NatCen
Social Research that works for society

UNIVERSITY OF LIVERPOOL

Patterns of Play

Technical Report 2: Account Data Stage

Authors: David Forrest and Ian G. McHale

Date: June 2022
Prepared for: GambleAware

At **NatCen Social Research** we believe that social research has the power to make life better. By really understanding the complexity of people's lives and what they think about the issues that affect them, we give the public a powerful and influential role in shaping decisions and services that can make a difference to everyone. And as an independent, not for profit organisation we're able to put all our time and energy into delivering social research that works for society.

David Forrest is Professor of Economics in the University of Liverpool and has served as a member of the Advisory Board for Safer Gambling, and on the Editorial Board of International Gambling Studies.

Ian G. McHale is Professor of Analytics at the University of Liverpool and serves as Associate Editor of the Journal of the Royal Statistical Society, and the International Journal of Forecasting.

NatCen Social Research
35 Northampton Square
London EC1V 0AX
T 020 7250 1866
www.natcen.ac.uk

A Company Limited by Guarantee
Registered in England No.4392418.
A Charity registered in England and Wales (1091768) and Scotland (SC038454)
This project was carried out in compliance with ISO20252

Contents

Glossary

***Betting*:** betting generally relates to events external to the gambling environment (e.g., results of cricket matches).

***In-play betting*:** in-play betting is betting on a sports match between the start and end of a particular match, i.e., while the match is taking place. In the case of cricket, where some matches are played over more than one day, 'in-play' refers to bets placed between the start and end of each individual day. *In-play betting* stands in contrast to traditional *pre-match betting* whereby wagers are placed before the match starts.

***Gaming*:** gaming outcomes are generated within the gambling environment (e.g., by the roulette wheel). Gaming covers a range of gambling activities: bingo, live and virtual casino games, poker, slots, and instant wins.

Virtuals: this product allows bets to be placed on the outcome of a computer-simulated sports event, for example a horse race. It is categorised within betting because it has the same structural characteristics as other betting. However, it also has similarities with gaming in that the outcome is determined by random number generation and the operator itself provides the event.

***Stake*:** stake is the amount wagered on the outcome of an individual gamble; for example, on the winner of a horse race or the number selected from one spin of a roulette wheel. Sometimes operators add a bonus to the stake as a promotional device, but here the stake is taken to refer only to the customer's own money put at risk.

***Spend*:** total amount gambled by the customer minus any winnings. If spend is negative, this means that the customer has collected winnings greater than his or her stakes.

Gross Gambling Yield (GGY): the amount retained by operators from customer stakes after the payment of winnings but before the deduction of the costs of the operation. In this report the terms Gross Gambling Yield and spending/spend losses all refer to the same thing: the customers give some money as stakes and may get back some money in winnings. What the operator then keeps is called Gross Gambling Yield, whereas for consumers it is what they as a group have lost/spent. The terms are used interchangeably depending on the context in which a statistic is presented.

***Session*:** a session refers to the successive play of gambling games, e.g., the customer plays slots games over a period of 20 minutes before going away. In the data, we do not observe exact start and end times because *gaming* data are summarised over 15-minute windows. For analysis, we define a session as *gaming* spread over closely adjacent 15-minute windows where there is a reasonable presumption that the whole represented a single block of time dedicated wholly or partly to gambling.

***Player/customer/account-holder*:** These terms have been used interchangeably throughout this report and denotes the user of the online gambling accounts analysed in this report.

1 Methodology

1.1 Sampling

The aim for the second phase of *Patterns of Play* was to analyse transactional data from major online operators in order to paint a picture of online gambling in Great Britain. To do this, seven operators which agreed to cooperate with the project were requested each to provide records of 20,000 accounts over one year, to include details of gambling transactions, customers' use of safer gambling tools and operator social responsibility interventions. Prior to a formal specification of what data were to be provided and in what form, a half-day workshop with operators explored issues concerning what data were feasible to collect, to explain why they were required, and how they would be used.

Each operator was requested initially to provide a full list of all its accounts where the customer's registered address was in Great Britain and where there had been at least one transaction (in which money had been gambled) between July 1, 2018 and June 30, 2019. Together with the account numbers, operators were asked to provide, for each account, the number of days on which the customer had gambled over the year and in which product groups (e.g. betting) the customer had engaged. The research team then used a *stratified random sampling*[1] process to select the 20,000 accounts for which each operator was to supply records of activity. Thus, sample selection was not the responsibility of the gambling companies themselves but was guided by the research team.

The purpose of using stratified random sampling was to ensure that each important sub-group of customers was adequately represented in the final sample. Every operator had a large number of accounts which were used only once or on only two or three days during the year. By contrast, numbers of frequent gamblers, those who engage perhaps twice a week or more often, represent a low proportion of the customer base. Nonetheless, it is these frequent gamblers who account for most expenditure and who are also likely to be at the highest risk of gambling harm. Therefore, it was necessary to obtain an adequate sample of such frequent gamblers. Simple random sampling, however, would have led to only small numbers of frequent players being included in the sample, making it difficult to extrapolate aspects such as demographics and behaviour to the full population of frequent players. The research design therefore over-sampled the more frequent players. For example, 5% of the sample from each operator (1,000 accounts) was drawn from customers who had gambled on just one day; whereas 35% (7,000 accounts) was drawn from customers who had gambled on more than 100 days. There were six sub-sets (strata) of account-holders defined by number of gambling days. See Table 1 for more detail.

[1] A method of sampling that involves the division of the population into sub-groups (strata).

Table 1: Random stratified sample.

Strata (frequency of gambler)	Proportion of sample from each operator (total 20,000 accounts)
Played 1 day only	5% of the sample (1,000 accounts)
Played 2 to 3 days	5% of the sample (1,000 accounts)
Played 4 to 13 days	5% of the sample (1,000 accounts)
Played 14 to 50 days	15% of the sample (3,000 accounts)
Played 51 to 100 days	35% of the sample (7,000 accounts)
Played more than 100 days	35% of the sample (7,000 accounts)

When analysing the account data subsequently, the researchers applied selection weights to correct for the over-representation of more frequent gamblers. Weighting was also required to deal with other issues, notably that each operator was requested to supply the same number of account records even though they had very different total customer numbers (so that, for example, account-holders of the largest operators were under-represented in the sample). Weighting was executed by assigning to each account in the sample a weight given by the reciprocal of the *ex ante* probability that the account would be selected for inclusion in the sample.

In Chapter 2, which will describe behaviour on the basis of the account data, we will present estimates for the whole population of accounts held with the seven operators. For example, we will estimate the proportions of bingo players in particular age-groups or the proportion who play on more than a certain number of days in the year. It should be emphasised that the estimates, made on the basis of sample data, relate to the whole population of online gamblers with these operators and do not describe the behaviour and characteristics of the sample itself. They are projections from the sample to the whole player base. Because sample weights were applied, these projections are not biased by the over-representation of frequent players in the sample.

Although the target size of the sample was 140,000 (i.e. 20,000 accounts from each of seven operators), some accounts did not meet the inclusion criteria: that they should be held by customers with addresses in England, Scotland or Wales, who had used their account to gamble with their own money (i.e. not free gambles) at least once during the study year (for example, an account would not meet the criteria if the only activity had been withdrawal of funds). In addition, two accounts were deleted from the sample: one because the age of the account-holder was missing and one where age was greater than 100.[2] The final sample used in analysis therefore contained only 139,152 accounts active during the study year. These 139,152 accounts 'represented' a population of 10.23m accounts across the seven operators.

1.2 Information on the account-holder

Operators were asked to provide a number of data files relating to accounts selected by researchers for inclusion in the sample. The first contained personal information on the account-holder for which each player was assigned an ID number, so that data would be completely anonymous to the research team. Data included age (on July 1, 2018) and gender. Gender was missing for 14.1% of the 139,152 accounts, which, once weighting was applied, represented 24.2% of the 10.23m total population the data represented. Parts of Chapter 2 will sometimes present estimates regarding differences in behaviour between men and women; for these estimates, analysis was based only

[2] One customer could not be taken as representing the online gambling behaviour of all of the very elderly. Since the share of centenarians in the whole population of Great Britain is very small, it was decided to confine analysis to the population up to age 100.

on accounts where gender was known; for all other estimates, analysis was based on all accounts including those where gender was missing.[3]

Beyond age and gender, no information was available on the background characteristics of individual players. However, operators are obliged to hold the addresses of customers and these include postcodes. A postcode enables access to data which capture the socio-economic characteristics of the neighbourhood to which the account is registered. To ensure privacy of customers, postcodes were not included in the data set supplied to the research team. Instead, NatCen provided each operator with a look-up file enabling it to assign each postcode an *Index of Multiple Deprivation* (*IMD*) decile, which was included in the data set available to the researchers.[4]

The IMD, widely used by social scientists, is a single figure capturing how relatively disadvantaged an area is in terms of a range of indicators related to, for example, income, health, employment and education and skills. It is published for each 'small area' in the country, where 'small areas' are defined in a way which makes them similar in size of population. The areas each have a population of about 1,500 (650 households), small enough for them to be regarded as 'neighbourhoods'. Every such small area is given a ranking and in our data we know for each account-holder the decile into which his or her neighbourhood falls: 1 indicates the highest degree of deprivation while 10 indicates the lowest degree of deprivation. IMD was missing for 1.0% of observations. In Chapter 2, where we present estimates such as the percentage of players who live in the two most deprived deciles, these 'missing IMD cases' are not included in the calculations.

