instantly, but it takes at least 72 hours to lift the limit or block. - Won't affect your credit score. **Need help choosing the right tool?** Click here or call us for more information about the tools or additional gambling support. We are here to help!	

Figure 2: Mock up of final messages: a) Free tools, b) How much spent



3. Methodology

Trial design

We conducted a three-arm randomised controlled trial to compare the effectiveness of two behaviourally-informed messages against a control condition (no message) in reducing gambling-related financial harm. The messages were delivered via the banking partner's mobile app and promoted the use of the bank's gambling management tools.

The banking partner offers two gambling management tools:

- **Gambling block:** Prevents all debit card transactions with gambling merchants
- **Spending limit:** Allows customers to set a personalised cap on gambling transactions over a rolling 30-day period

Both the message review process and the trial itself underwent formal internal ethical review at BIT, receiving approval on 27 August 2024 and 2 October 2024 respectively (see Appendix B for details).

Target population and sampling

Customers of the banking partner were included in the randomisation if they met all the following criteria:

1. Had a maximum 30-day[40] net outflow due to gambling of above £150 anytime in Q2 or Q3 2024 (1 April to 30 September 2024). The £150 threshold was chosen to align with the gambling commission's new thresholds for light touch financial checks.
2. Had the banking app (90.3% of all customers), and had used the banking app in the 30 days prior to trial launch (92% of those with the app).

[40] As we had weekly data the £150+ net spend in a rolling 30-day period was operationalised as the sum of 4-week periods, which will include fewer people than a continuous 30-day inclusion check. This is because (i) it contains fewer days, and (ii) if spending falls unequally across the week, 5-week periods may next 30-day rolling spend above £150 without the 4-week threshold picking it.

3. Created an account with our bank no later than 2024-04-01.
4. Were born before 31 March 2006, confirming they were at least 18 years old.
5. Didn't have a block set on 5 November 2024. Existing research, including previous online experiments we ran, found some evidence that limits substitute blocks for those at higher risk, suggesting providing information about limits could lower total gambling restrictions. Those who had a limit set were allowed to participate in the trial.
6. Were not in the process of being "exited" by the bank (e.g., due to unusual activity).

Procedure

The trial flow is illustrated in figure 3. The banking partner identified customers eligible for the trial (see criteria under target population and sampling section) and provided BIT with a list of pseudonymised bank customer IDs. BIT used stratification[41] in this case, previous gambling spend and gender[42], before randomising them into three groups or treatment arms (see Table 2 for the communication messages):

- Intervention 1: Bank sends customers message 1
- Intervention 2: Bank sends customers message 2
- Control: Bank sends customers no message

The RCT design ensures that any observed differences across the three treatment arms can be attributed with confidence to the interventions rather than other factors.

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[41] a process of sorting individuals into categories based on shared characteristics,

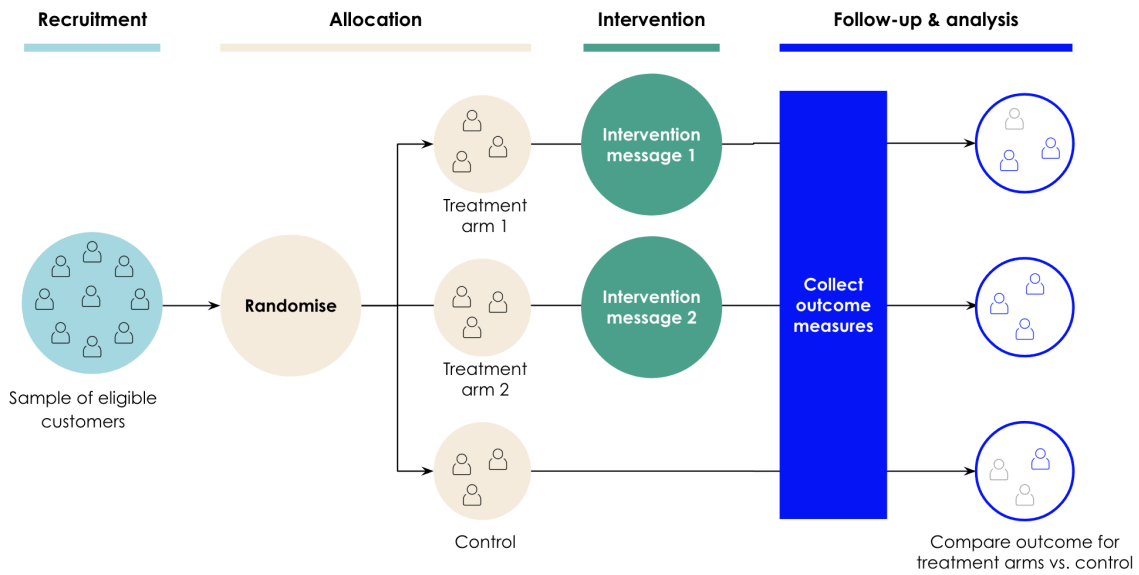
[42] Randomisation was stratified on:

1. Deciles of average weekly gambling deposits
    a. This was determined by the average weekly gambling deposits across both Q2 and Q3 2024.
    b. We split this into 10% bands up to 90th percentile, then 91st-95th and 96th-100th to account for the heavy right tails of the distribution.
2. Approximated gender
    a. Our partner bank used their internal LLM and salutations (Mr., Mrs.) alongside first names to classify people's genders.

The banking partner sent out the intervention messages on 19 November 2024 at 12:30 pm. As explained in Section 2, in line with the bank's standard message hierarchy, customers first received a short notification on their mobile home screen (depending on their phone type and settings). This directed them to a preheader in their app inbox, which provided a preview of the full in-app message they could choose to open. Customers would have received the messages as soon as they were online.

Data was collected over a 12-week period enabling the evaluation of both the immediate behavioural impact and the longer-term effectiveness of the interventions in reducing GRFH. The 12-week timeframe was chosen to balance several factors: providing sufficient time to observe meaningful changes in gambling behaviour, and ensuring the study remained practical within operational constraints. This period also captures potential delayed effects, as individuals may take time to engage with GMTs or adjust their gambling behaviour in response to the intervention.

Figure 3: Trial flow



Outcome measures

This study used gambling expenditure as a proxy for harm, since as described in [the Introduction], research shows it is strongly linked to GRFH,[43] with harm increasing beyond certain spending thresholds.[44,45] While the relationship is not always linear, higher gambling expenditure is generally associated with greater financial risk.[46,47] Additionally, BIT's banking partner routinely records transaction data, including gambling-related spending, as part of standard financial processes, making gambling expenditure readily available for analysis.

The selection of outcome measures was guided by the study's research questions:

- Does communicating about gambling blocks and limits via a bank's app influence gambling spend among customers?
- How does setting up a GMT affect subsequent gambling deposits?
- Which in-app message is most effective at encouraging the adoption of GMTs?

To address these, the study focused on two key behavioural outcomes: (1) whether customers set a GMT and (2) whether they reduced their gambling spending over the 12-week trial period.

Our **primary outcome** was the amount individuals deposited with gambling operators each week. We chose deposits rather than losses because:

- Gambling management tools operate at the deposit level (winnings don't affect spending limits)
- Banking data reliably captures deposits but may miss cash winnings

[43] Markham, F., Young, M., & Doran, B. (2014). Gambling expenditure predicts harm: Evidence from a venue-level study. *Addiction*, 109(9), 1509-1516.
[44] Currie, S. R., Hodgins, D. C., Casey, D. M., el-Guebaly, N., Smith, G. J., Williams, R. J., & Schopflocher, D. P. (2017). Deriving low-risk gambling limits from longitudinal data collected in two independent Canadian studies. *Addiction,* 112(11), 2011-2020.
[45] Dowling, N. A., Youssef, G. J., Greenwood, C., Merkouris, S. S., Suomi, A., & Room, R. (2021). The development of empirically derived Australian low-risk gambling limits. *Journal of Clinical Medicine,* 10(2), 167.
[46] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 1: Analysis of Monzo customer data*
[47] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 2: Analysis of HSBC UK customer data*.

- Deposits represent customers' financial engagement with gambling operators

It is important to note that gambling deposits do not account for winnings or the timing of wagers, (deposits may not be wagered immediately) meaning actual gambling losses (i.e. financial harm) may be different. However, since financial institution-based GMTs operate at the deposit level (e.g., winning £10 does not change a customer's deposit limits), this was the most relevant metric for assessing their effectiveness.

The **secondary outcome measure** was the impact on tool usage. This was assessed by tracking the percentage of customers who set either a gambling block or a spending limit at two time points: at randomisation and 12-weeks after the messages were sent. This measure directly relates to the intervention's goal of increasing GMT uptake

Methodological limitations

Gambling blocks and limits can be easily circumvented. BIT's banking partner's GMTs do not block certain gambling transactions, including the purchase of lottery tickets or scratch cards at some shops, direct bank transfers, direct debits, or standing orders to gambling merchants, ATM withdrawals near or within a casino or betting premises, or in-game purchases in video games. E-wallet (like PayPal) top-ups used for gambling are also not blocked. Customers can also turn on a block on one bank account, but gamble from any others they hold.[48]

This study did not have the data required to determine whether participants circumvented the GMTs. If participants bypassed the tools - such as by using multiple accounts or alternative payment methods - it could compromise the study's validity.

[48] Money and Mental Health Policy Institute (2022) *Raising the stakes: Overcoming barriers to tackling gambling-related harm*

4. Results

Summary of key results:

- Randomisation was implemented successfully.
- Open rates were 64% for both messages, and click-through rates were statistically indistinguishable (2.7% and 2.9%).
- **Tool adoption remained very low**: Fewer than 1% of customers set gambling management tools in any treatment arm (see table D.3).
- **Spending reductions were modest**: Point estimates suggest 1.2% and 3.0% reductions in weekly gambling deposits, but these were not statistically significant

Sample characteristics

Randomisation was successfully implemented across 9,701 customers.[49] The treatment arms were well-balanced on key characteristics, with participants averaging 43 years of age and 73% male. Small imbalances in pre-existing limit usage (17 in control vs 10 in each treatment arm) are controlled for in our statistical models.

[49] In addition to the eligibility restrictions detailed in section 3.2, the bank's communications team removed 16 individuals in final checks before the trial launched due to accounts being blocked, customers having switched out, online banking being recently suspended or no longer having any products with the bank.

Table 4.1: Sample characteristics across treatment arms.

Characteristic	Control	Treatment 1:	Treatment 2:	Overall
N randomised	3,239	3,239	3,239	9,717
N final	3,239	3,235	3,227	9,701
Male	2,355 (73%) 2,350 (73%)	2,354 (73%) 2,350 (73%)	2,355 (73%) 2,345 (73%)	7,064 (73%) 7,050 (73%)
Mean Age {years (s.d.)}	42.9 (13.6) 42.9 (13.6)	42.6 (13.5) 42.6 (13.5)	42.6 (13.6) 42.6 (13.6)	42.7 (13.6) 42.7 (13.6)
Mean duration of banking relationship (in years)	18.3 (10.0) 18.3 (10.0)	18.2 (9.9) 18.2 (9.9)	18.1 (10.0) 18.1 (10.0)	18.2 (10.0) 18.2 (10.0)
Financial difficulties flag in Q3 (or Q2 if no gambling in Q3)	21 (0.6%) 21 (0.6%)	14 (0.4%) 14 (0.4%)	25 (0.8%) 25 (0.8%)	60 (0.6%) 60 (0.6%)
Had a limit (not block) active on 5th November 2025	17 (0.5%) 17 (0.5%)	10 (0.3%) 10 (0.3%)	10 (0.3%) 10 (0.3%)	37 (0.4%) 37 (0.4%)
Prior gambling expenditure variables				
Mean value of weekly gambling deposits* in 12-weeks pre-trial**	-£108.01 (205) -£108.01 (205)	-£102.63 (188) -£102.75 (188)	-£107.44 (190) -£107.58 (190)	-£106.03 (194) -£106.11 (194)
Mean value of weekly gambling returns in 12-weeks pre-trial**	£48.64 (139) £48.64 (139)	£50.57 (171) £50.63 (171)	£49.83 (133) £49.93 (133)	£49.68 (149) £49.74 (149)
Mean value of weekly net position in 12-weeks pre-trial**	-£59.37 (133) -£59.37 (133)	-£52.06 (123) -£52.11 (123)	-£57.61 (115) -£57.65 (115)	-£56.34 (124) -£56.38 (124)

Mean number of weekly gambling deposits* in 12-weeks pre-trial**	5.7 (9.3) 5.7 (9.3)	5.6 (8.2) 5.6 (8.2)	5.7 (9.2) 5.7 (9.2)	5.65 (8.9) 5.66 (8.9)
Mean number of weekly gambling returns in 12-weeks pre-trial**	0.36 (0.98) 0.36 (0.98)	0.38 (0.96) 0.38 (0.96)	0.39 (1.05) 0.39 (1.05)	0.37 (1.00) 0.38 (1.00)
Datasets provided by our partner bank for dates covering every individual with a gambling transaction between 2024-03-01 to 2025-01-01. * Deposits are coded as negative to reflect money leaving the banking account. ** Prior 12 weeks covers (2024-08-26 to 2024-11-17).				