Whilst IMD is informative on issues such as the proportion of operator revenue derived from the most deprived areas, it is not appropriate to treat such figures as if they were estimates of the proportion of revenue extracted from the poorest individuals in society. To do so, would be to commit *the ecological fallacy* (Selvin, 1958)[5]: knowing something about the group to which an individual belongs does not permit inferences confidently to be made about the individual.

To take a hypothetical example, suppose we were to find that high casino losses were particularly concentrated in very deprived areas. This might reflect that relatively poor people are particularly drawn to casino games, but it might conceivably reflect instead that rich people who live in poor neighbourhoods have an unusual propensity to casino gambling and it is their behaviour which is driving the findings. Although this caveat should be borne in mind, it might still be considered a cause at least for unease if, for example, there were a large number of heavy losers living in deprived areas because there is a relatively very high incidence of poverty in such areas. According to official

[3] In some of the Tables in the Data File, summary statistics are presented for 'all customers' and for men and women separately. The total number of players will be greater than the sum of the numbers of male and female customers because 'all players' include missing gender cases.

[4] England, Scotland and Wales use different scales to measure area deprivation. Further, the IMD decile for each postcode captures a comparison of its local area with other areas within the same nation. To this extent, there may be some inconsistency in the IMD data if there are different gradients of deprivation in the three nations. In practice, England and Scotland have similar levels of deprivation but there may be some cases on the margin where, for example, a local area classified as in the second-most deprived quintile in Wales would have been in the most deprived quintile for Great Britain (G.A. Abel, M.E. Barclay, & R.A. Payne (2016).Adjusted indices of multiple deprivation to enable comparisons within and between constituent countries of the UK including an illustration using mortality rates, *BMJ open, 6(11),* e012750: https://doi.org/10.1136/bmjopen-2016-012750)

[5] H.C. Selvin (1958). Durkheim's suicide and problems of empirical research, *American Journal of Sociology, 63(6)*, 607-619: https://www.jstor.org/stable/2772991

data, 33% of households in IMD1 are 'income deprived' (compared with only 2.5% in IMD10).[6]

1.3 Betting versus gaming

Operators were asked to provide separate files documenting customers' betting and gaming transactions carried out during the year. *Gaming* covers a range of gambling activities: bingo, live and virtual casino games, poker, slots, and instant wins. Though a few products blur the distinction, *betting* generally relates to events external to the gambling environment (e.g. results of cricket matches), whereas gaming outcomes are generated within the gambling environment (e.g. by the roulette wheel).

We present separate analyses for the betting and gaming sub-sectors of the online industry in Great Britain. Whilst betting and gaming may attract gamblers with different motives (Binde, 2013)[7], this distinction was principally pragmatic: the two data categories have contrasting structural characteristics, necessitating separate analysis and organisation.

In a scoping study on machine gaming, Wardle et al. (2013)[8] distinguished between atomic data and aggregate data. Atomic data describe every individual action committed by a player, e.g. every individual spin in a slots game, the stake, and the amount won (if any). Aggregate data are less granular and aggregate over a period of time, e.g. total stakes and total winnings over one hour.

Betting typically consists of discrete actions which could readily be documented in the data set and therefore it was practical to request atomic data, describing every individual bet. However, some gaming activity involves continuous play. For example, in a slots game, a participant may make dozens of spins even in a single minute. This makes it impractical to compile and analyse atomic gaming data, and instead we requested data aggregated to 15 minute windows.

The betting data recorded the date and time of every individual bet made by every customer in the sample. For each bet, data showed the stake, the amount of any bonus added to the stake by the operator, the gross pay-out to the bettor (including return of stake)[9], the maximum gross pay-out to the bettor that would have been made had the bet (or every component of a combination bet) been successful[10], the subject(s) of the bet, e.g. greyhound racing, tennis, etc. (some combination bets will have more than one subject), and whether it was an in-play bet.[11] In all analysis of betting (and of

[6] Ministry of Housing, Communities and Local Government (2019), *The English Indices of Deprivation 2019*: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835115/IoD2019_Statistical_Release.pdf (accessed 19.2.22)

[7] Binde, P. (2013). Why people gamble: A model with five motivational dimensions, *International Gambling Studies*, *13(1)*, 81-97: https://doi.org/10.1080/14459795.2012.712150

[8] Wardle, H., Seabury, C., Ahmed, H. & Coshall C. (2013). *Scoping the use of industry data on category B gaming machines, Report prepared for the Responsible Gambling Trust*, NatCen Social Research: https://www.begambleaware.org/sites/default/files/2020-12/industry-data-scoping-final.pdf (accessed 13.12.21)

[9] This will most often be zero (bet lost) or may be less than the initial stake (if, say, only one component of a complex bet has won).

[10] This was missing for some operators because they had not retained odds information on losing bets.

[11] In-play bets are placed during the sporting event, in contrast to pre-match bets which are placed before the event starts. A more detailed definition is included in the Glossary.

gaming) in the Report, amount staked refers to the size of the gamble exclusive of any bonus applied by the operator (i.e. to the amount of the account-holder's own money put at risk). A customer's win or loss compares the amount staked and any return to the account-holder. Where a bonus has been applied, this will be reflected in an enhanced pay-out to the (winning) customer.

The gaming data were less granular. The study year was divided into 15-minute windows, the first beginning at midnight at the start of July 1, 2018 and the last beginning at 11.45 p.m. on June 30, 2019. For each window during which gaming activity took place, the data recorded which product categories (e.g. live casino, poker) were played during the window. For each of those products, they recorded: the number of gambles[12], the total staked, the amount of any bonus added to stakes by the operator, and the gross pay-outs credited to the player's account during the 15-minute period. In the case of casino games, although the data indicated which casino game(s) (roulette, blackjack, etc) had been played during the 15-minute window, they did not show how stakes and winnings had been split between the games. Accordingly, this Report does not break down casino activity by game played.

In Chapter 2.2, we will analyse data organised by *gambling session*. A session refers to closely adjacent 15-minute windows where there is a reasonable presumption that the whole represented a single block of time dedicated wholly or partly to gambling. We deem a new session to have begun when activity occurs in a 15-minute window without activity having occurred in either of the two immediately preceding windows. We deem a session to have ended in a 15-minute window where there is activity in that window but no activity in the two immediately following windows.

When we measure *session length*, we assume that play in the first/last window in the session begins/ends at the mid-point in the window. For sessions including only one window, we assume that duration of play is 7.5 minutes. While the need to make such assumptions introduces imprecision into measurement of session length, our main interest will be to document the frequency of very long (multi-window) sessions; in these cases errors in the measurement of duration of play will be proportionately small as only the first and last windows making up the session are affected.

1.4 Other data

Operators also provided files which recorded, for every player, any *safer gambling events*.[13] These could have been either of two types. First, the account-holder may have used one of the gambling self-management tools provided to help customers gamble more safely: reality checks, deposit limits, or temporary or longer term self-exclusion. Second, the operator may have initiated a social responsibility contact with the customer, for example via a pop-up message or a telephone call, because of concern that the customer was having trouble with their gambling.

Other data provided by the operators included whether customers had made use of a credit card when depositing into the account.

[12] A gamble was defined as when money was staked on one play of the game, e.g. one spin of the roulette wheel or, for slots, one game cycle (thus, in roulette, the game cycle is one spin of the wheel and it was treated as only one gamble even if the stake had been split among multiple outcomes).

[13] In the original data request as reproduced in Appendix A, these were referred to as 'responsible gambling events'.

For the detailed data specification sent to operators, showing all the different variables requested in thematic categories, see Appendix A.

1.5 Limitations/ considerations for data interpretation

There are two major limitations of the account data set:

1. We will outline below why we believe that patterns of betting and patterns of gaming at the seven operators are likely to provide an adequate representation of patterns of play in the British online betting and gaming markets as a whole. However, the degree of confidence to be attached to any picture we present of behaviour across the whole online gambling space in Great Britain is lower. In the data set, the proportion of accounts used for online betting is more than twice as great as the proportion used for gaming; that in itself is not a cause for concern as it roughly mirrors relative participation rates in the whole population, as reported in the *Health Survey for England, 2018*. On the other hand, the data capture a much larger share of consumer expenditure on betting than on gaming; as a result, account-holders with companies included in the study spent marginally more on betting than on gaming whereas, in the whole online market, consumer expenditure was more than 75% higher on gaming than on betting. The obvious explanation is that there are more operators in the study whose brand is predominantly associated with betting than operators whose brand is predominantly associated with gaming; so the pooled sample will probably include an excess of gamblers whose main interest and spending is in betting. When we look at the spread of account-holders' gambling activities, this should be considered; much of what we will describe (in Section 2.3) will relate just to the seven operators in the study. Findings should not be extrapolated to the whole market.

2. As with other published international research on online gambling, we can observe an individual's activity in only one online account. We do not observe any other gambling in which individuals may have engaged using accounts with other operators (or at land venues). The most engaged online gamblers may use several accounts, spreading high spending across different operators, such that they are not identified as heavy gamblers in any single account. Such concerns are reinforced by findings from analysis of banking data by the Behavioural Insights Team (2021).[14] This showed a positive correlation between the amount deposited into online gambling accounts over a period and the number of gambling accounts into which the customer had paid. Similar conclusions may be drawn from follow-on survey evidence in the Patterns of Play project. Higher spending customers in the account data were more likely to report that they had had other active online accounts during the study period and, of them, one-half estimated that their sampled account represented half-or-less of their online gambling activity during that year (see Technical Report 3: Follow-on survey Stage). This implies that **our estimates of how many players lose large sums of money while online gambling should be treated as lower-bound estimates**.

[14] Behavioural Insights Team (2021). *Gambling behaviour: What can bank transactions data tell us? A feasibility study, Part 2, Analysis of HSBC UK customer data*: https://www.begambleaware.org/sites/default/files/2021-07/Patterns%20of%20Play%20-%20BIT%20HSBC%20report%2C%20final%20%28June%204th%202021%29.pdf (accessed 22.1.2022).

2 Findings

All tables referenced in the following chapter can be found in the Data File.

2.1 Betting

2.1.1 Overview

Based on the sample, we estimate that the gross gambling yield (GGY) from betting of the seven operators over the data period was £1.57b. From data included in relevant editions of *Industry Statistics*, issued by the Gambling Commission and based on regulatory returns, the total GGY from betting for the whole remote betting sector in Great Britain, excluding the relatively small betting exchange and pools platforms, was £1.84b (over the exact same period). **We therefore estimate that the operators which provided our data accounted for 85.5% of consumer expenditure on online betting** (excluding pools and exchanges).

The Gambling Commission also publishes the share in betting GGY of each major category of betting (football, horse racing, etc). We compared our estimates of the shares of GGY accounted for by each category with the Gambling Commission data.[15] For operators in the study we estimate that:

- football betting accounted for 49.8% of betting GGY, compared with 47.7% in the whole market
- horse race betting accounted for 31.4% of betting GGY, compared with 26.1% in the whole market
- greyhound race betting accounted for 2.6% of betting GGY, compared with 3.0% in the whole market
- tennis betting accounted for 5.0% of betting GGY, compared with 6.0% in the whole market
- virtuals (betting on simulated events) accounted for 2.9% of betting GGY, compared with 3.4% in the whole market

The patterns estimated from the sample data and the patterns in the data for the whole market are, then, relatively similar although, in detail, horse racing and football appear slightly more dominant in our sample. This could be because more niche products (for example, betting on e-sports or political events) may be more concentrated in specialist operators. Nevertheless, there are no major discrepancies in respect of the relative importance of different betting products. Given the market dominance of the firms included in our study, such observations provide confidence that patterns of betting among customers of the seven operators will reasonably represent the British online sector as a whole.

The data set provided 110,211 accounts which had been used at least once for placing a bet during the study period. This means that 86% of all online gambling accounts were ‘betting-active’ (the remainder having been used only for gaming). The high figure is consistent with evidence from the *Health Survey for England, 2018*, which found that,

[15] In the case of these category shares, Gambling Commission calculations were made from figures which include the (small) betting exchange and pools sections of the market (which do not feature in our data).

of the 9% of adults who had gambled online in the preceding year (excluding on lottery draws), approximately 90% had placed a bet with an online bookmaker.[16] Thus, in terms of participation, betting was the principal online gambling activity in the study population. On the other hand, most bettors participated relatively infrequently. Only 10% of betting-active accounts were used on average to bet on two days per week or more often.

Although subjects of betting varied, both participation and operator revenue were dominated by football and horse racing. In fact, as noted above, football accounted for half of all betting GGY and horseracing for more than 30%. More detailed analysis of the pattern of different activities will be presented in Section 2.1.2 below.

The majority of online bettors were men: based on accounts where gender was known[17], 78.4% of those who bet online were male. In Sections 2.1.3 and 2.1.4, we explore differences in betting behaviour by gender, as well as by age and by the deprivation status of the local area where a customer resided, focusing on metrics such as frequency and subject of betting, stake size, degree of risk-taking, rate-of-return and breadth of engagement. Each metric is explained in more detail in each results section.

It is in the nature of commercial betting that most customers lose money. However, we estimate that 23.0% of betting-active accounts at these operators showed a positive return on stakes over the one-year period.[18] Among those which lost money, the loss was modest in the large majority of cases. But, as typically found in gambling data sets, a relatively small number of customers lost much more than the average. For example, 2.2% of accounts recorded a net loss from betting in excess of £2,000 in the year. In Section 2.1.5, we present the distribution of expenditure across customers, providing detailed evidence that the online betting industry depends on a small number of highly engaged customers. In Section 2.1.6, we focus on the customers who lost the most money over the year, investigating characteristics in terms of gender, age, deprivation status of their account address, and their subjects of betting. While many high spenders were likely to have been betting within their means, the loss levels on which we focus would probably be challenging to sustain at typical income levels for British households. Participation at these levels is therefore a plausible marker for elevated risk of current gambling-related harm. Furthermore, longitudinal research consistently finds high spending to be predictive of future harm.[19]

2.1.2 Principal betting activities

Table 1 in the Data File presents information on the pattern of play across different subjects for betting. It includes data on the number of customers placing a bet in each category, the number of bets from each category and operator GGY from each category. Unless specified otherwise, all quoted figures are extrapolated estimates for the whole customer base of the seven operators taking part in the Project, with appropriate weights applied. See Section 1.1 for methods. ‘Customers’ under each

[16] https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2018/health-survey-for-england-2018-supplementary-analysis-on-gambling (accessed 04.10.21).
[17] Gender was missing for 17.3% of accounts used for betting.
[18] The largest one-year profit for a customer observed in the data set was about £143,000 (the largest loss was just in excess of £620,000).
[19] for example, Currie, S.R., Hodgins, D.C., Williams, R.J. *et al.* (2021). Predicting future harm from gambling over a five-year period in a general population sample: a survival analysis. *BMC Psychiatry 21,* 15: https://doi.org/10.1186/s12888-020-03016-x

product heading refers to accounts where at least one bet was placed during the year.[20]

Figures 1 and 2 illustrate the relative importance of different betting activities in terms of participation and contribution to GGY.

Figure 1. Percentage of betting-active accounts used for each betting activity

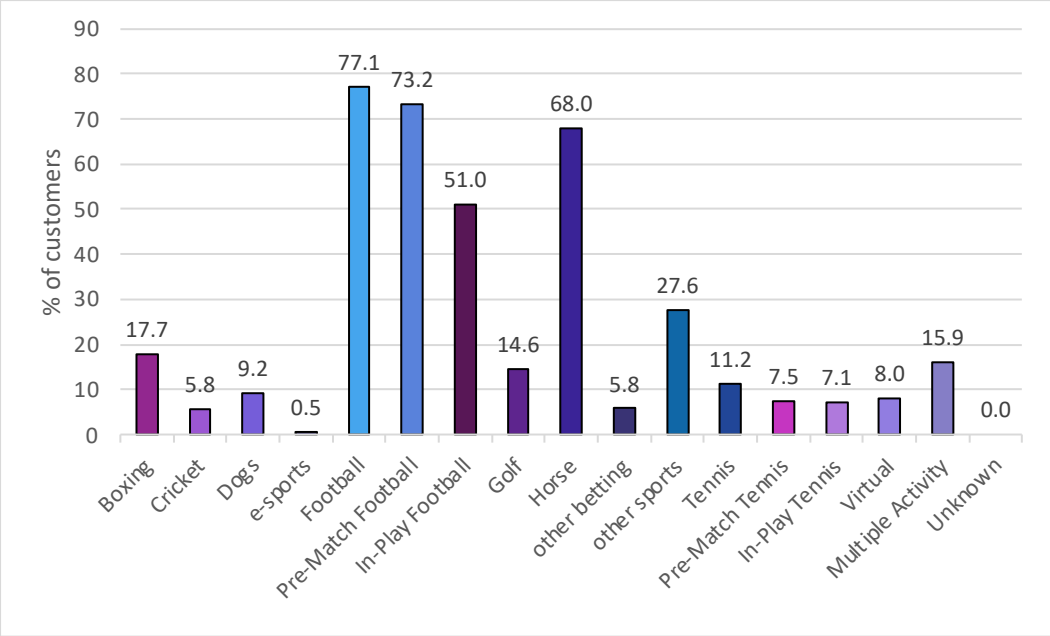
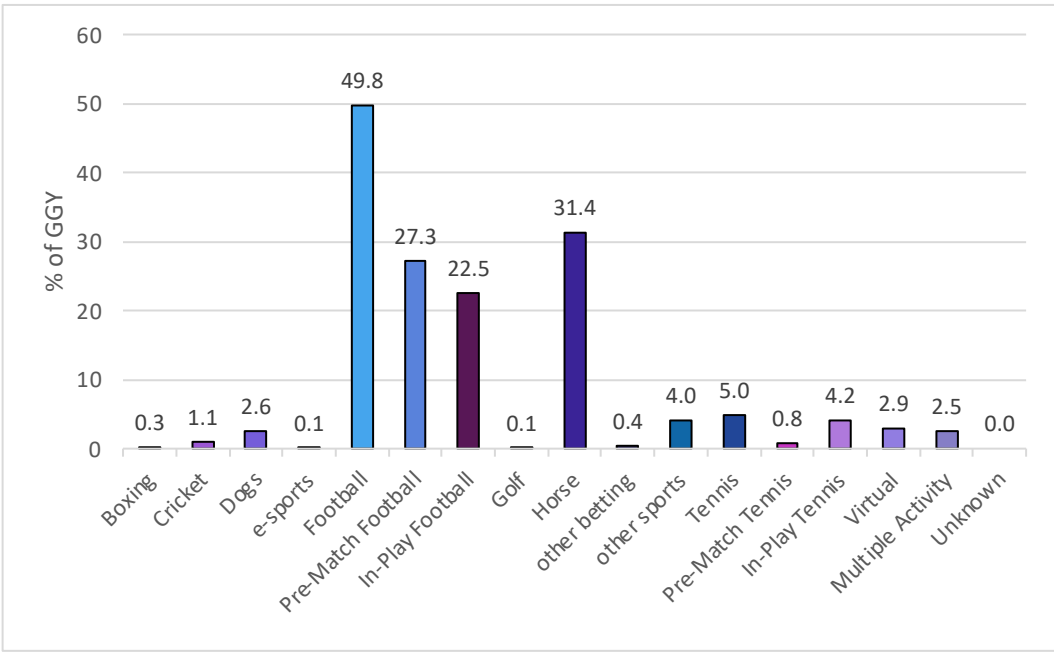


Figure 2. Percentage share of GGY of different betting activities



[20] In compiling Table 1, we assigned a bet to a particular activity only if it related solely to that activity. For example, a combination bet where the customer selected the winner of a football match and the winner of a rugby match was designated as neither a football bet nor a rugby bet but was instead assigned to 'multiple activity'.