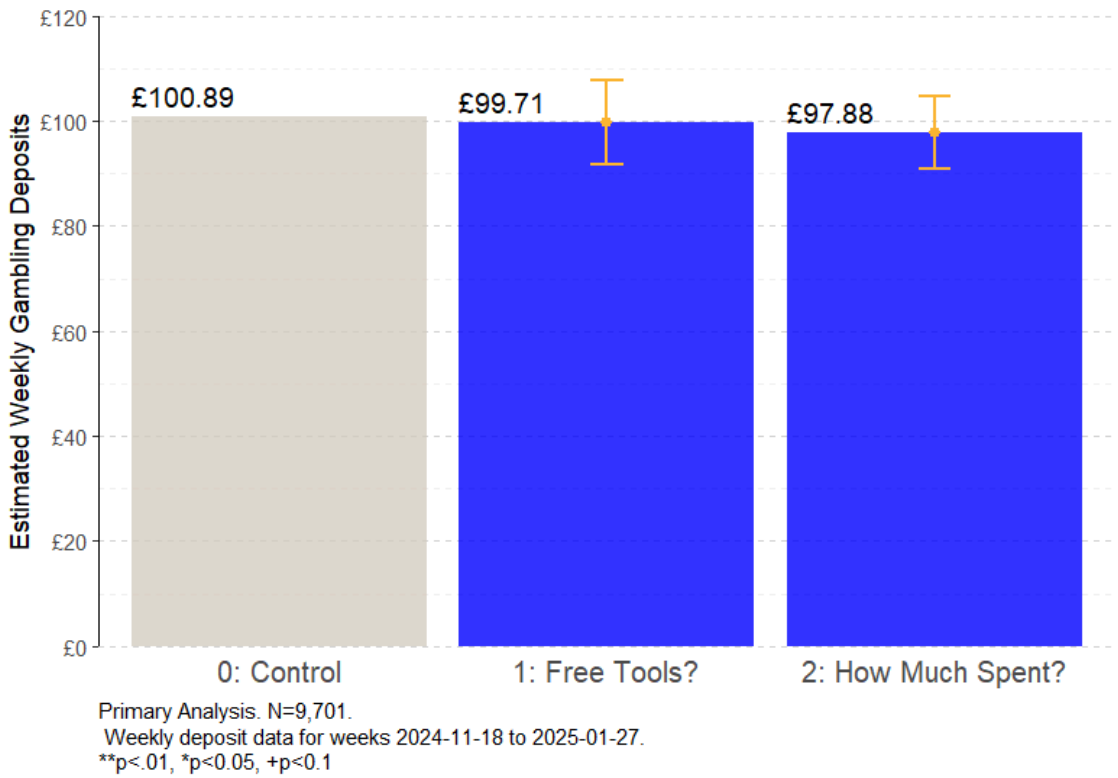
Notification impact on gambling deposits and net outflow

Our primary analysis found no statistically significant effects on weekly gambling deposits (see Figure 4.1). Using Poisson regression, we estimate:

- **"Free Tools" message**: 1.2% reduction [95% CI: -9.2%, +6.9%]
- **"How Much Spent" message**: 3.0% reduction [95% CI: -9.9%, +3.9%]

Neither effect is statistically distinguishable from zero, nor are the two messages significantly different from each other.

Figure 4.1: Estimated weekly gambling deposits by message received.

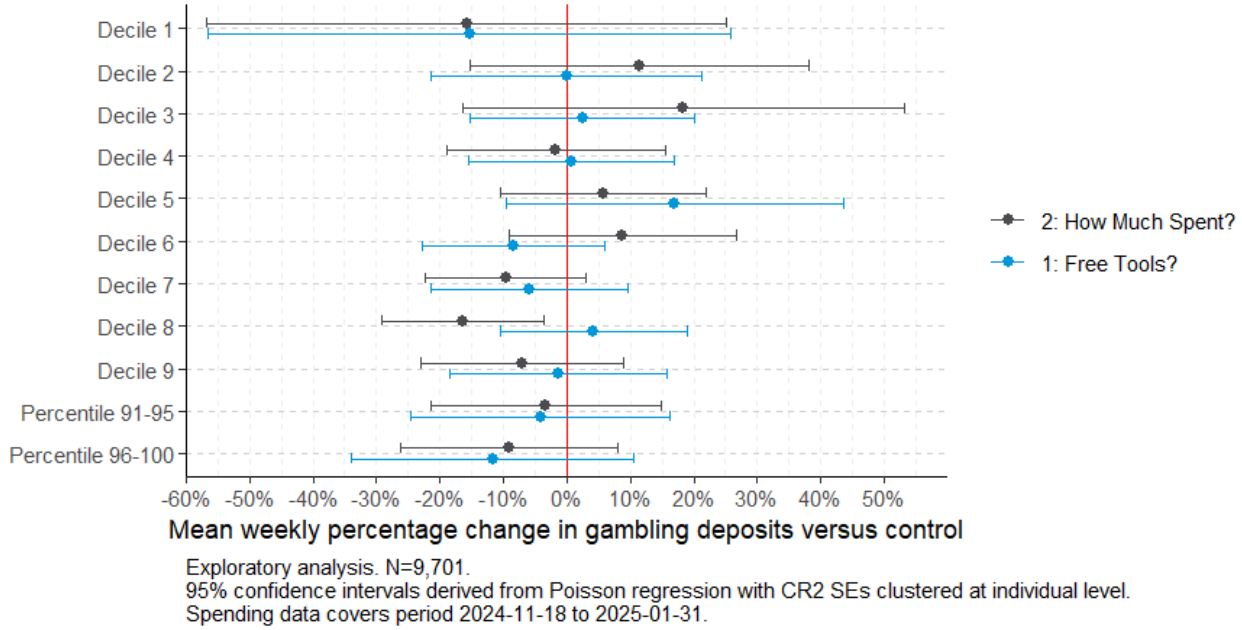


While both point estimates suggest reductions in gambling deposits, the confidence intervals are wide and include both meaningful reductions and small increases. We cannot conclude these messages caused changes in gambling spending.

Exploratory analysis of deposits

We found limited evidence that treatment effects varied by customers' baseline gambling engagement (see Figure 4.2). Effects were consistently small across all deciles of prior spending.

Figure 4.2: Change in gambling deposits versus control by prior gambling deposits.



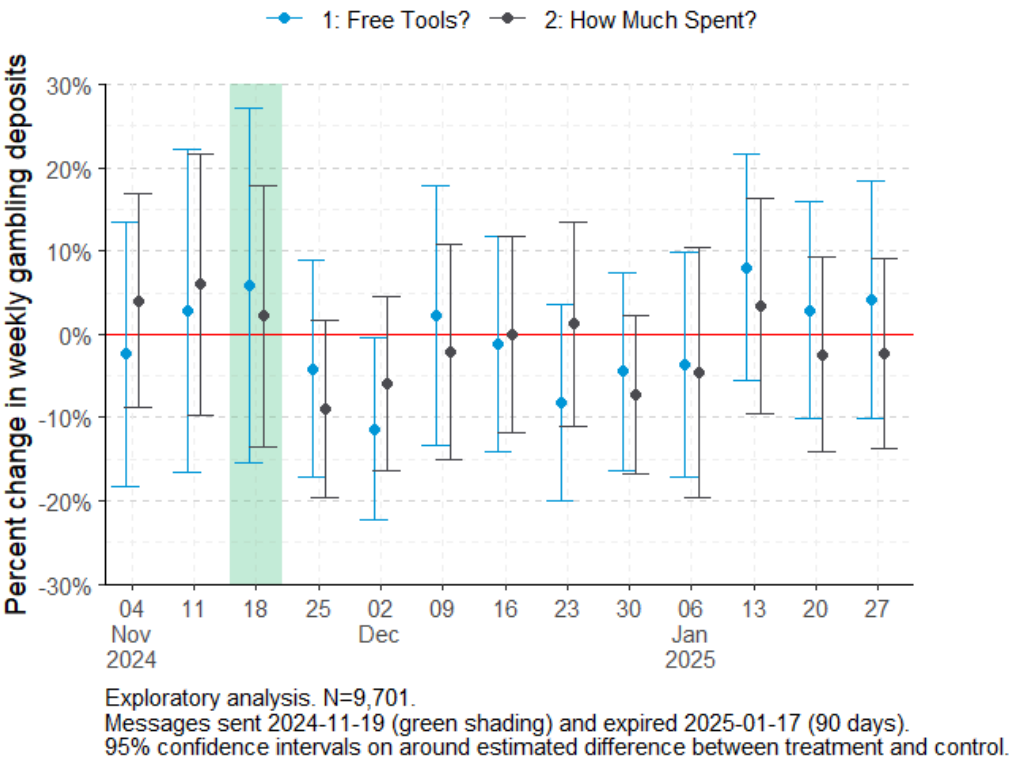
Exploratory analysis. N=9,701.
95% confidence intervals derived from Poisson regression with CR2 SEs clustered at individual level.
Spending data covers period 2024-11-18 to 2025-01-31.

Because gambling deposits are concentrated among "heavy roller" (the top 5% of depositors accounted for 32% of deposits in Q2 and Q3), the 10% reductions observed at the highest percentiles correspond to large absolute reductions in gambling deposits, though they do not reach statistical significance against similar heavy depositors in the control group.

We recommend caution interpreting the reduced gambling deposits in decile 8 in the curiosity arm due to the large number of statistical comparisons. However there is very tentative evidence of a more consistent reduction in gambling deposits for those engaged in gambling most heavily in Q2 and Q3.

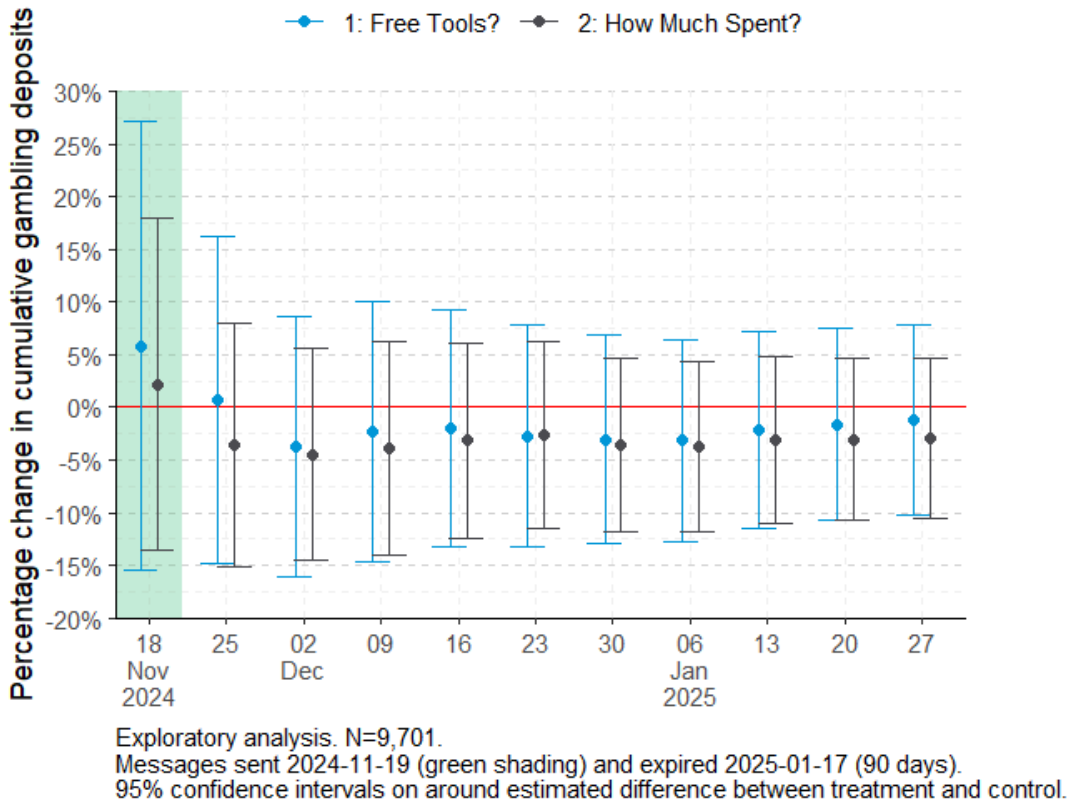
Analysis of weekly treatment effects shows no evidence of persistent changes in gambling behaviour, with only weak evidence of short-term impacts immediately following the intervention (see Figure 4.3).

Figure 4.3: Change in weekly gambling deposits versus control by week.



Over the 11-week follow-up period, cumulative deposits were £13 and £33 lower per person in the two treatment arms respectively (see Figure 4.4). While statistically insignificant, this represents approximately £149,000 in potentially reduced gambling across both treatment groups.

Figure 4.4: Change in cumulative gambling deposits versus control by week.

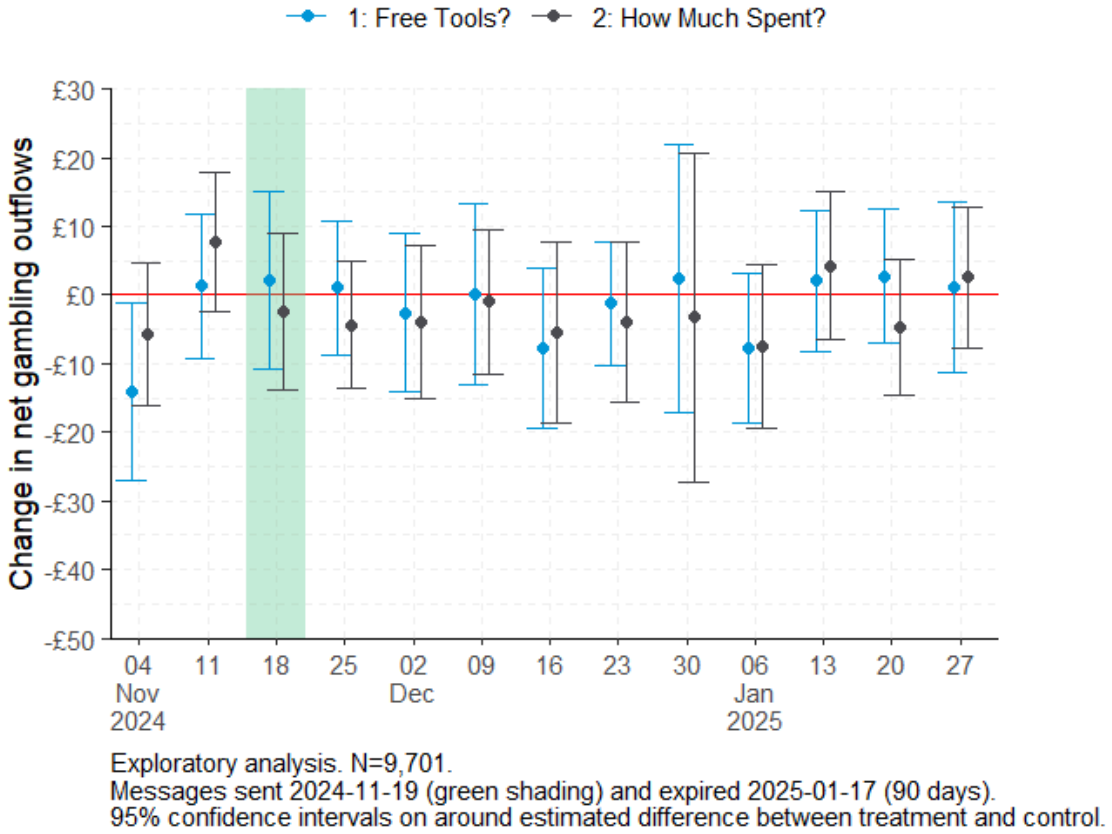


Exploratory analysis of net gambling outflows

We also examined net gambling outflows (deposits minus returns from gambling). This provides a closer approximation to actual losses, though gambling management tools operate at the deposit level rather than the net level.

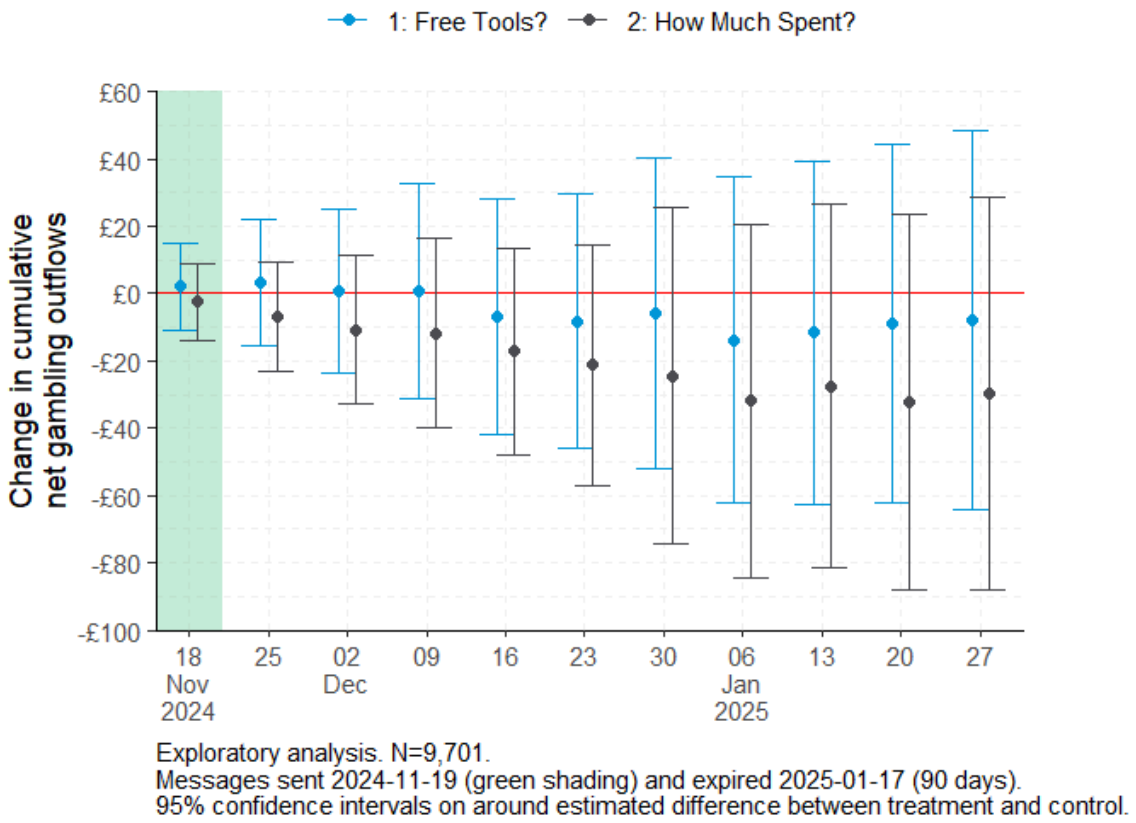
We found no statistically significant differences in net gambling outflows between treatment and control groups, consistent with our primary findings on deposits (see Figure 4.5).

Figure 4.5: Change in average weekly net gambling outflows by treatment arm.



Analysing the cumulative change in net gambling outflows leads to the same conclusion of no detectable difference (see Figure 4.6). After 11 weeks, average net gambling outflows were £7.80 [95% CI: -£64.17, £48.59] lower for the "free tools" message and £29.73 [95% CI: -£88.12, £28.67] lower for the "how much spent" message compared to the control group. Again, while the point estimates are statistically indistinguishable from zero, over the 11 weeks post-intervention the total net outflows were £25k lower for the "free tools" and £96k lower for the "how much spent" messages compared to the control group.

Figure 4.6: Change in average cumulative net gambling outflows by treatment arm.



While it may be that safer gambling messages had no overall impact on gambling deposits and net outflows, this trial may have included insufficient numbers of people to detect a reasonably small effect size. The primary explanation for the small effect size is very low take-up of gambling management tools as a result of the intervention, partly due to the frictions in the set-up process with our partner bank.

Notification impact on gambling management tool adoption

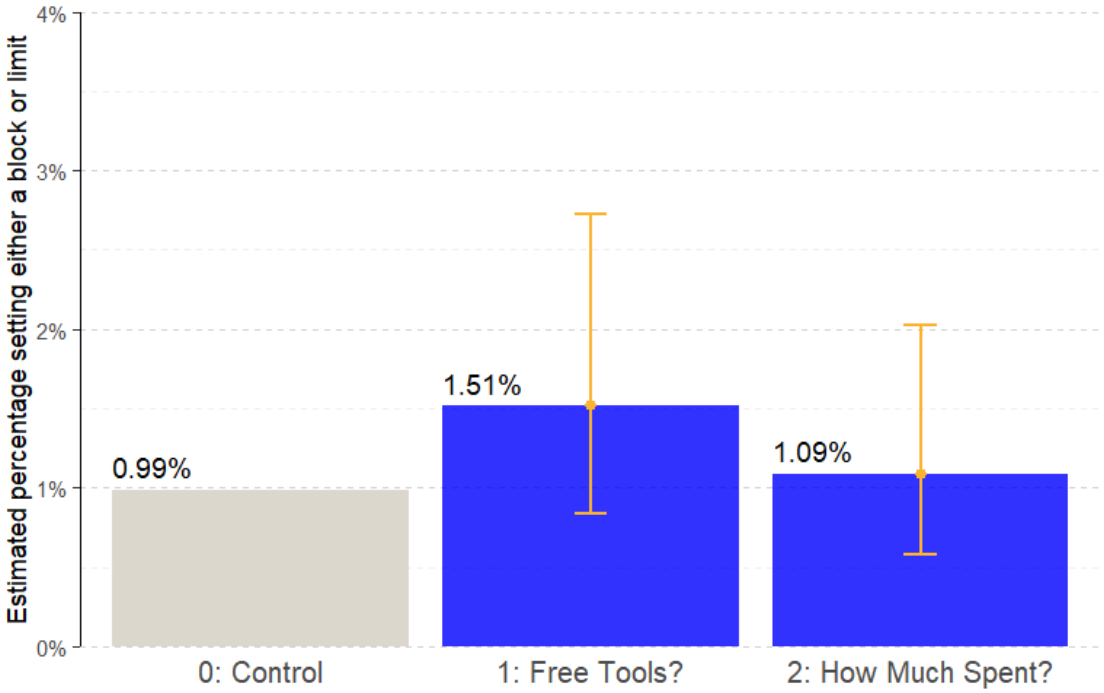
Tool adoption was extremely low across all trial arms, with only 57 individuals (0.6% of the sample) setting a new block or limit during the trial period.

Using logistic regression, we estimate the interventions increased the odds of setting a tool by:

- **"Free Tools" message**: 54% increase in odds [95% CI: -15%, +181%]
- **"How Much Spent" message**: 10% increase in odds [95% CI: -41%, +107%]

However, neither effect was statistically significant (See Figure 4.7).

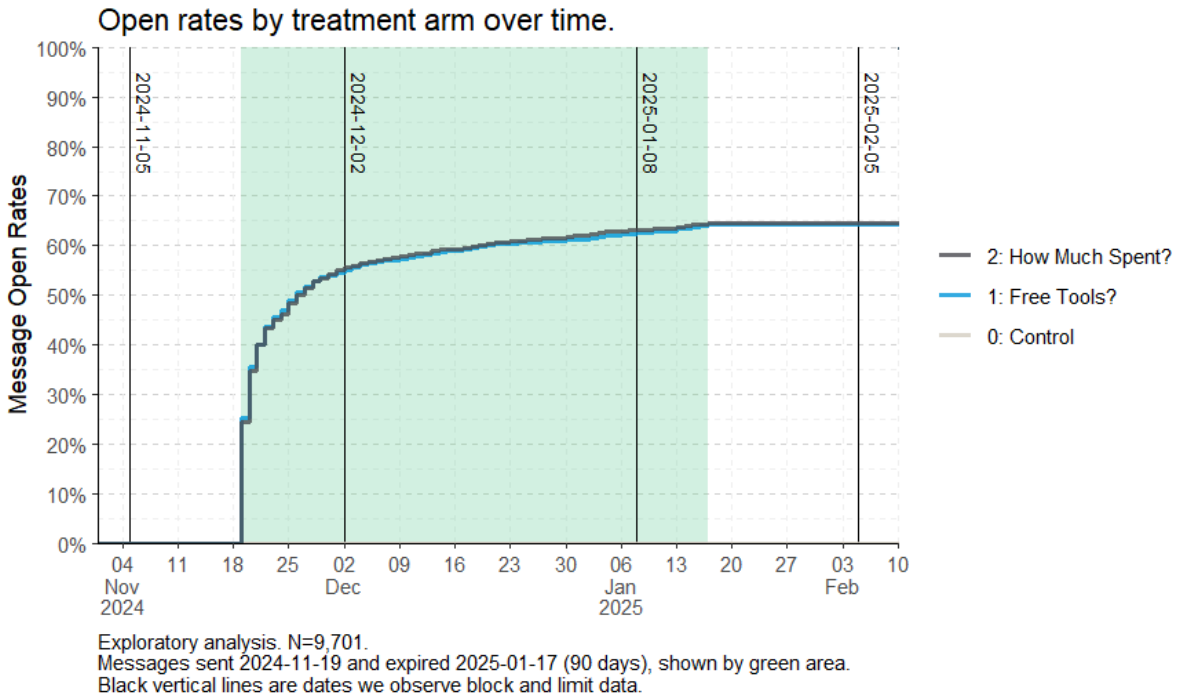
Figure 4.7: Estimated change in setting either a block or limit by 5th February 2025.