It was common for accounts to be used for bets on both football and horse race betting. Football was the most popular subject for betting, attracting at least one wager from 77.1% of bettors; and horseracing drew 68.0%. In terms of the number of bets placed during the year across all operators, the two sports together accounted for about 80% of the total (41% on football and 39% on horseracing). Within football, we were able to separate pre-match from in-play bets. 73.2% of all betting accounts were used for pre-match football betting and 51.0% for in-play, meaning that most football bettors engaged in both.

The popularity of football and horseracing as subjects for betting is reflected in the break-down of operator GGY. Football betting generated approximately half of operator win from all betting, and horseracing more than 31%. On a per-customer basis, football was the more lucrative of the two products for operators, with an average operator win of £115.47 per football customer over the year, compared with £82.48 per customer in racing. Within football, pre-match contributed more to GGY than in-play, but a greater profit-per-customer was achieved from in-play betting.

While football and horseracing accounted for the large majority of bets, some other sports attracted betting from significant numbers of customers and indeed a minority of bettors cast their nets very widely: 6.4% placed a bet on six or more of the eleven betting subjects[21] delineated in the data.[22]

17.7% of accounts used for betting over the one-year period included at least one wager on boxing; and golf featured for 14.6%. However, each of these two sports accounted for much less than 1% of all bets and made negligible contribution to operator GGY. It may be presumed that the high participation-rates for betting on boxing and golf derived from only one or two major events. On the other hand, tennis, which offers extended tournament play on most days of the year, both attracted significant numbers of customers (11.2% of accounts) and made a useful contribution to operator profits, accounting for 5.0% of betting GGY. In tennis, the majority of operator GGY (about 80%) came from in-play.

Greyhound racing is a traditional betting sport and online bettors continued to place bets in significant numbers (9.2% of accounts) even if its contribution to GGY was somewhat marginal (2.6%). Of activities developed more recently, betting on virtual sports events[23] and on e-sports have been identified as of potential concern in debate on gambling harm. Virtual betting, whether on racing or on other sports, is an almost 'on-demand product', for example, with races starting every 2-3 minutes on betting websites, allowing almost immediate access for bettors prone to impulsive play. Betting on e-sports has been reported from survey evidence to be concentrated among young, male and heavily engaged gamblers, characteristics which raise the potential for it to be associated with harm.[24] In our data set, virtual betting showed similar participation and contribution to GGY as greyhound racing, but betting on e-sports was rare (0.5% of customers) and essentially insignificant in terms of share (0.05%) of operator GGY

[21] football, horseracing, greyhound racing, tennis, golf, cricket, boxing, e-sports, virtual sports, other sports, other betting. The last category covers diverse subjects such as outcomes of lotteries, political events, the weather, and the winners of television game shows.
[22] Bettors with the greatest breadth of activities are profiled in the following section.
[23] A virtual sports event is an event, such as a horse race or football match, which is simulated by computer technology. If the customer wishes, he or she can view its progress through a visual representation shown on screen. Outcomes of simulated events provided by licensed operators are determined by random number generation.
[24] Wardle, H., Petrovskaya, E. & Zendle, D. (2020). Defining the esports bettor: Evidence from an online panel survey of emerging adults, *International Gambling Studies, 20(3)*, 487-499: https://doi.org/10.1080/14459795.2020.1826559

from betting.[25] Nevertheless, we report below the profile of e-sports and virtual bettors because of possible concentration of activity in these potentially vulnerable sub-groups.

Demographics

Table 2 in the Data File, which presents detailed estimates of key metrics related to betting in the aggregate, for 'all customers', and also for male and female accounts separately, supports much of the information presented in this and subsequent sections.

Gender

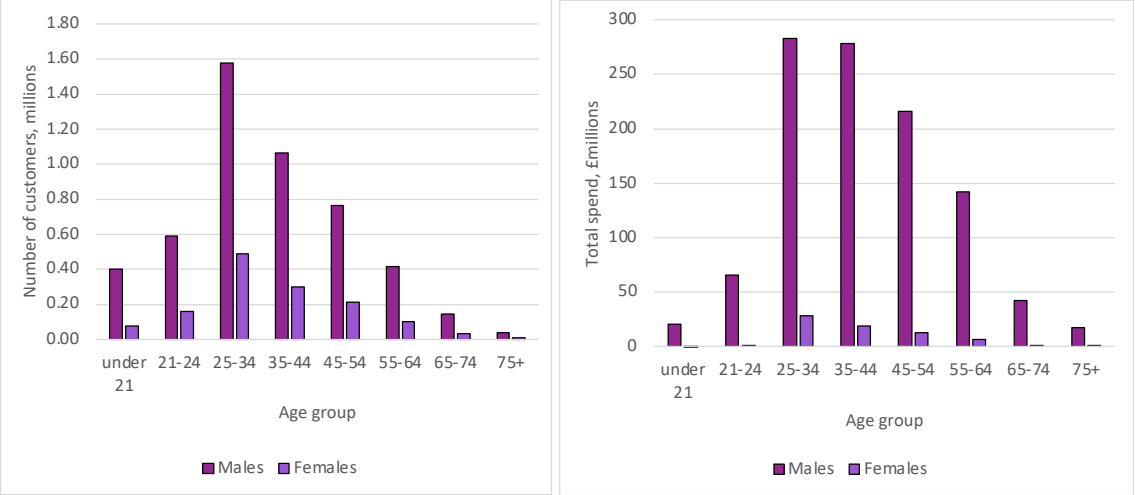
Based on our estimates for the whole customer base of the seven operators, **online bookmakers in Great Britain depend overwhelmingly on male customers**: 94.1% of betting GGY in the study year was from men. The dominance of males in generating operator GGY derived from four principal differences in betting behaviour by gender:

- **men were much more likely to be online bettors**- where gender was known, 78.4% of betting-active accounts were registered to a male account-holder
- **male account holders placed many more bets than female account holders**- depending on age-group, 2-5 times as many, measured at the median
- **median stake size for an individual bet was somewhat higher among male** (£5.25) **than among female** (£4.13) customers.
- Compared with female customers, **male customers were much more likely to spend far above the median**. For example, more than 95% of accounts with a net betting loss in excess of £5,000 over the year belonged to men, even though men held only 78.4% of accounts.

[25] The proportion of accounts used for betting on e-sports appears low when set against lifetime participation-rates reported from the regular surveys of online gambling behaviour conducted by the Gambling Commission. According to the 2018 survey results, 7% of respondents had 'ever' bet on e-sports with 'money or items'. The last two words are important because they are intended to capture 'skins betting', which is reportedly popular on unregulated websites. The data analysed here relate only to mainstream operators regulated by the Gambling Commission. See *Taking a More In-Depth Look at Online Gambling*, issued 2021, https://www.gamblingcommission.gov.uk/statistics-and-research/publication/taking-a-more-in-depth-look-at-online-gambling (accessed 10.10.21). On the distinctive characteristics of e-sports betting markets, see Greer, N. Rockloff, M. *et al.* (2019). Esports betting and skin gambling: A brief history, *Journal of Gambling Issues, 43* (Winter): https://doi.org/10.4309/jgi.2019.43.8

Figure 3 illustrates that reliance on men in terms of both numbers of customers and spending held across the age-range.

Figure 3. Number of betting-active accounts and spending by age-band and gender



There was also a marked difference between genders in preferred subjects for betting. Following convention in the literature and international industry data, we draw a distinction between 'race betting' (which relates to wagering on horse and greyhound racing) and 'sports betting' (which covers all other sports). In our case, we further restrict 'sports betting' to wagering on real-life traditional sports events. This excludes betting on e-sports and on virtual sports events, for each of which we present separate data to inform recent public discourse on potential for gambling harm.