Engagement with the communication material

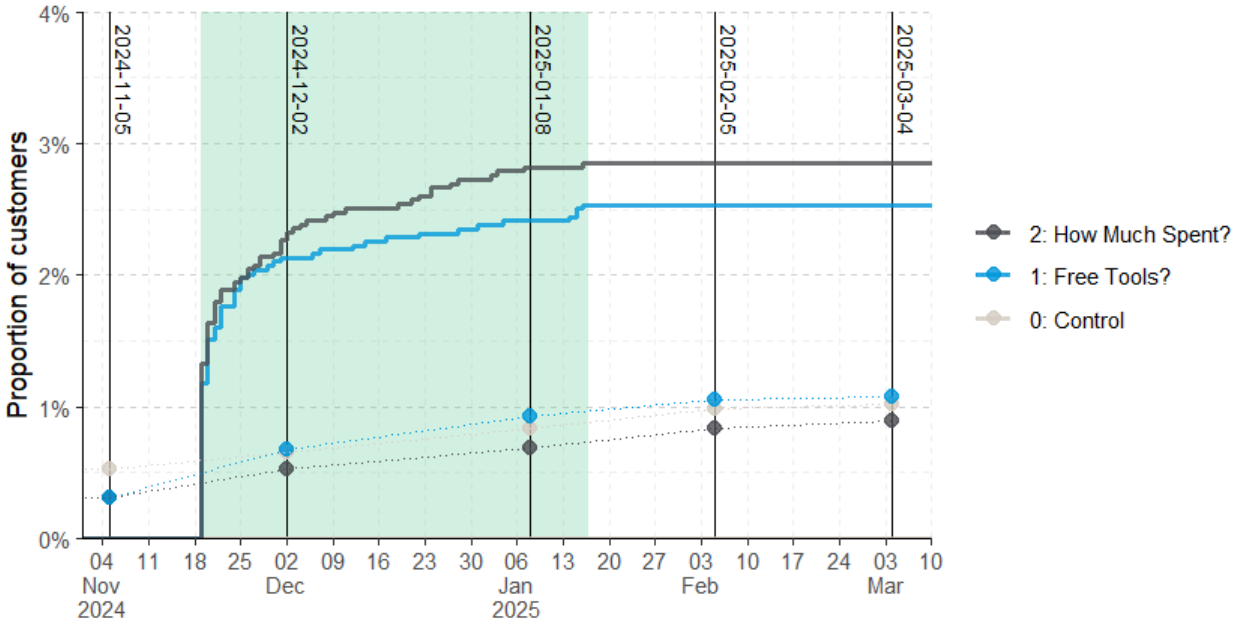
Both messages achieved nearly identical and substantial engagement rates (see Figure 4.8), with 64.4% of customers opening the "Free Tools" message and 64.5% opening the "How Much Spent" message. This high level of engagement suggests that customers are receptive to communications about gambling management tools, contradicting any assumption that such messages would be widely ignored or cause negative reactions.

Figure 4.8: Open rates of the messages over time by treatment arm.



However, this strong initial engagement did not translate into action (see Figure 4.9). Only 2.5% of customers who received the "Free Tools" message and 2.9% who received the "How Much Spent" message clicked through for additional information about the tools. Among those who opened the messages, this represents click-through rates of 3.9% and 4.4% respectively. While these differences between the two messages are not statistically significant, they suggest that the self-reflection prompt in the "How Much Spent" message may have generated slightly more interest in learning about available tools.

Figure 4.9: Click-through rates (solid) and the time-path of blocks and limits set (dotted)



There was a dramatic drop-off from message engagement to actual tool adoption. Despite 64% of customers opening their messages, fewer than 1% ultimately set up gambling management tools. This represents one of the largest engagement-to-action gaps observed in behavioural interventions and points to significant implementation barriers rather than lack of customer interest.

Importantly, among the subset of customers who both opened messages and clicked through for more information, conversion rates were much higher: 30.5% of "Free Tools" clickers and 18.5% of "How Much Spent" clickers went on to set up a gambling management tool. This suggests that when customers are sufficiently motivated to actively seek information, the current setup process can work, but it creates insurmountable barriers for the majority who might benefit from these tools.

Among the 64% of customers who opened their messages, gambling deposits were an estimated £18 [95% CI: -£108, +£143] lower for "Free Tools" readers and £104 [95%

CI: -£16, £225] lower for "How Much Spent" readers over the 11-week follow-up period[50]. These differences are not statistically distinguishable from zero.[51]

[50] We used treatment assignment as an instrument for reading the message and ran a 2SLS regression to capture the treatment effect on those induced to read the message (Angrist & Pishcke, 2009 Ch.4).

[51] These results are an underestimate of the true causal impact on the readers because only 39% of readers opened the message on the first day. This means "untreated" days are included in the sum of post-intervention gambling deposits, diluting the treatment effect we observe.

5. Discussion and recommendations

This trial tested whether behaviourally-informed messages delivered through a bank's mobile app could reduce gambling-related financial harm by encouraging adoption of gambling management tools. We ran a three-arm randomised controlled trial with 9,701 customers, comparing two message interventions against a control group that received no message.

Our primary analysis used Poisson regression to examine weekly gambling deposits over an 11-week follow-up period. We found reductions of 1.2% for the "Free Tools" message and 3.0% for the "How Much Spent" message compared to the control group. Neither reduction was statistically significant. Our secondary analysis used logistic regression to examine gambling management tool adoption. We found that the odds of setting a tool were 54% higher for the "Free Tools" message and 10% higher for the "How Much Spent" message, but again neither effect reached statistical significance. This means we cannot conclude that either intervention successfully increased tool adoption or reduced gambling spending based on this evidence.

The observed reductions in gambling deposits are not statistically distinguishable from zero in this study. This may reflect either a true null effect or insufficient precision to detect a smaller but practically meaningful difference. The confidence intervals for our primary outcomes are wide. A larger study might distinguish between these possibilities and provide more conclusive evidence about the effectiveness of banking communications for reducing gambling harm.

Across gambling deposits, net outflows, and tool uptake, we observed a consistent pattern of small changes in the hypothesised direction, though none were statistically significant. This directional consistency across multiple independent outcomes suggests the possibility of a genuine but small treatment effect. However, we cannot confirm this interpretation. Our study may have been underpowered to detect effects of this magnitude, and we cannot conclude that the interventions were effective based on this evidence alone.

There was a substantial gap between customer engagement and behavioural response. We found that 64% of customers opened their messages, suggesting an

interest in communications about gambling management tools. However, fewer than 1% ultimately set up gambling management tools, representing a large engagement-to-action gap. This pattern suggests that lack of awareness is not the primary barrier to tool adoption. The requirement for customers to contact bank staff to activate tools might create substantial implementation friction, as evidenced by the finding that 18-31% of customers who actively clicked through for more information did successfully set up tools.

Due to the low rates of tool adoption in our trial, we were unable to establish whether gambling management tools themselves causally reduce gambling behaviour. While we observed associative evidence that customers who set tools subsequently reduced their gambling spending, we cannot determine causality from this pattern. This represents a significant evidence gap, particularly given that these tools are increasingly promoted as harm reduction measures by both banks and regulators. Future research should prioritise generating causal evidence on tool effectiveness, especially considering that 40% of online gamblers use multiple bank accounts, which may limit the effectiveness of single-bank interventions.

Our study has several limitations that should be considered when interpreting these findings. We focused on customers who had spent at least £150 on gambling over a 30-day period, representing those with relatively high gambling engagement. Effects may differ for customers with different gambling patterns or spending levels. Additionally, banking data captures most but not all gambling transactions, as it does not include cash gambling or some retail purchases such as lottery tickets. This may provide an incomplete picture of total gambling behaviour, though it covers the majority of online gambling activity where management tools are most relevant.

The observed effects, while not statistically significant, may still have practical importance when scaled across large customer bases. The estimated £149,000 in potentially reduced gambling across our treatment groups over 11 weeks, while not statistically significant, illustrates the potential magnitude of impact if these interventions were effective at scale. Future research could test these communications with larger samples and in banks with streamlined tool setup processes to determine whether meaningful effects can be reliably detected and achieved.

Based on these findings, we make three recommendations that address both the implementation barriers identified and the evidence gaps that emerged:

1. **Prioritise implementation within banking apps**

Banks could enable customers to set and adjust gambling management tools directly within their apps, without requiring contact with customer service staff.

The conversion rate from message engagement (64%) to tool adoption (<1%) suggests implementation friction may be a barrier. BIT's trials with gambling operators show that reducing friction can significantly increase tool adoption.

2. **Scale up studies**

Given the directional consistency across outcomes but lack of statistical significance, we recommend testing communications at larger scale if implementation barriers are addressed first. The observed reductions of 1.2-3.0% could reflect genuine but small effects that require greater statistical power to detect, though they may also represent statistical noise. A larger study could distinguish between true null effects and underpowered detection of meaningful differences.

3. **Link gambling data to broader financial measures**

Banks could build on the methodology established by Muggleton et al. (2023), which analysed data from 6.5 million UK bank customers and found that gambling at all levels is associated with financial distress and lower financial inclusion. Linking gambling deposits to other financial measures, such as overdraft usage and missed payments, payday loan uptake, and other spending patterns, could transform outcome measurement to broader gambling harm reduction. This approach would provide stronger evidence for the business case for gambling interventions and could reveal effects not captured by gambling deposits alone.

In conclusion, while we cannot conclude that the interventions were effective based on the evidence from this trial, the high engagement rates and consistent directional effects across outcomes suggest potential for meaningful impact if implementation barriers are addressed. Most importantly, this study establishes that banks can engage customers on gambling-related issues without causing

widespread complaints or distress, supporting their role as partners in harm reduction efforts.

Appendix

Appendix A: Evidence review

What is gambling related financial harm (GRFH)?

There is no universally agreed definition of GRFH. It affects individuals who gamble, their families, and the wider community. Gambling-related harm exists on a broad spectrum and, under Langham and colleagues' framework, is categorised into four distinct levels of severity. The first involves the loss of discretionary spending on luxury items and savings. The second includes attempts to manage short-term cash flow through additional income generation or accumulating debt. The third relates to reduced spending on non-immediate needs, such as insurance, maintenance, and preventative healthcare, increasing financial vulnerability over time. The most severe level involves an inability to meet essential needs, including food, housing, and medical care. These financial harms often lead to wider consequences, such as relationship strain, health issues, and emotional distress, with long-term effects including poor credit ratings, persistent poverty, and intergenerational disadvantage. The point at which individuals seek help varies depending on their ability to tolerate financial hardship and the support available to them.[52]

Public Health England's framework for understanding gambling harm similarly highlights its multifaceted nature, categorising harms into types including financial; relationship disruption, psychological distress; criminal activity; and health detriments.[53] While this research primarily focuses on mitigating financial harm, interventions that help individuals manage their gambling spending may also contribute to reducing other interrelated harms.

[52] Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2015). Understanding gambling related harm: A proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health,* 16, 1-23.

[53] Office for Health Improvement and Disparities (2023) *The economic and social cost of harms associated with gambling in England Evidence update 2023*

Relationship between gambling spend and gambling related financial harm

Research demonstrates a nuanced relationship between gambling expenditure and GRFH. Gambling expenditure has been shown to be a strong predictor of harm.[54] For instance, analysis of electronic gaming machine (EGM) expenditure has been found to predict the prevalence of gambling-related harm within specific gambling venues, reflecting the level of harm experienced by individuals who gamble at those locations.[55] Studies have established clear thresholds for low-risk gambling, with Canadian research defining this as gambling up to eight times per month, spending no more than $75 CAD per month, and using up to 1.7% of income for gambling. Exceeding these thresholds significantly increases the risk of harm, with individuals being four times more likely to experience future harm.[56] Australian research calculated the risk at three to twenty times more likely to experience harm.[57]

Analyses of banking data from HSBC UK and Monzo by BIT reveal that the relationship between spending and harm is not purely linear. The Monzo analysis further found that individuals who spend large amounts on gambling tend to gamble frequently, allocate a significant portion of their expenditure to gambling, save little, and exert less control over their gambling habits.[58] However, the HSBC UK analysis found that customers who gamble classified as "Concerning" spend a smaller proportion of their income on gambling but may be exceeding their financial capacity whereas those classified as "Very Concerning" spend heavily but

[54] Muggleton, N., Parpart, P., Newall, P., Leake, D., Gathergood, J., & Stewart, N. (2021). The association between gambling and financial, social and health outcomes in big financial data. *Nature Human Behaviour*, 5(3), 319-326.
[55] Markham, F., Young, M., & Doran, B. (2014). Gambling expenditure predicts harm: Evidence from a venue-level study. *Addiction*, 109(9), 1509-1516.
[56] Currie, S. R., Hodgins, D. C., Casey, D. M., el-Guebaly, N., Smith, G. J., Williams, R. J., & Schopflocher, D. P. (2017). Deriving low-risk gambling limits from longitudinal data collected in two independent Canadian studies. *Addiction,* 112(11), 2011-2020.
[57] Dowling, N. A., Youssef, G. J., Greenwood, C., Merkouris, S. S., Suomi, A., & Room, R. (2021). The development of empirically derived Australian low-risk gambling limits. *Journal of Clinical Medicine,* 10(2), 167.
[58] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 1: Analysis of Monzo customer data*

often have the financial means to do so (though they exhibited the most substantial declines in wealth).[59]

Affect of gambling management tool usage on gambling related financial harm

Evidence regarding the effectiveness of GMTs offered by gambling operators and banks shows mixed but generally positive results. Three systematic reviews found no clear evidence supporting monetary pre-commitment through deposit limits,[60,61,62] however other research indicates more promising outcomes. The "TalkBanStop" pilot evaluation (which included merchant code blocking as one of the three gambling management tools) demonstrated that GMTs created significant barriers to gambling access, thereby reducing gambling appetite.[63] A Gambling Commission survey revealed that 80% of tool users reduced their gambling time or expenditure, while only 1% reported increased activity.[64] Similarly, research on deposit limits found 73% of users were satisfied with the tool, with one operator reporting that 25% of users reduced their gambling expenditure.[65,66] An online randomised control trial (RCT) by BIT suggests that sharing information about tools together may increase tool adoption combining different tools, such as gambling blocks with spending limits, may increase tool adoption, particularly among people at lower risk of gambling harm.[67] Importantly, customers view operators who promote these tools positively, with 64% agreeing that such promotion demonstrates

[59] BIT (2021). *Gambling behaviour: what can bank transaction data tell us? A feasibility study. Part 2: Analysis of HSBC UK customer data*.
[60] Ladouceur, R., Blaszczynski, A., & Lalande, D. R. (2012). Pre-commitment in gambling: A review of the empirical evidence. *International Gambling Studies*, *12*(2), 215-230.
[61] Ladouceur, R., Shaffer, P., Blaszczynski, A., & Shaffer, H. J. (2017). Responsible gambling: a synthesis of the empirical evidence. *Addiction Research & Theory*, 25(3), 225-235.
[62] Drawson, A. S., Tanner, J., Mushquash, C. J., Mushquash, A. R., & Mazmanian, D. (2017). The use of protective behavioural strategies in gambling: A systematic review. *International Journal of Mental Health and Addiction*, *15*, 1302-1319.
[63] Stow et al. (2022) *Final Evaluation of the TalkBanStop Pilot*
[64] Gambling Commission (2024) *Customer awareness and use of gambling management tools*
[65] Gainsbury, S. M., Angus, D. J., Procter, L., & Blaszczynski, A. (2020). Use of consumer protection tools on internet gambling sites: Customer perceptions, motivators, and barriers to use. *Journal of Gambling Studies*, *36*(1), 259-276.
[66] DCMS 2023 *High Stakes: Gambling Reform for the Digital Age*
[67] BIT(2023) *Can spending limits in a banking app support safer gambling?*

greater customer care,[68] suggesting banks may also benefit from promoting such tools.

Factors influencing gambling tool use

The adoption and effectiveness of GMTs are influenced by several key factors that affect awareness, accessibility, and motivation. Awareness remains a significant challenge, with research showing that 62% of respondents were unaware of gambling blocks,[69] and 81.5% didn't know they could request gambling payment blocks from their bank.[70] However, evidence from Finland demonstrates that prompting can significantly increase tool adoption, with almost half of users setting limits when prompted during account registration to a gambling operator compared to less than 10% without prompting.[71] In a different gambling context self-appraisal messaging such as "Do you know how long you have been playing? Do you need to think about a break?" during in-play sessions on EGMs resulted in shorter playing sessions and greater awareness of time spent gambling than purely information messaging.[72]

Accessibility barriers exist on multiple levels. Some users struggle with technological aspects, particularly older adults and land-based venue players - who may lack the digital literacy to access and engage with tools, while others face challenges with rural internet access, device affordability, or language barriers.[73] The abundance of available tools can also create decision paralysis, with users struggling to identify the most appropriate options for their needs.[74]

Motivation to use these tools is complicated by perception issues. People often view the tools as irrelevant – they don't know who they are for, when to use them, or what

[68] Gambling Commission (2023) *Exploring consumer journeys using customer-led tools*
[69] Gambling Commission (2021) *How the consumer engages with safer gambling opportunities*
[70] Gambling Commission (2024) *Customer awareness and use of gambling management tools*
[71] Ivanova, E., Magnusson, K., & Carlbring, P. (2019). Deposit limit prompt in online gambling for reducing gambling intensity: A randomized controlled trial. *Frontiers in Psychology*, *10*, 639.
[72] Monaghan, S., & Blaszczynski, A. (2010). Impact of mode of display and message content of responsible gambling signs for electronic gaming machines on regular gamblers. *Journal of Gambling Studies*, 26, 67-88.
[73] Responsible Gambling Commission (2022) *Gambling digital tools*
[74] Responsible Gambling Commission (2022) *Gambling digital tools*

to expect.[75] Others have a non-specific perception that the tool/s are not needed or that they have their own approach to budgeting the amount they spend on gambling.[76,77] Many potential users view the tools as relevant only for those experiencing harm from their gambling rather than as preventative measures. This stigmatisation creates a significant barrier to adoption, with users often believing they have sufficient control without external support.[78, 79,80] However, research suggests this barrier can be overcome by normalising usage by for example reframing tools as budget management features rather than "problem gambling"[81] interventions.[82]

Implementation challenges also exist, particularly around circumvention. A Swedish study found that 49% of self-excluders continued gambling despite restrictions, most commonly through online casinos.[83] Technical limitations, such as the ability to bypass debit card gambling blocks through e-wallets like PayPal or bank transfers to the operator further complicate effectiveness.[84] Research by BIT indicates that 40% of people who gamble online frequently use multiple bank accounts for deposits, highlighting the challenge of implementing comprehensive controls.[85]

Finally, there is the risk of backfire effects. Invitations to set up gambling management tools may unintentionally increase feelings of guilt among individuals

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[75] Responsible Gambling Commission (2022) *Gambling digital tools*
[76] Ivanova, E., Magnusson, K., & Carlbring, P. (2019). Deposit limit prompt in online gambling for reducing gambling intensity: A randomized controlled trial. *Frontiers in Psychology*, *10*, 433546.
[77] Gambling Commission 2023 *Exploring consumer journeys using customer-led tools*
[78] Responsible Gambling Commission (2022) *Gambling digital tools*
[79] Ivanova, E., Magnusson, K., & Carlbring, P. (2019). Deposit limit prompt in online gambling for reducing gambling intensity: A randomized controlled trial. *Frontiers in Psychology*, *10*, 639.
[80] Gambling Commission (2024) *Customer awareness and use of gambling management tools*
[81] This is the terminology used in the Responsible Gambling Commission's (2022) *Gambling digital tools* report.
[82] Responsible Gambling Commission (2022) *Gambling digital tools*
[83] Håkansson, A., & Komzia, N. (2023). Self-exclusion and breaching of self-exclusion from gambling: a repeated survey study on the development of a nationwide self-exclusion service. *Harm Reduction Journal,* 20(1), 107.
[84] Money and Mental Health Policy Institute (2022) *Raising the stakes: Overcoming barriers to tackling gambling-related harm*
[85] BIT (2023). *Gambling Management Tool Survey*

engaged in harmful gambling.[86] Furthermore, there are limitations in effectively de-escalating or providing support to those who feel distressed or triggered by receiving such invitations.[87]

[86] DCMS (2023) *High Stakes: Gambling Reform for the Digital Age*
[87] Responsible Gambling Commission (2022) *Gambling digital tools*

Appendix B: Supplementary trial design communication materials

Applying EAST framework to promote us of GMTs

BIT's EAST framework provides a simple structure for designing effective interventions. It posits that to encourage a behaviour, it should be made Easy, Attractive, Social, and Timely.[88] The framework below is applied to messages about the GMTs below:

Easy:	• **Easy to understand:** Use plain language, avoid jargon, relate complex ideas to everyday life, and clearly explain how each tool works. Provide step-by-step instructions.[89] • **Easy to act on:** Offer actionable guidance (e.g., specific starting points for limits), emphasise ease of use, and provide clear instructions for setup.[90,91]
Attractive:	• **Relevant:** Tailor messages to the target audience's needs and values. Frame tools as supporting broader financial goals (e.g., budget management). Relatable content increases trust.[92, 93] • **Attractive:** Highlight benefits (e.g., saving money), emphasise that the tools are free and won't impact credit scores, use positive emotional appeals and storytelling.[94] • **Salience:** Use visual stimuli (bold font, color, images) to draw attention to key information.

[88] BIT (2024) *EAST Framework: Four Simple Ways to Apply Behavioural Insights*
[89] NSW (2021) *Using behavioural insights to increase completion of forms and surveys.*
[90] BIT(2021) *Vaccine communications: Equipping community advocates with behavioural science principles*
[91] BIT (2020) *How behavioural insights helped Canadians access their tax benefits*
[92] Bholat, D., Broughton, N., Parker, A., Ter Meer, J., & Walczak, E. (2018). Enhancing central bank communications with behavioural insights. *Bank of England Working Paper No. 750*
[93] BIT (2019) *Enhancing central bank communications using simple and relatable information*
[94] BIT (2018) *Reducing rent arrears at Metropolitan Thames Valley Housing*

	• [95]**Self-reflection:** Incorporate self-appraisal messaging, in other gambling contexts messages such as "Do you know how long you have been playing? Do you need to think about a break?" at relevant moments (e.g., during in-play sessions) has proven more effective than purely informational messaging.[96]
Social:	• **Normalise usage:** Position tools as beneficial for everyone, not just those experiencing gambling harm. Avoid stigmatizing language. Emphasise universal benefits, making them a standard part of responsible behavior. • **Norms:** Use injunctive (what people *should* do) and descriptive (what people *are* doing) norms to encourage adoption.[97,98]
Timely:	• **Timely:** Provide information and prompts at moments when they are most relevant and actionable. This includes offering clear instructions and actionable steps so people can act *when* they need to. It also includes tailoring messages to the audience's current needs.[99]

[95] Faulkner, N., Borg, K., Bragge, P., Curtis, J., Ghafoori, E., Goodwin, D., ... & Wright, P. (2019). The INSPIRE framework: How public administrators can increase compliance with written requests using behavioral techniques. *Public Administration Review,* 79(1), 125-135.
[96] Monaghan, S., & Blaszczynski, A. (2010). Impact of mode of display and message content of responsible gambling signs for electronic gaming machines on regular gamblers. *Journal of Gambling Studies,* 26, 67-88.
[97] Hallsworth, M., List, J. A., Metcalfe, R. D. & Vlaev, I. (2014). The behavioralist as tax collector. *NBER Working Paper no. 20007*.
[98] Allcott, H. (2011). Social Norms and Energy Conservation. Journal of Public Economics, 95(9-10), 1082-1095. Ayers,I. (2009). Evidence from two large field experiments that peer comparison feedback can reduce residential energy usage. Working Paper No. 15386. Cooney, K. (2011). Evaluation Report: Opower SMUD Pilot, Year 2.
[99] Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. *Proceedings of the National Academy of Sciences*, 108(26), 10415-10420

Additional principles (Not within EAST):	• **Reassurance:** Reassure customers about credit ratings[100] • **Support:** Signpost support resources.