Among both males and females, it was most common to have placed wagers on both race and sports betting. We estimate that similar proportions of male and female accounts (76.4% and 74.3% respectively) were used at least once to bet on races. But, whereas 85.2% of male accounts included at least one sports bet, only 62.2% of female accounts did so, thus signalling that online bettors tended to be engaged with both product classes but **the relative preference of women for race bets was stronger**. This is reflected in the split of expenditure between race and sports betting. For females, the split was almost even (46.5%, 47.4%) whereas for men the sports share was much the larger (35.2%, 62.0%).[26] Women contributed only 4.6% of operator GGY from sports betting but 7.7% of operator win from race betting.[27]

Age

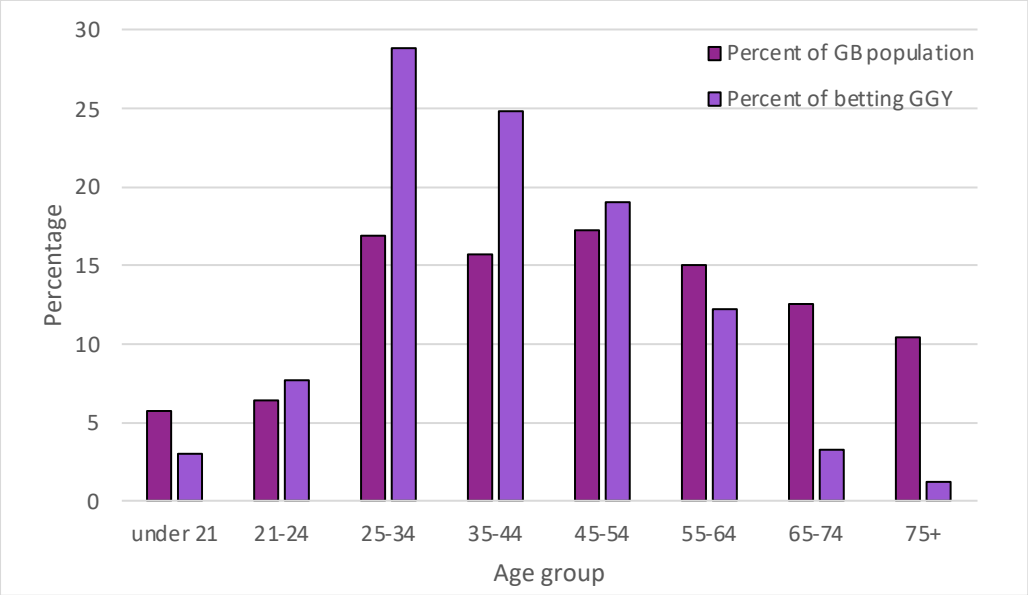
Customer ages at the start of the data period ranged from 17 to 97. The sample included 505 customers aged 17, but this should not be taken as indicative of under-age play since they may have reached 18 during the twelve-months covered by the data and opened their account at or after that point.

We allocate each account to one of eight age-bands, from under-21 to 75-or-over.

[26] Figures do not add up to 100% because there were also bets not only on e-sports and on virtual events but also on such as elections and outcomes of lotteries.
[27] In compiling Tables 2, 4 and 5 in the Data File, we allocated cross-activity bets (e.g. a double on the winner of a horse race and the winner of a football match) to each activity represented in the bet. So, in the example, the wager would count as both a football (sports) bet and a horseracing (race betting) bet. This introduces an element of double-counting but a limited one as such multiple bets represent a relatively small part of aggregate betting activity.

For each band, Table 3 in the Data File and Figure 4 here compare the proportion that that group represented in the British adult population in 2018[28] with its proportionate importance in online betting activity at the operators covered by the data set.

Figure 4. Shares of Great Britain adult population and of betting GGY for each age-band



- **the age-bands covering ages 25-44 represent a key demographic for the online betting sector**: while comprising only 32.7% of the adult population, members of these groups held 53.7% of accounts used for betting and generated 53.6% of operator GGY
- **under-25s also held a disproportionately high share of online betting-active accounts but spent relatively little**: these groups comprised 13.2% of the adult population, held 21.3% of betting-active accounts, but contributed only 10.7% of operator GGY
- **members of older age-groups were much less likely to have an account but those who did so tended to be relatively heavy spenders**
- **mean spending-per-account on online betting increased almost monotonically across our eight age-bands**, from £63.74 for the youngest group to £345.16 for the oldest

The pattern of participation in online betting may also be illustrated by our estimates of the number of betting-active accounts held at these seven collectively dominant operators per 1,000 population. Again, **the young appear far more likely to have had an active online betting account**. Among those aged under 25, there were 299 such accounts per 1,000 population and the figure (280) was similar for those aged 25-44. Thereafter this indicator fell steadily and there were only 22 accounts per 1,000 people in the population aged 65 or over. It is likely that only a relatively small part of the

[28] We use mid-year estimates (2018) of the population of Great Britain by age, made by the Office for National Statistics and accessed using the online Nomis tool (nomisweb.co.uk). We used estimates by individual age to confine the 'under-21' group to those who had reached age 17. Thus, 'adult population' here means 17+ on July 1, 2018.

differences across age-groups can be explained by multiple account holding. Survey data collected during a period overlapping with ours indicated that younger online gamblers more commonly reported having used more than one online account in the preceding twelve months but differences between age-bands were limited. Among online gamblers, the mean number of accounts used was always in the range 1.8-2.0 for age-groups below the age of 65 and still 1.2 for seniors.[29]

This greater participation of younger populations in online betting is not likely to be explained only by their being more comfortable with online transactions. The *Health Survey for England, 2018*, whose data-collection period overlapped with ours, asked respondents about participation in offline horse, dog, sports and other betting. In each category, participation was highest for those aged under 25 and generally decreased with age: i.e. betting *per se* appears to be more popular among the young than the old.

What the account data for online betting reveal, which we cannot know from past survey evidence for land-based betting in Great Britain, is that, **conditional on taking part at all, members of older age-groups tend to be more lucrative customers for the industry**.[30] Table 2 in the Data File includes summary data on key metrics which allow us to link the greater level of spending of older customers to their underlying patterns of activity.

For some metrics, the Table displays both median and mean values. For example, across all age- groups combined, the median value of total stakes over one year was £90. This was the total amount wagered by the 'middle' customer when all customers were ranked in order of betting volume. In that sense, the median represents the level of activity on a 'typical' account. However, the mean, the simple average-total-stake-per-customer, is more than twenty times higher, £2,049. Such very large gaps between mean and median are typically found in gambling data sets because the mean is pulled up strongly by a relatively small number of 'extreme' players. Later in this chapter we will focus on 'extreme' bettors, but here we use Table 2 to focus on differences in *typical* betting behaviour across age-groups:

- **typical spending (bettor loss over the year) increases monotonically across our eight age-groups**: the median rises steadily with age, from £16 over the year for under-21s to £30 for senior citizens
- **spending is higher among older bettors because they typically bet more often and to higher stakes**

[29] Gambling Commission (2020), *Gambling participation in 2019: behaviour, awareness and attitudes*, Annual Report, retrieved from: https://assets.ctfassets.net/j16ev64qyf6l/7uIxjm1SNQMygdOFV2bzxN/ea74db1104925f015edb11db0596f98b/Gambling-participation-in-2019-behaviour-awareness-and-attitudes.pdf (accessed 19.10.21)

[30] In the case of horse race betting, it can be said that offline spending-per-participant was probably somewhat higher than for online. Taking the closest relevant dates from each source, we used the GGY figure for non-remote horse race betting according to *Industry Statistics* published by the Gambling Commission, the estimate of past-year participation in offline horse betting according to the *Health Survey for England*, 2018, and population estimates from the Office for National Statistics, to calculate an average-spend-per-customer of around £130 (compared with £82.48 from the online data analysed here). The estimate is imprecise, since it involves using different sources, one of which applied only to England, but it is suggestive that those using over-the-counter betting services might not behave in similar fashion to online players. We do not repeat the calculation for other betting products because, except for greyhound racing, the *Health Survey for England* did not collect participation data for each individual sport.

- the median number of betting days over the year was 6 in each of the two youngest bands but then increased to 15 by age 65-74; the median number of individual bets placed over the year was 14 in the youngest group but 35 in age-band 65-74
- median 'average stake size'[31] across all bettors was £5 but was a little lower (£4.55) in the youngest group and reached £6.69 at age 75+
- **the same tendency for both betting frequency and stake size to increase with age is observed in mean as in median values** for each metric but the absolute differences between age-groups become starker; for example, the mean number of individual-bets-per-customer increases steadily, from 85 for the youngest, to peak at 437 among 65-74 year olds (and is only marginally lower than that for the 75+ age group)

Thus the higher spending on online betting observed among older age-bands reflects a typically much higher level of activity on accounts held by older customers. However, compared with younger bettors, the scale of losses incurred by older bettors was partially mitigated by less negative rates-of-return on their stakes.

In its final three columns, Table 2 reports on returns to betting. The 'rate-of-return' is the proportion of stakes lost over the year. We calculated the rate-of-return for each bettor and took the average across bettors, which was -0.26, meaning that, for every pound wagered, the 'average bettor' received 74 pence back in winnings, with 26 pence lost to the operator.[32] The winsorised rate of return', shown in the following column, is an alternative measure of rate-of-return, designed to limit the influence of the biggest outliers.[33]

The broad pattern of rates-of-return by age, based on data in Table 2 in the Data File, is that **meaningfully less adverse betting outcomes are observed in the two oldest age-bands than among young and middle-aged bettors**. Partly this can be linked to their stronger preference for race betting, where a higher proportion of stakes was paid out in winnings compared with sports betting. But, even within race betting, the two oldest age-groups recorded lower percentage losses than the generality of bettors. This is consistent with research from Finland, where analysis of betting accounts showed that longer experience of horse betting tended to improve bettor outcomes.[34]

In general, differences between *individuals'* rates-of-return by age could be related to:

- different levels of skill and time investment of research *and/or*

[31] For clarity: for each individual, we calculated mean stake by dividing total stakes in the year by the number of bets placed. We then took the median value of the set of individual mean stake measures.

[32] Overall, bettors collectively lost 8.7% of total stakes to the operators. The large difference from that quoted for the 'average bettor' arises because the latter calculation gives every customer equal weight, regardless of betting volume. In practice, light and occasional bettors achieve much poorer returns than heavy and frequent bettors and their weight of numbers make the 'average bettor's' return poor compared with the overall-return-to-player.

[33] We calculated the 5% winsorised value. This involves replacing the 5% most extreme values at either end of the distribution with the next-highest value just outside the 5% of outliers. Here, this makes no difference for the bad return end of the distribution since more than 5% of customers had an identical return of -1. However, adjustment of values for the very biggest winners dampens the influence of those who have achieved truly exceptional positive returns, sometimes just from success in a single, very long-odds wager. Hence winsorised mean rates-of-return appear consistently worse (from the bettor perspective) than mean rates-of-return.