Longlisted messages reviewed by panels

To gather feedback, BIT developed a workbook with structured questions and exercises focused on the eight longlisted messages.

First part of the message varies across each message:	
Prompt A. Normalising usage (seatbelt metaphor)	
Key idea and aim: This framing presented the tools as a preventative measure, using the seatbelt analogy to illustrate their benefits. Just as seatbelts do not affect safe drivers but provide protection in case of an accident, normalising the use of GMTs allows for minimal impact on those gambling within their budget, whilst helping those who may have lost track or control. **Problems the framing is addressing:** ■ Stigma ■ Relevance ■ Awareness	**Proposed draft:** You wouldn't ride in a car without your seatbelt on. Why gamble without protecting yourself? Just like buckling up before you drive, setting up a gambling management tool provides a layer of protection by helping ensure you don't overspend. Conveniently, they also safeguard your money if your debit card is ever lost or stolen. You can: ■ Set a limit on how much you want to spend over a month. ■ Take a break by freezing all gambling transactions on your [banking partner] debit cards.
Feedback Many people found the car and seatbelt analogy clear and attention-grabbing, due to its brevity, boldness, and universal understanding. They also appreciated the message for highlighting the risks of not using the tools, which they found impactful and thought-provoking.	

[100] BIT (2023) *Gambling support via financial services firms*

However, some individuals felt that the analogy unfairly grouped people who gamble with unsafe drivers and implied that those who do not use the tools are irresponsible, which could be perceived as judgmental. The banking partner also suggested that the seatbelt analogy might remind people of recent aggressive road safety adverts which some might find distressing or triggering. Furthermore, a few participants noted that some people drive without a seatbelt, meaning the message might not be effective for everyone.

Prompt B. Future focus

Key idea and aim:

This framing encouraged individuals to consider alternative uses for their money, aligning with their financial goals and aspirations. By highlighting potential benefits, such as saving or treating themselves or others, the message aimed to create a positive and motivating association with reducing gambling spend, making the behaviour feel rewarding rather than restrictive.

Problems the framing is addressing:

- Stigma
- Relevance
- Awareness

Proposed draft:

What would you do with some extra cash in your pocket?

Spending just £5 less on gambling each week adds up to £260 over the year. Would you save it? Or buy something special for you or someone else?

With our free gambling management tools, you can decide in advance the maximum amount you would like to spend on gambling, making it simpler to manage your finances so you can focus on what matters most. You can:

Set a limit *on how much you want to spend over a month.*

Take a break *by freezing all gambling transactions on your [banking partner] debit cards.*

Feedback

Some participants appreciated message F because phrases such as "keep your options open" and the mention of "flexibility" made them feel that customers remained in control. They also liked that the message was clear, positive, and not patronising, without putting undue pressure on them.

However, the "easily adjust" section was unclear to some, as adjustments actually take 72 hours to process. Others found the message somewhat dull and generic, having encountered similar phrasing before, and less engaging compared with the other messages. Additionally, some participants mentioned that certain individuals might prefer

to permanently block their access rather than keep their options open.

Prompt C. Budget management tool

Key idea and aim:

This framing repositioned GMTs by presenting them as tools for budget management, rather than a tool for people experiencing gambling related harm.

Problems the framing is addressing:

- Relevance
- Stigma
- Awareness

Proposed draft:

Balancing needs and wants can be tricky.

Our free gambling management tools help you set personal gambling and betting limits so that you stay within your budget. You can:
Set a limit *on how much you want to spend over a month.*

Take a break *by freezing all gambling transactions on your [banking partner] debit cards.*

Feedback
Although some people liked the phrase 'needs and wants,' others found it unclear. Overall, the consensus was that it was not attention-grabbing.

Prompt D. Raising awareness

Key idea and aim:

This framing raised awareness of the existing tools in a relatable way. As an informational message, it is unlikely to alienate customers, as it just presents available options.

Problems the framing is addressing:

- Awareness
- Inaccessibility
- Too much choice in tools

Proposed draft:

Did you know we offer two free tools to help our customers manage their gambling spending? You can:

Set a limit *on how much you want to spend over a month.*

Take a break *by freezing all gambling transactions on your [banking partner] debit cards.*

Feedback

A simple, direct message explaining GMTs. Participants found it clear, supportive, and encouraged them to proactively control their finances. While some suggested a catchier

slogan, its simplicity ensured that the message focused solely on raising awareness as a motivator..

Prompt E. Self-reflection

Key idea and aim:

This framing encouraged self-appraisal, inviting customers to reflect on their own behaviour to make the messages more personally relevant.

Problems the framing is addressing:

- Awareness
- Relevance

Proposed draft:

Do you know how much time and money you spend on gambling every month?

Many people underestimate how much they've spent gambling. That's why we offer free tools to help our customers plan and stay on track. You can:

Set a limit *on how much you want to spend over a month.*

Take a break *by freezing all gambling transactions on your [banking partner] debit cards.*

Feedback

This message encouraged individuals to consider their gambling spend and highlighted that many underestimate their spending. While it encouraged reflection, some participants found parts of the wording slightly accusatory. Accordingly, adjustments were made to soften the language. "Do you know how much time and money you spend on gambling every month?" became" How much do you think you spend on gambling each month?" and the sentence "Keeping track can be a challenge." was added,

Prompt F. Keeping options open

Key idea and aim:

This framing reassured customers that they can keep control over their spending decisions when using a GMT while also highlighting the ease of setting up the tools.

Problems the framing is addressing:

- Awareness

Proposed draft:

Keep your options open with our free gambling management tools.

Imagine having the flexibility to decide when and how much you spend on gambling. With our tools, you can set limits, take breaks, and easily adjust your settings whenever you need to. Here's how it works:

■ Ease of action	***Set a limit*** *on how much you want to spend over a month.* ***Take a break*** *by freezing all gambling transactions on your [banking partner] debit cards.* **Easy to manage:** Adjust your settings or lift the block whenever you like. They are applied instantly, but it takes at least 72 hours to lift the limit or block.

Feedback
Some participants appreciated this message because phrases such as 'keep your options open' and the mention of 'flexibility' reinforced a sense of control. They also liked that the message was clear, positive, and not patronising, without applying too much pressure.

However, the 'easily adjust' section was unclear to some, as adjustments actually take 72 hours to process. Others found the message somewhat dull and generic, having encountered similar phrasing before, and felt it was less engaging than the other messages. Additionally, some participants noted that certain individuals might prefer to permanently block their access rather than keep their options open.

We added wording on "flexibility" to the shortlisted messages because it resonated well with participants.

Prompt G. Normalising usage (roller coaster metaphor)

Key idea and aim:	**Proposed draft:**
The same idea and aim as message A but using a more striking metaphor. **Problems the framing is addressing:** ■ Stigma ■ Relevance ■ Awareness	You wouldn't ride a roller coaster without your safety bar on. Limits and blocks are the safety bars of gambling. They offer a layer of protection, helping you avoid overspending. They also safeguard your money if your debit card is ever lost or stolen. You can: ■ Set a limit on how much you want to spend over a month.

	■ Take a break by freezing all gambling transactions on your [banking partner] debit cards.

Feedback
This message compared GMTs to a rollercoaster safety bar, making it relatable, memorable, and engaging. Participants appreciated its non-judgmental tone and how it captured gambling's highs and lows. While some questioned its relevance for those experiencing gambling harm, it generated minimal negative feedback and had strong visual potential.

Second part of the message - consistent across all the alternatives

Key idea and aim: The framing of the second part of the message clarified the tools, reduced uncertainty about how they work, reinforced the setup process, and highlighted how easy it is to use them. It offered different alternatives for setting up the tools (e.g., via in-app messaging or by contacting the bank) and provided guidance on finding additional support and information. **Problems the framing is addressing:** ■ Ease of action ■ Awareness ■ Accessibility	Set up your tool today by emailing xxxx or calling xxxx. Both tools: - work at licensed gambling providers; - are applied instantly, but it takes at least 72 hours to lift the limit or block; - won't affect your credit score. Need help choosing the right tool? We are here to help, contact us or click here for more information.

Overarching feedback
Some participants appreciated the reference to credit scores, as they were aware that certain gambling activity can impact their credit rating and found this aspect of the message relevant. The phrasing around the banking partner being there to help also resonated, making participants feel supported and valued. Additionally, the mention of "free" was well received.

However, a reference to GMTs adding another layer of protection in case the card is stolen was seen as confusing. Some participants felt it detracted from the main message, and there were concerns that it could undermine the banking partner's existing security procedures.

Feedback from the ranking exercise

Participants were also asked to rank the prompts, from their most to their least favourite (ranked 1 and 7 respectively) on the following criteria:

Mean Ranking	Attention grabbing:	Motivation:	Ease:	Overall:
	Which message caught your attention the most (most attention grabbing first, least attention grabbing last)	Which message motivated you to set up a tool the most (most motivational first, least motivational last)	Which message was the clearest and easiest to understand (clearest first, least clear last)	Rank your favourite to least favourite message overall (most favourite first, least favourite last)
G	2.75	3.50	3.58	2.67
D	4.83	3.67	3.00	3.75
B	3.25	3.42	4.17	3.83
A	2.17	4.25	4.50	4.00
E	3.58	3.58	4.42	4.42
F	5.67	4.42	3.67	4.50
C	5.75	5.17	4.67	4.83

Worst scoring prompts on each criteria

Feedback from banking partner on the shortlisted messages

The banking partner's compliance and communications teams reviewed the shortlisted messages (D, E and G) and decided to exclude the metaphor-based message G due to concerns about normalising gambling or portraying it as a fun activity. The bank particularly wanted to avoid appearing to trivialise the experiences of those affected by gambling harm and to minimise the risk of customer complaints or opt-outs from in-app notifications. To align with the bank's communication standards, further refinements were also made to the messages' wording.

Appendix C: Supplementary technical details of the methodology and data analysis process

Ethical considerations

The research underwent a formal internal ethics review in line with BIT policy to cover both the feedback gathering exercise, used to inform the design of the communications, and the trial itself.

Feedback exercise

Two groups of participants were recruited to take part in the feedback gathering exercise:

- Group 1: individuals who gamble regularly
- Group 2: individuals with lived experience of gambling related harm

This was to explore appropriateness of message content from a broader range of viewpoints. Individuals recruited for group 1 were screened using questions from the PGSI to exclude those showing signs of gambling-related harm, where participation could cause additional harm. Individuals from group 2 were recruited through lived experience networks from a gambling support provider. The team worked directly with their co-ordinator to ensure suitability for taking part. Follow up support was also available through the organisation if needed. Informed consent was obtained through an information sheet outlining the study's purpose, expectations, data usage, potential risks, and available support, with written consent required. Participants received £50 compensation.

Trial

Trial participants had agreed when signing up to use the app for their data to be used for research purposes, as part of the banking partner's terms and conditions. This covered consent for their participation. Customers had the option to opt out of bank notifications, and trial messages were not sent to those who had done so. All communications were tested with people who gamble, individuals with lived experience of gambling harm, academics, and the bank. The intervention itself was minimal, consisting of a single in-app notification that participants could dismiss.

Appendix D: Regression Tables

Primary analysis: weekly gambling deposits

Appendix table D.1 presents the results from four regression models examining the intention to treat (ITT) impact of the two messaging interventions on customer gambling expenditure during the 11-week post-intervention period.

Technical notes. These regressions are run on the post-intervention data, starting on the Monday 2024-11-18 and finishing 2025-01-31 inclusive. As our notification was sent on a Tuesday (2024-11-19), we include Monday 18th November as post-intervention. Please also note the data for the final week (w/c 2025-01-27) consists of 5 days for models 1 to 3; the inclusion of week fixed effects should prevent this influencing the treatment effects estimated. Finally, model 4 is run on the sum of post-intervention deposits to speed up the bootstrapping of standard errors.