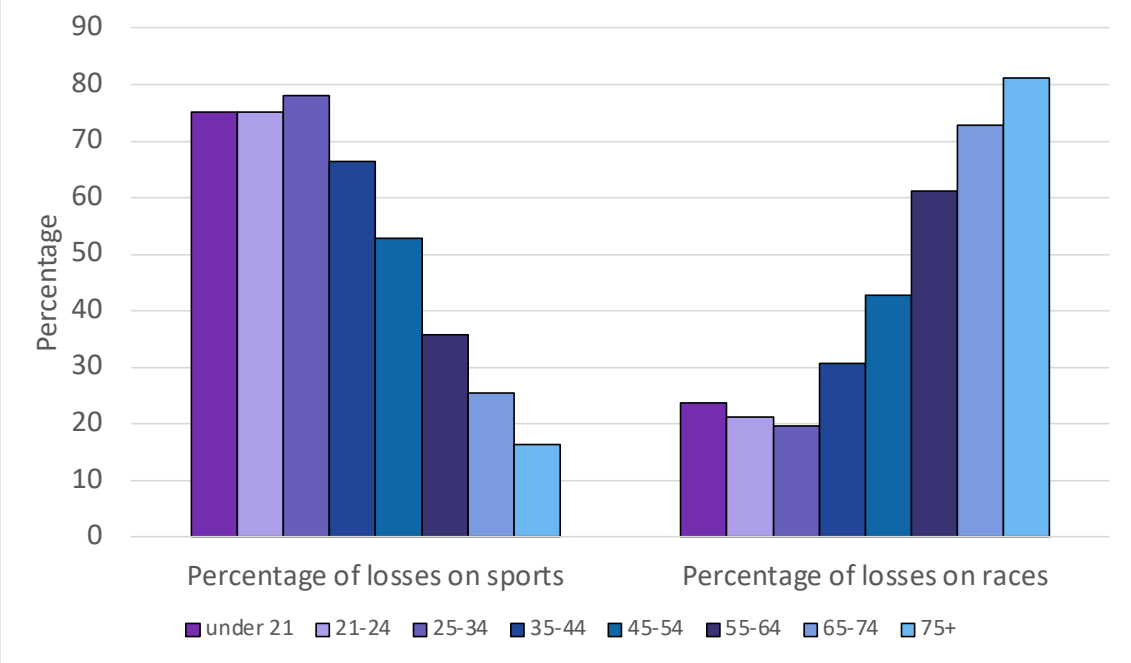
[34] Suhonen, S., Saastamoinen, J., Kainulainen, T. & Forrest, D. (2018). Is timing everything in horse betting? Bet amount, timing and bettors' returns in pari-mutuel wagering markets, *Economics Letters, 173*, 97-99: https://doi.org/10.1016/j.econlet.2018.09.021

- to different choices of betting activity (because bookmaker margins differ between activities) *and/or*
- to different choices of bet type (for example, combination bets are relatively poor value for the bettor compared with singles bets because the implicit bookmaker commission built into odds is applied at each leg of the bet) *and/or*
- to different attitudes to risk (a preference for long odds may lower expected returns because of the presence of longshot bias in the odds).

Riskiness of betting choices is explored in Section 2.1.7 below.

The proportions of betting spend allocated to different activities shows sharp differences between younger and older bettors, in particular in the relative shares of race and sports betting. Table 4 in the Data File and Figure 5 here display the split of spending for each age-band. **For groups up to age 35, sports betting accounted for more than three-quarters of spending. Thereafter, the balance shifts towards race betting, its share increasing particularly sharply after age 55**. By the oldest age-band, race bets accounted for the large majority of betting spend, more than four-fifths.

Figure 5. Percentage shares of sports and races in total betting spend



In practice, most of sports betting is on football and most of race betting is on horses. According to successive editions of *Industry Statistics*, issued by the Gambling Commission and based on regulatory returns, football has been gaining market share at the expense of horseracing for several years. This trend is observed in many jurisdictions. In 2021, for example, the Hong Kong Jockey Club reported for the first time having derived more net revenue in the past year from football betting than from horse race betting.[35] It is to be expected that shifts in population preferences in the long-term are achieved through cohort effects since young consumers are likely to be

[35] Hong Kong Jockey Club, *Annual Report for the Year Ended June 30, 2021: Racing Forward Together*: https://corporate.hkjc.com/corporate/english/history-and-reports/annual-reports.aspx (accessed 07.11.21)

affected first. Then, as they age, the new preferences become more and more the preferences of the whole population. **The data here reveal a strong reliance of race betting on older members of the population. This constitutes a risk for the large British horseracing and bloodstock industries**.

We estimate that 55.4% of online *horseracing* GGY in 2018-19 was generated by those aged 45 or older and 31.7% by those aged 55 or over. Since a principal revenue stream of British horseracing is the 10% of operator GGY paid to it through the Horserace Betting Levy Board, the long-term sustainability of the sport at current scale might be compromised if younger bettors carry through their spending split into older years. It might be speculated that they are likely to do so since the preference of older bettors for racing may be primarily a cohort rather than a life-cycle effect given that those aged 45+ in the data set were already aged 28+ in 2001, which was the year when British bookmakers first allowed betting on the results of individual football matches. These older cohorts therefore had limited access to football betting in the years when their betting habits were being formed, a contrast with the high exposure of currently younger groups to football betting.[36]

Deprived and less deprived areas

Table 5 in the Data File presents key metrics according to the deprivation status of the address to which a betting-active account was registered. We had available the decile of the Index of Multiple Deprivation (IMD), where one indicates that the area where the account address was situated falls within the 10% of most deprived areas in Great Britain and ten refers to the 10% of least deprived areas.

The IMD is based on a wide variety of indicators, including crime-rates and health, but the most influential on the final rating are income deprivation and employment deprivation. The former is defined by the proportion of households eligible for (even if not claiming) social security benefits and the latter is based on involuntary exclusion from the labour market. To illustrate from figures for England in 2019, 33.1% of households in IMD1 were 'income deprived' and 25.0% were 'employment deprived'. In IMD5, the corresponding proportions were 11.1% and 8.7%. And in IMD10, they were 2.5% and 2.4%.[37]

By design, the areas defined in IMD data are of roughly similar size (with about 1,500 residents, small enough to be regarded as neighbourhoods). Thus, if participation in online betting were unrelated to deprivation, one would expect the proportion of online bettors in each IMD decile never to be very far from 10%. This may appear a somewhat rough-and-ready benchmark to the extent that, even if all IMD areas were the same size in terms of total population, they might conceivably differ in terms of the size of population entitled to take part in online gambling (i.e. the proportion of adults might differ systematically between areas according to IMD status). However, we

[36] Another relevant question is whether the high participation in betting in general of those currently 25-44 is maintained as they age. However, the age distribution of bettors revealed in prevalence surveys over time has not changed a great deal, so the lower overall betting participation of older groups observed in our data perhaps owes more to life-cycle than to cohort effects.

[37] Ministry of Housing, Communities and Local Government (2019), The English Indices of Deprivation 2019: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835115/IoD2019_Statistical_Release.pdf (accessed 19.2.22)

checked the best matched data available and ascertained that this was not a factor likely to make a significant impact on the interpretations of our data offered below.[38]

In addition to figures for 'all betting', Table 5 in the Data File also presents information specific to each of football and horse race betting, which are by far the most popular activities represented in the data set.

Overall, the data revealed that:

- the 20% **most** deprived areas provided 20.8% of online bettors, 18.4% of betting turnover and 21.3% of operator GGY; in the aggregate, bettors from these areas had a net loss of 10.6% of their stakes
- the 20% **least** deprived areas provided 18.6% of online bettors, 25.3% of betting turnover and 18.0% of operator GGY; in the aggregate, bettors from these groups had a net loss of 6.2% of their stakes[39]

From this contrast between the most deprived and the least deprived areas, participation in online betting appears to display only modest variation by type of area. This remains true if one considers the whole range of IMD areas: the proportion of customers from each successive decile up to the ninth is never outside the range 9.6% to 10.6% and is still 9.0% at the top (least deprived) decile. **Participants in online betting therefore appear to be drawn relatively evenly from across different types of area**.

Typical behaviour of participants in online betting, captured by median values of measures of frequency and number of bets, and by betting volume, also displays little variation across the deprivation range. However, mean values, affected by the activity of more engaged customers, tell a different story. **On average, residents of more deprived areas placed more bets but at lower average stake size than residents of less deprived areas**. The increase in average stake along the scale from most to least deprived is modest at first; but mean stake begins to increases sharply after the fifth decile. Once the tenth (the least deprived) decile has been reached, mean stake has risen to £20.81, compared with only £8.01 for IMD1.

Even though the average number of bets-per-customer was lower in less deprived areas, the average stake size was sufficiently higher to offset this such that most IMD categories ended up contributing similar amounts as each other to betting turnover (total amount wagered). That turnover was evenly spread across deciles was, however, true only for the first eight deciles. The 20% of **least** deprived areas contributed disproportionately heavily to turnover compared with the rest.

[38] The Office for National Statistics published estimates of population in different age-bands by IMD quintile (for England only), in response to a user request. We were able to calculate the percentage of the total 15+ population living within each quintile in 2018. Ordered from the most deprived to the least deprived areas, the proportions in each quintile were 19.6%, 20.2%, 20.6%, 20.5% and 19.1%. Calculations were made from tables displayed at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/adhocs/12386populationbyindexofmultipledeprivationimdengland2001to2019 (accessed 14.10.21)

[39] The percentages of stakes lost are very much lower than suggested by the rates-of-return displayed in Table 3. For clarity, mean rates- of-return represent the average rate-of-return calculated across bettors, i.e. the rate-of-return was calculated for each individual bettor and the average of those taken to derive the figure shown in the Table. Rates-of-return in the Table therefore give equal weight to each bettor regardless of amount staked. Many occasional bettors will have an individual rate-of-return of -1 because their relatively few bets all lose.

On the other hand, bettors' financial outcomes (which depend on choices regarding the betting product, as well as on skill) tended to be less adverse in the 20% of least deprived areas, where only 6.2% of the stake remained with the bookmaker rather than being claimed back in winnings. By contrast, residents of the 20% of most deprived areas collectively lost 10.6% of total stakes (and intermediate categories of area fared almost as badly).

In aggregate, customers in the least deprived decile (IMD10) *as a group*, stand out as different from the rest even though the behaviour of the *typical* member of a group was rather similar across area types. Customers in IMD10 collectively contributed disproportionately heavily to turnover; but their relatively successful betting performance (i.e. smaller percentage loss) led to the least deprived areas actually contributing slightly less to bookmaker win than the most deprived areas. Nevertheless, the differences in shares of GGY were relatively modest and **it would be fair from the data to characterise online betting as drawing its profits fairly evenly from across social strata as defined by IMD**. This finding contrasts with what we will report later concerning online gaming.

Next, we consider data for the two most popular betting activities, football and horseracing. Across the operators represented in the data set, we estimate that 6.7m accounts were used for football and 5.9m for horse betting.

- **participation in horse betting, measured by the number of customers placing at least one bet, was evenly distributed across IMD deciles**, with the proportion of customers in a given decile never outside the range 9.4% to 10.3%
- **in the case of football betting, there appears to be a slight skew in participation towards more deprived areas**: 11.3% of customers had account addresses in IMD1 compared with 8.3% in IMD10
- median values show that **frequency of betting was greater for football than for horseracing and that in neither case was there significant variation across IMD deciles**
- for both football and horse betting, median stake size was not far from £5 for any IMD decile; but mean values reveal that, generally, **stake size was higher the less deprived the area**; at more than £22, it was particularly high among horse bettors in the least deprived IMD category[40], more than three times higher than the mean stake level for horse betting in the most deprived IMD category
- despite some anomalies, **football's share of total betting expenditure was generally higher the more deprived the area and the opposite was true for horseracing**; horse betting accounted for 45.2% of the GGY from all betting originating in the very least deprived areas, IMD10, but for the most deprived decile, IMD1, the corresponding figure was only 24.3%
- thus, **football GGY was drawn disproportionately from more deprived areas while horse betting GGY was drawn disproportionately from less deprived areas**

[40] Using account and administrative data from Finland, Forrest et al. (2022) reported that horse race betting volume and spending increased only slightly with disposable income through most of the income range but increased rather sharply in the top quartile. They found that the elevated contribution of the highest income groups was attributable to higher stake sizes rather than more bets. These findings are highly congruent with what we observe in our data. Forrest, D., Suhonen, N., Saastamoinen, J. & Kainulainen, T. (2022). Income elasticity of demand for horse wagering: - Large-scale evidence from online betting accounts, *Economics Letters*. Accepted manuscript: https://doi.org/10.1016/j.econlet.2022.110356.

These two betting sectors together account for the bulk of all betting expenditure. It is evident that **the fairly uniform distribution of total betting spend across different types of area results from roughly offsetting patterns in football and horse betting**.

Virtuals and e-sports

Detailed summary data of key metrics describing online betting on each of virtual events and e-sports, separately by age-band and IMD decile, are presented in Table 6. In the case of e-sports, estimates should be treated with caution because few customers in the sample participated in e-sports; the risk of significant sampling error is therefore higher than for mainstream products.

We estimate that 7.9% of all betting customers at the seven operators placed at least one bet on a *virtual* event during the study year. They present a similar age distribution as in football betting, with an average age of 34.7 (compared with 34.9 for football and 37.4 for horseracing). Based on accounts where gender was known, we estimate that 90.2% were male (compared with 83.9% for football and 75.7% for horseracing).

Compared with more popular forms of betting, there was a stronger skew in participation towards more deprived areas. 28.0% of customers who bet on virtuals had addresses in the 20% of most deprived areas (and only 14.1% addresses in the 20% of least deprived areas). For comparison, estimates for football were 22.2%/17.9% and for horseracing 19.6%/19.4%. On the other hand, typical levels of engagement with virtuals were very low in all types of area, with the median number of active days as high as 3 in only one of the ten deprivation deciles and median stake size above £2.50 only in the very least deprived decile. Typical stake sizes contrasted sharply with those for football and horse betting where median stake was not far from £5 in any type of area. Median annual spend was similarly low, never in excess of £5 for any area type. All this suggests that, **while the number of accounts used for betting on virtuals was fairly high, for the majority of customers such betting was very infrequent, or indeed one-off, and made minimal difference to annual losses incurred from their whole betting activity**.

As with other betting products, there are more regular and engaged customers who influence mean values for all metrics. The mean number of betting days was 9.3 across all customers, with a tendency to be somewhat higher in the most deprived areas. Neither mean stake size nor mean annual loss per customer showed a clear pattern across IMD categories (though both were sharply higher in the very least deprived areas compared with all the rest). The tendency for more deprived areas to contribute disproportionately to GGY from betting on virtuals therefore largely reflected higher participation. The 20% of most deprived areas accounted for 29.7% of GGY and the 20% of least deprived areas 14.1%.

Customers who bet on *e-sports* were more likely to be young and male than bettors generally. According to our estimates, 84.5% were under 35 (compared with 53.9% of all bettors) and 90.2% were male (compared with 78.4% of all bettors). Typical activity levels were low and for every age-band the median number of betting days was 1, (i.e., for the small number of online bettors who wagered on e-sports, it was something most did on only one day). Mean values for indicators of activity level were naturally higher, but still very modest relative to more popular betting products. For example, the mean annual loss from e-sports betting was only £16.54. However, this was £37.76 for under-21s and, according to our estimates, this group accounted for more than half of operators' GGY from e-sports. This degree of reliance on under-21s makes e-sports distinct from other betting products, although even in this age-group, only 9.6% of accounts included one or more wagers on e-sports.

Participation in e-sports betting tended to be modestly higher in areas of most deprivation. The 20% of most deprived areas supplied 24.3% of the customers and the 20% of least deprived areas supplied 17.0% of the customers. **However, regardless of area type, the typical level of engagement was low**. In nine of the deciles, more than half of e-sports bettors bet on only a single day in the study year (and the median was only 2 in the remaining deprivation category). Possibly partially explained by the low numbers of e-sports bettors observed in the data set, patterns of differences in mean behaviour across the deprivation range proved hard to discern. Together, the behavioural indicators led to an estimate that more than 43% of the total GGY from e-sports was generated in the 20% of least deprived areas, but low confidence is attached to this estimate due to the small sample size.

2.1.3 Patterns in activity

Breadth of involvement

As noted already, we defined eleven betting activities covering various sports and groups of sports as well as virtual betting and wagering on non-sport events. Gambling in a large number of different gambling genres (betting, casino games, bingo, lotteries, etc) is a well-established marker for problem gambling.[41] However, Nelson et al. (2021)[42] note that research is still required to establish whether this finding applies also within betting, i.e. to the variety of sports in a bettor's portfolio of activity. Here, we do not have information on the problem gambling status of customers who bet on a range of sports, although we are able to assess whether the profile of gamblers in terms of demographics and levels of play varies with number of betting activities.

Table 7 presents summary statistics:

- we estimate that 62.6% of bettors wagered on only either one or two betting activities but **6.4% bet on six or more**
- **men were much more likely than women to display high breadth of involvement**; for example, 91.5% of those with six or more activities were men (whereas only 78.4% of betting-active accounts were held by men)
- those with addresses in the 20% most deprived areas were somewhat over-represented (22.6%) among customers with six or more activities
- there was **a strong correlation between participation in multiple activities and level of spending**. For example, for those with a single activity, the top quarter of spenders (bettor loss in the year) all spent at least £30; for those with six activities, the top quarter all spent more than £700; and by eight activities, the top quarter all lost in excess of £1,570; median spending in each group, from one activity to ten activities, increases monotonically to reach £1,160.

[41] For evidence specific to the context of online gambling, see LaPlante, D. A., Nelson, S. E., & Gray, H. M. (2014). Breadth and depth involvement: Understanding Internet gambling involvement and its relationship to gambling problems. *Psychology of Addictive Behaviors, 28*(2), 396–403: https://doi.org/10.1037/a0033810

[42] Nelson, S.E., Edson, T.C., Louderback, E.R., et al. (2021). Changes to the playing field: A contemporary study of actual European online sports betting, *Journal of Behavioral Addictions*, *10(3)*, 396-411: https://doi.org/10.1556/2006.2021.00029

Depth of involvement

Analysing the accounts of 1,440 bwin customers who had completed an online screen for gambling disorder, LaPlante et al. (2014) found that their other measure of degree of engagement, depth of involvement- defined by number of betting days- was also predictive of risk of problem gambling (though not as strongly predictive as breadth).