Table D.1: Regression Tables for Gambling Management Tool Usage

	(1)	(2)	(3)	(4)
Outcome	Weekly gambling deposits	Weekly gambling deposits	Weekly net account change due to gambling	Total post-treatment gambling deposits (2024-11-18: 2025-01-31)
Model	Poisson	OLS	OLS	Quantile Regression (median)
Standard errors	CR2 clustered at individual level	CR2 clustered at individual level	CR2 clustered at individual level	Percentile bootstrap (R=5,000)
Intercept	£16.35** (£1.98)	£65.79** (£10.73)	-£32.96** (£8.63)	£739.88** (£36.94)
Treatment (reference: average value for control group)	£100.89	£100.89	-£57.53	Median: £440.00
Treatment 1: "Did you know…"	-1.17% (4.10%)	-£1.52 (£3.66)	£0.71 (£2.60)	-£1.52 (£5.97)
Treatment 2: "How much do you think you	-2.99% (3.50%)	-£6.17+ (£3.53)	£2.70 (£2.67)	-£1.52 (£5.71)

spend?"				
H0: T2-T1=0	-1.82% (3.29%)	-£4.65 (£3.10)	£1.99 (£2.41)	-£0.00 (£5.88)
Decile of baseline gambling deposits pre-randomisation (reference: 1st)	£17.69	£17.69	-£12.36	Median: £20.00
Decile 2 [11th to 20th]	36.27%** (15.88%)	£2.60 (£2.33)	-£3.10 (£2.12)	£23.34** (£6.10)
Decile 3	81.87%** (21.18%)	£4.51 (£2.83)	-£3.68 (£2.42)	£51.51** (£9.00)
Decile 4	111.84%** (23.30%)	£4.38 (£3.46)	-£1.68 (£3.17)	£76.78** (£12.45)
Decile 5	156.06%** (28.88%)	£7.82+ (£4.07)	-£6.60* (£3.29)	£84.24** (£14.74)
Decile 6	222.62%** (35.34%)	£12.38* (£5.14)	-£11.20** (£3.72)	£120.56** (£25.25)
Decile 7	317.66%** (46.02%)	£18.25* (£7.61)	-£14.29* (£6.36)	£136.30** (£26.96)
Decile 8	481.68%** (64.00%)	£29.83* (£11.63)	-£25.27** (£9.25)	£193.34** (£40.29)
Decile 9 [81st-90th]	731.82%** (93.03%)	£45.16* (£18.85)	-£33.46* (£15.16)	£344.15** (£60.08)
91st to 95th percentile	1,050.57%** (139.90%)	£64.71+ (£33.65)	-£54.52* (£26.04)	£431.53** (£116.90)
96th to 100th percentile	1,270.58%** (187.40%)	£89.11+ (£48.98)	-£69.15* (£34.86)	£438.77* (£178.93)
Baseline average 12-week pre-trial gambling deposits (reference values the regressor is centred around)	Average: £106.11	Average: £106.11	Net change: -£56.38	Median weekly: £45.81 Average (used to centre): £106.11
Centred weekly pre-trial gambling	-0.09%** (0.01%)	-£0.63** (£0.11)	£0.56** (£0.17)	-£7.41** (£0.32)

deposits (net change for model 3)				
Previously set a limit or block before 2024-11-05 (reference: no)	£96.81	£96.81	-£54.60	Median: £441.67
Previously set block or limit: yes	-8.10% (23.38%)	-£6.32 (£23.11)	£27.52+ (£15.20)	-£59.95 (£49.83)
Gender (reference: non-male)	£88.78	£88.78	-£47.41	Median: £358.46
Gender: male	1.15% (3.10%)	£3.11 (£2.88)	-£5.35* (£2.21)	£28.48** (£6.26)
Age (reference: 18-24)	£65.00	£65.00	-£36.16	Median: £282.15
Age: 25-34	7.07% (6.39%)	£1.72 (£4.26)	£-0.30 (£3.72)	£18.07* (£8.57)
Age: 35-44	20.92%** (6.96%)	£12.69** (£4.27)	£-5.29 (£4.31)	£46.82** (£9.80)
Age: 45-54	17.92%** (6.60%)	£6.65 (£4.54)	£0.72 (£4.73)	£56.82** (£9.79)
Age: 55-64	14.28%* (7.29%)	£4.41 (£5.43)	£1.22 (£5.15)	£54.97** (£10.78)
Age: 65+	22.49%** (8.06%)	£19.06* (£9.04)	£-16.26* (£7.77)	£46.82** (£11.94)
Observations	106,711	106,711	106,711	9,701
Number of unique individuals	9,701	9,701	9,701	9,701

Note: Region and week fixed effects are included in all regressions.
+ p < 0.10, * p < 0.05, * p < 0.01.

Model 1 is our preferred specification. It employs a **Poisson regression** with standard errors clustered at the individual level to account for the repeated observations for each customer. This model is well-suited for outcome data like expenditure, which is non-negative and highly skewed.[101] The coefficients are exponentiated and

[101] Chen, J., & Roth, J. (2023). Logs with Zeros? Some Problems and Solutions. *The Quarterly Journal of Economics*. https://doi.org/10.1093/qje/qjad054

interpreted as percentage changes. The results show that neither Treatment 1 ("Free Tools?") nor Treatment 2 ("How Much Spent?") had a statistically significant effect on weekly gambling deposits. The coefficient for Treatment 1 implies a non-significant 1.2% reduction in deposits ($p>0.1$), while Treatment 2 implies a non-significant 3.0% reduction ($p>0.1$) compared to the control group. The test of the difference between the two treatment arms (T2-T1) is also not significant.

Model 2 serves as a robustness check using an **Ordinary Least Squares (OLS)** model. The findings are consistent with the Poisson model, showing small, statistically insignificant reductions in absolute weekly deposits.

Model 3 investigates the impact on **weekly net gambling outflows** (deposits minus returns) using an OLS model. We are unable to apply our preferred Poisson specification because of the mix of negative and positive values. We find no evidence that the interventions significantly altered customers' net gambling position.

Model 4 uses a **median quantile regression** to assess the impact on the total post-treatment deposits for the *typical* customer, thereby reducing the influence of extreme outliers in the spending distribution. This model confirms the null finding, showing no significant effect of either treatment on the median customer's gambling deposits.

Across all models, covariates perform as expected. Higher deciles of baseline gambling deposits are strongly and significantly associated with higher post-intervention deposits. Typically customers in age brackets from 35 upwards generally deposit more than the 18-24 reference group.

Please note the collinearity between the average weekly baseline covariates (defined in the 12 weeks prior to the intervention 2024-08-26 to 2024-11-17) and the deciles of previous gambling spend (defined on Q2 and Q3 2024 between 2024-04-01 and 2024-09-30), making interpretation of those coefficients more challenging. There is some evidence of mean reversion, which may be an interesting line of future research.

Secondary analysis: setting a block or limit

Table 2 presents the results from three regression models examining the impact of the interventions on the probability of a customer having a gambling block or limit set as of February 5th, 2025.

Table D.2: Regression Tables for Gambling Management Tool Usage

	(1)	(2)	(3)
Outcome	Setting block or limit	Setting a limit	Setting block or limit
Model	Logistic	Logistic	OLS
Standard errors	HC3	HC3	HC3
Intercept	0.001** [0.000–0.006]	0.000** [0.000–0.003]	-0.39% (0.47%)
Treatment (reference: control)	Odds: 0.00988	Odds: 0.00653	Percent: 0.998%
Treatment 1: "Free Tools?"	1.542 [0.846–2.810]	0.708 [0.211–2.383]	0.25% (0.22%)
Treatment 2: "How Much Spent?"	1.103 [0.587–2.072]	0.773 [0.221–2.705]	0.06% (0.20%)
H0: T2=T1	Odds ratio: 0.715 [0.392-1.304]	Odds ratio: 1.091 [0.289, 4.118]	-0.193% (0.217%)
Decile of baseline gambling deposits pre-randomisation (reference: 1st)	Odds: 0.00513	Odds: 0.00410	Percent: 0.511%
Decile 2 (11th to 20th)	1.469 [0.457–4.722]	0.991 [0.114–8.587]	0.18% (0.27%)
Decile 3	1.237 [0.340–4.501]	0.890 [0.138–5.763]	0.16% (0.24%)
Decile 4	1.160 [0.362–3.717]	1.301 [0.197–8.590]	0.05% (0.25%)
Decile 5	2.197 [0.682–7.074]	1.621 [0.211–12.456]	0.37% (0.34%)
Decile 6	1.357 [0.353–5.222]	0.405 [0.034–4.779]	0.13% (0.31%)
Decile 7	1.511	1.137	0.14%

	[0.439–5.200]	[0.139–9.302]	(0.29%)
Decile 8	4.586** [1.543–13.636]	1.633 [0.212–12.547]	1.10%** (0.41%)
Decile 9 (81-90th)	3.790* [1.229–11.689]	1.204 [0.119–12.190]	0.92%* (0.42%)
91st to 95th percentile	3.197 [0.789–12.955]	0.145 [0.012–1.820]	0.88% (0.61%)
96th to 100th percentile	5.511** [1.615–18.806]	4.574 [0.303–68.971]	1.42%* (0.64%)
Previously set a limit or block before 2024-11-05 (reference: no)	Odds: 0.00574	Odds: 0.00083	Percent: 0.571%
Previously set block or limit: yes	359.040** [161.780–796.821]	3,413.022** [870.217–13,385.997]	56.29%** (6.14%)
Gender (reference: non-male)	Odds: 0.01106	Odds: 0.00417	Percent: 1.094%
Gender: male	0.654 [0.386–1.108]	0.823 [0.295–2.299]	-0.28% (0.22%)
Age (reference: 18-24)	Odds: 0.01481	Odds: 0.01135	Percent: 1.459%
Age: 25-34	1.746 [0.549–5.556]	2.188 [0.336–14.265]	0.61% (0.38%)
Age: 35-44	2.915+ [0.962–8.831]	5.280+ [0.984–28.326]	0.92%* (0.38%)
Age: 45-54	2.020 [0.669–6.094]	4.956+ [0.916–26.800]	0.67%+ (0.39%)
Age: 55-64	2.096 [0.649–6.766]	7.940* [1.090–57.830]	0.68%+ (0.40%)
Age: 65+	0.544 [0.075–3.956]	0.399 [0.008–19.743]	0.22% (0.39%)
Observations	9,701	9,701	9,701

Note: Region fixed effects are included in all regressions.
95% confidence intervals within square brackets, and standard errors for OLS.
+ p < 0.10, * p < 0.05, * p < 0.01.

Model 1 uses a **logistic regression**, with results presented as odds ratios. An odds ratio greater than 1 indicates a higher likelihood of setting a tool compared to the control group. The odds ratio for Treatment 1 is 1.54 and for Treatment 2 is 1.10. However, the

95% confidence intervals for both estimates are wide and cross 1, indicating that these results are not statistically significant. We cannot conclude that the interventions meaningfully increased the odds of a customer setting a GMT. The average marginal effects for the treatment coefficients for the treatment coefficients are:

- T1 - T0: 0.31% [95% CI: -0.12%, 0.75%]
- T2 - T0: 0.06% [95% CI: -0.34%, 0.46%]

Model 2 uses a logistic regression to isolate the impact on setting a **limit only**, excluding blocks. The results are again not statistically significant.

Model 3 uses an **OLS (linear probability) model** as an alternative specification. The coefficients represent the percentage point change in the probability of setting a tool. The estimated effects are very small and statistically insignificant: a 0.25 percentage point increase for Treatment 1 and a 0.06 percentage point increase for Treatment 2.

Having a limit set prior to the intervention is, unsurprisingly, the strongest predictor of having a tool set post-intervention. Furthermore, customers in higher deciles of baseline gambling spend (Deciles 8, 9, and 96-100th percentile) and those in older age brackets (specifically 35-44, 45-54, and 55-64 for limit-setting) were significantly more likely to set a tool.

We supplement the logistic results with Firth's bias-reduced logit (Firth, 1993). With an event rate below 1%, standard maximum-likelihood estimation is known to produce coefficient estimates that are biased away from zero (King & Zeng, 2001). This overestimation of the coefficients' magnitude leads to a corresponding underestimation of the predicted probability for the rare event (due to the negative intercept). Firth's penalised regression corrects for this first-order bias. The results from the Firth regression produce similar treatment coefficients and support the original conclusion of a statistically insignificant treatment effect.

Box D.1: Explaining the discrepancy between estimated and observed block and limit usage rates

We included eligible participants who had a limit set on 5th November 2024, just before randomisation took place, while excluding those with a block. This was because an online lab experiment had found limits can "cannibalise" block setting.[102]

Unfortunately there were small differences in baseline rates of limit setting between the customers in each treatment arm: 17 in the control group had a limit set at baseline compared to 10 in each of the message arms. Consequently the proportions in our statistical model, which "controls" for baseline limit setting (Model 1 of Table D.2, presented in Figure 4.7) leads to estimates of block and limit setting that are higher than the descriptive statistics observed in Table D.3.

Table D.3: Communication "funnel"

	N	Open rates	Click through rates	Block or limit set*
Control	3,239 (3,222)	NA	NA	0.99% (0.47%)
Treatment 1: Free Tools?	3,235 (3,225)	64.4% (64.4%)	2.53% (2.54%)	1.05% (0.78%)
Treatment 2: Think You Spent?	3,227 (3,217)	64.5% (64.4%)	2.85% (2.86%)	0.84% (0.53%)

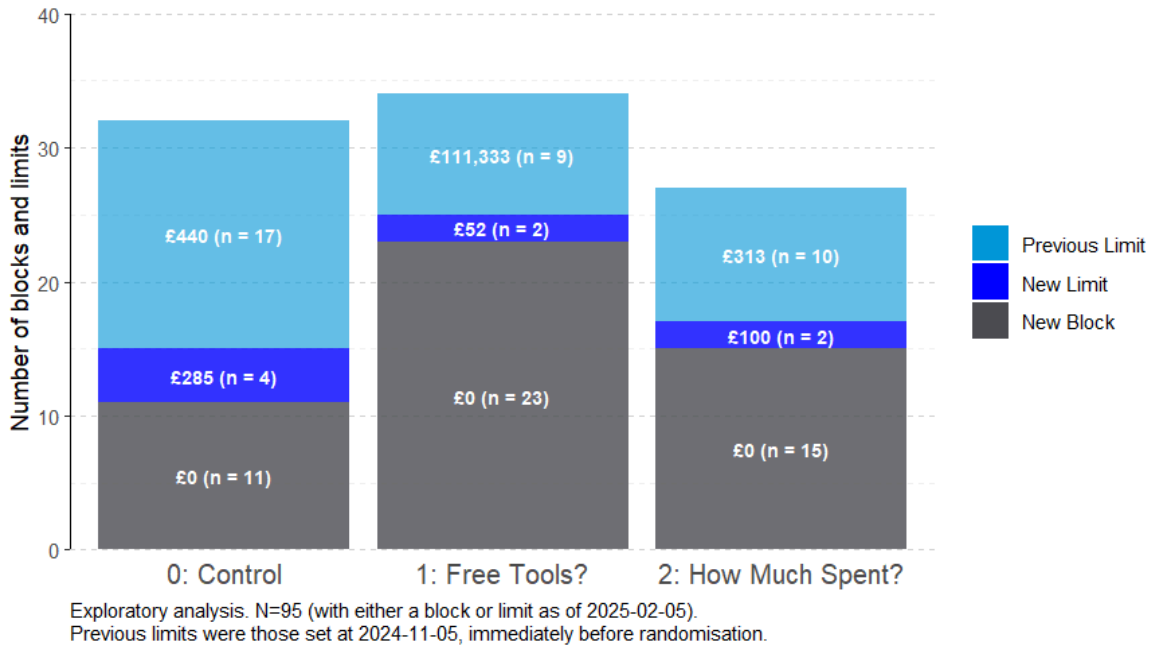
*Block and limits set at 2025-02-05.
Notes: Exploratory analysis. N=9,701. (N=9,664 excluding those with limits set pre-trial, as assessed at 2024-11-05).
Bracketed numbers are for new blocks and limits, i.e. excluding those who had a limit set at 2024-11-05 (the data pull nearest randomisation).

In particular Figure 4.7 presents what the model predicts the rates of block and limit setting if the control group had been randomised to receive each message. Treatment effects from the statistical models are therefore much closer to the

[102] BIT (2023). Can spending limits in a banking app support safer gambling? Results from an online lab experiment.

differences between the "New" limits and blocks set across treatment arms seen in Figure D.1.

Figure D.1: Rates of new and old block and limit setting, with average limit values.



Exploratory analysis. N=95 (with either a block or limit as of 2025-02-05).
Previous limits were those set at 2024-11-05, immediately before randomisation.

Figure D.1 shows there were 15 new blocks and limits set in the control group compared to 25 receiving the "free tools" and 17 receiving the "how much spent" message. Among new management tools set, the block appeared more popular, which differs substantially from our online experimental results[103], which found the majority of those choosing to set a hypothetical gambling management tool had a preference for limits over blocks.

The average limit is presented for each group. Please note before the trial one individual set a limit of £999,999 in the informational treatment arm, being solely responsible for the high average. Without them the average limit is £250 for this group.

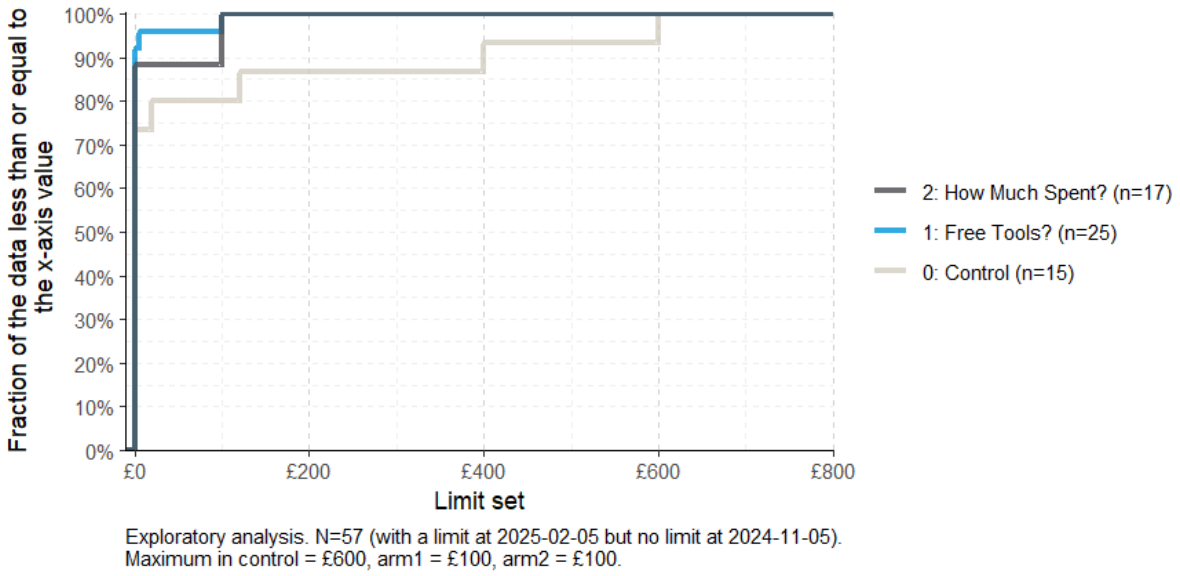
[103] BIT (2023). Can spending limits in a banking app support safer gambling? Results from an online lab experiment.

Appendix E: Appropriateness of Limits

Individuals have the freedom to choose any limit between £0 (a block) or £999,999 for a 30-day rolling period. Previous work by BIT has found evidence of very high limits being set[104] , which will not actually reduce the overconsumption of gambling and therefore will not reduce harm. This appendix section asks whether the limits set by banking customers are likely to change gambling behaviour moving forward.

Analysis of the value of new limits set in this trial would not be informative given only 8 individuals set a new limit (Figure D.1). We therefore include the 36 customers who had set a limit before the trial and kept it active until February 5th 2025. We still recommend caution in drawing any conclusions from such a small sample.

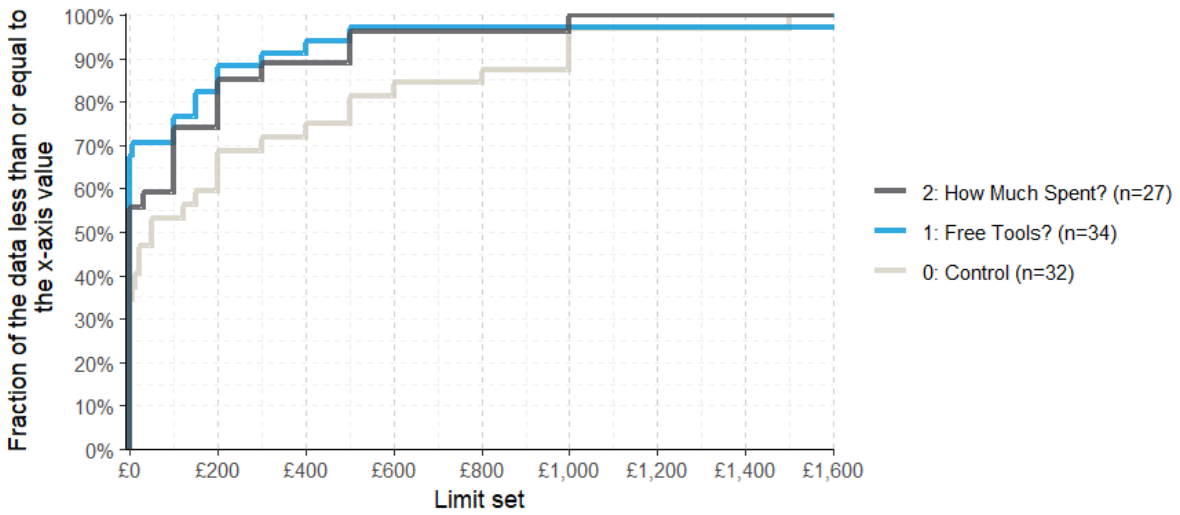
Figure E.1: The distribution of new blocks and limits set.



Exploratory analysis. N=57 (with a limit at 2025-02-05 but no limit at 2024-11-05).
Maximum in control = £600, arm1 = £100, arm2 = £100.

[104] BIT (2021). Applying behavioural insights to design better safer gambling tools. Part 1: Anchoring. See p. 27.

Figure E.2: The distribution of all blocks and limits set.



Exploratory analysis. N=95 (all customers with a limit at 2025-02-05).
Maximum in control = £1,500, arm1 = £999,999, arm2 = £1,000.

Limit "tightness". Would the limits set as of February 5th 2025 have restricted gambling in any 4-week period[105] between April 1st 2024 and January 31st 2025? For the majority (at least 64%) of those setting a limit the answer is yes (Table 4.2, column 3).

Column 4 of Table 4.2 presents average and median ratio of the limit set compared to the maximum observed 4-week gambling deposit. In this case more than half in each arm set a limit that was less than or equal to their maximum observed 4-week gambling deposits. There was one outlier of £999,999 in treatment arm 1 (set before the trial), pulling the average up.

Finally, we report our preferred measure of limit tightness: what percentage of 4-week periods would the limit have restricted gambling across all gambling data we have available. Here we find between 15% and 26% across the treatment arms.[106]

[105] Limits at our partner bank bind on a 30-day rolling basis. Our data is weekly, and we therefore approximate a 30-day rolling period using the sum of 4-week periods, knowing this is an underestimate.

[106] This measure does not account for differences in when the limit is set, and is therefore calculated on periods for which the limit was active. This measure is therefore an underestimate for the true "limit tightness".

Table E.1: Limit tightness for those with a gambling limit on as of February 5th 2025

	N (with limits)	Would bind on highest 4-week?	Ratio of limit to max 4-week	Proportion of 4-week periods the limit binds
Control	21	14 (67%)	0.53 (Median: 0.16)	26.1%
Treatment 1: Free Tools?	11	7 (64%)	312.58 (Median: 1.00)	15.1%
Treatment 2: Think You Spent?	12	10 (83%)	0.54 (Median: 0.67)	22.8%

Notes: Exploratory analysis. N=44 (with a limit, not block, as of 2025-02-05, including those with the same limit as 2024-11-05).
We calculate the sum of gambling deposits across all consecutive 4-week periods from 2024-04-01 to 2025-01-31 as a proxy for 30-day rolling periods.
Bracketed numbers are percentages.

One final measure of appropriateness is whether the limits are kept. Using block and limit data from the 4th of March 2025, we find three individuals (one in each intervention arm) changed their limits:

- One individual in the control group increased their limit from £800 to £1,200.
- One individual receiving the "free tools" lowered the limit from £100 on February 5th to £0 on March 4th (moved from a limit to a block).
- One individual receiving the "how much spent" message entirely removed a £30 limit.

Overall this exercise suggests most of the small number of people setting limits in our experiment have limits that are at least somewhat restrictive, though there are exceptions. Limits that are too large are a key failure route for gambling management tools, and much larger samples are required to conclude this isn't a problem with the banking space.

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