Table 8 shows metrics describing groups of bettors defined by the number of days on which they placed a bet during our one year data period:

- we estimate that more than one-fifth of all betting-active accounts with these operators were used to bet on only one day in the year and 10% more were used on only two days
- 19.8% of accounts were used on more than 50 days, which would roughly correspond to weekly-or-more betting[43]
- **6.9% of accounts were used on more than 100 days and 3.2% on more than 200**; we estimate that, across the seven operators, 893,917 accounts were used on more than 100 days and 291,417 on more than 200. Compared with other bettors, account-holders with this frequency of activity tended to be significantly older, were much more likely to be male, and were somewhat more likely to have an address in the 20% of most deprived areas
- **annual spending was strongly correlated with depth of involvement**
- among those who bet on more than 200 days in the year, the median loss over the year was nevertheless rather modest (£860); however, one-quarter lost more than £2,204 from their betting
- in this group of most frequent participants, 45.6% were 'mainly sports' bettors and 30.8% were 'mainly race' bettors[44]

Patterns of betting across the year and across the day

Appendix B presents a series of charts (one of which is included here) to illustrate how betting activity and the profile of bettors varied across the week and across the day.

It is not possible, from one year's data, to assign seasonal trends. Nonetheless, it is clear that day-to-day variation in the volume of betting is driven primarily by the racing and football calendars. For example, the two days with the highest total amount staked on horse betting were both during the Cheltenham Festival, the most prestigious event in jumps racing (held in March), and the next highest was on July 28 when there was an exceptionally rich flat racing fixture list, a 'super Saturday' which included meetings at four leading courses, Ascot, Chester, Newmarket and York.[45] Two of these three biggest days for horse race betting were also the top two days for total betting. Cheltenham notwithstanding, the flat-turf racing season typically had higher betting

[43] This may underestimate the number of 'regular bettors' to the extent that some accounts with each operator were opened or closed during the year, such that betting was more frequent during the period when the account was open than the number of betting days in the year might suggest.

[44] We define as "mainly sports" bettors all those for whom sports betting accounted for at least 80% of their total annual spending (and similarly for race betting).

[45] The most popular single race day of the year was the date of the Grand National, held at Liverpool in early April. The reputation of the race for attracting the interest of small, occasional bettors was upheld to the extent that that day had the highest number of bets in the whole year even if the total amount staked was less remarkable. 5.3% of those who placed any bet during the year did so only on this day and 14.7% of those who placed a horseracing bet during the year did so only on this day.

volumes than the part of the year when jumps racing predominates. In sports betting, sharp peaks in turnover across the year coincided with weekends between October and May, reflecting interest in domestic football. Of course, high volume betting on any individual day does not necessarily translate to high operator GGY on that day. For example, we estimate that on March 14, 2019, the seven operators in the study collectively lost close to £0.5m across their whole online betting operations; that day, at the Cheltenham Festival, favourites won three of the first four races and there were historic and popular wins for two female jockeys. Conversely, the following day brought the bookmakers' highest profit of the whole year when most races at Cheltenham were won by rank outsiders, illustrating the short-run sensitivity of industry profits to sporting outcomes.

Turning to patterns of activity across days of the week, Saturday was the peak day for betting activity, whether measured by reference to total amount staked, total amount of bettor losses or total number of bets (all averaged over the year). Monday was the weakest day. On each measure, average activity was a little less than twice as high on Saturdays as on Mondays.

To examine patterns *across the day*, we divided each day into 96 fifteen-minute windows and took averages across the year for indicators of the level of activity in each time window. On average, the number of bets placed and the total amount staked were both clearly higher between noon and 8 p.m. than in the rest of the day, with local peaks in activity around 2.30 p.m. and 7.30 p.m.. These times are shortly before the start times of many Saturday and midweek football matches, and 2.30 is also around the time when the 'biggest' horse races of the day are shortly to be run.

Unsurprisingly, betting activity typically declines more or less steadily after 8 p.m. as the domestic sports programme declines and many potential customers approach bedtime. Still, **we estimate that, on an average day, in any given fifteen minutes window covering 1.30 to 6 a.m., between 2,500 and 3,000 customers of these operators placed one or more bets**.[46] This group may be of particular interest. Although some will be placing advance bets on events taking place in Great Britain, others will be engaging with sports matches in other, distant time zones as no local live events are normally in progress in the early hours. Some of these may have been enabled by online access to continue chasing losses by wagering on unfamiliar sports or unfamiliar leagues in other parts of the World.[47] Again, at that time of day, many may be gambling without the presence of others able to exert a moderating influence.[48] Moreover, propensity to place sports bets after midnight has been identified as a statistically significant marker for problem gambling.[49]

We estimated the average age of bettors who placed a bet during each of our 96 time windows, which was lowest shortly after midnight. However, there was a sharp rise during the early hours and the average age around 6 a.m. was the highest of the whole day, above 39 years. Thus, **the profile of those who bet 'in the middle of the night'**

[46] For comparison, the average number of active bettors was around or above 7,000 in each window between 10.15 a.m. and 8 p.m.

[47] Parke, A. & Parke, J. (2019). Transformation of sports betting into a rapid and continuous gambling activity: a Grounded theoretical investigation of problem sports betting in online settings, *International Journal of Mental Health and Addiction 17*(6)**,** 1340–1359: https://doi.org/10.1007/s11469-018-0049-8

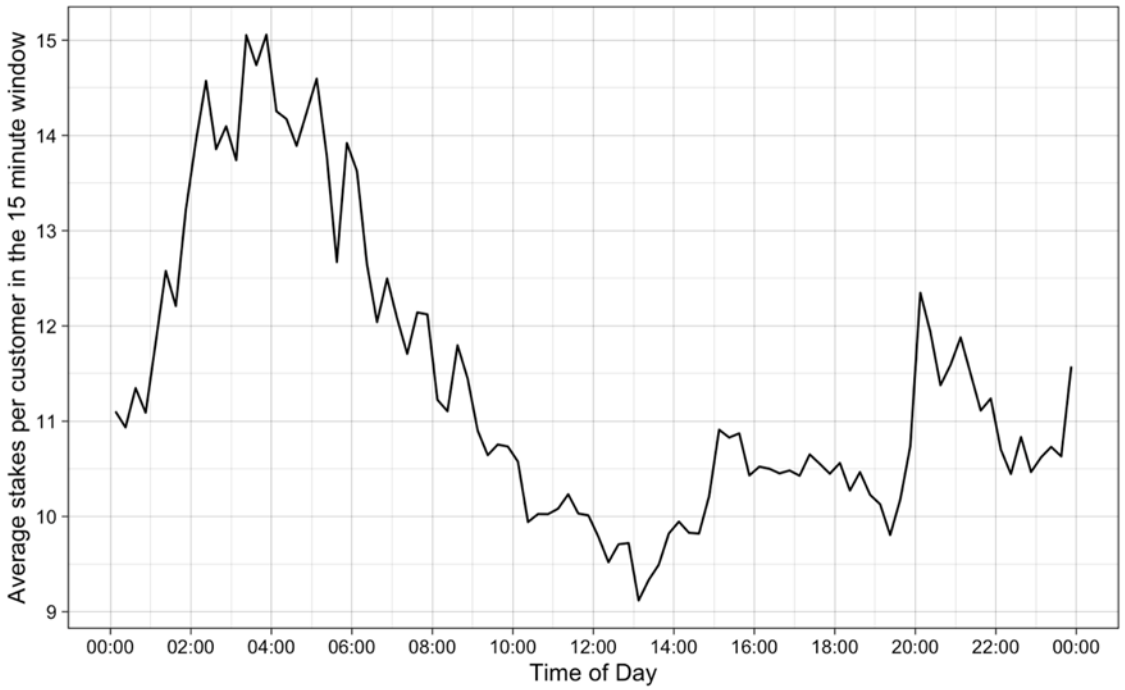
[48] Winters, K.C. & Derevensky, J. L. (2019). A review of sports wagering: Prevalence, characteristics of sports bettors, and association with problem gambling*, Journal of Gambling Issues*, December: https://doi.org/10.4309/jgi.2019.43.7

[49] PWC (2017). *Remote Gambling Research, Interim Report on Phase 2*, GambleAware: https://www.begambleaware.org/sites/default/files/2020-12/gamble-aware_remote-gambling-research_phase-2_pwc-report_august-2017-final.pdf (accessed 29.10.21)

was distinctly 'old'. It was also somewhat skewed towards those with addresses in more deprived areas. The mean value of IMD fluctuated around 4.9 from midnight to 6 a.m. (compared with around 5.3-5.4 in every window between 8 a.m. and 8 p.m.).

We also examined how the amount of money bet varied between time windows across the day. For each time window, Figure 6 shows, on average, how much money was wagered by a customer active in that window. Throughout the day from 9 a.m. to 7.30 p.m., the average is below £11 and in some cases below £10. It briefly rises above £12 around 8 p.m. However, it is sharply higher than this between 2 a.m. and 6 a.m., generally close to £14 and in two windows above £15. Therefore, on average, **betting in the early hours is associated with above-average outlay**. Elevated activity by late-night gamblers has been noted in other settings. Research by Wardle et al. (2014)[50] reported a greater propensity to stake at the maximum permitted level among those playing late at night on gaming machines in bookmaker shops. In addition, Forrest and McHale (2016), studying patterns of machine gaming in British casinos, presented a plot where the diurnal pattern of spending-per-minute-per customer is broadly similar to that represented here in Figure 6.[51]

Figure 6: Average stakes-per-15-minutes of betting customers active at different times of day



[50] Wardle, H., Ireland, E., Sharman, S., Excell, D. & Gonzalez-Ordonez, D. (2014*). Patterns of play: Analysis of data from machines in bookmakers*, Responsible Gambling Trust, 2014.: https://paperzz.com/doc/7356813/patterns-of-play--analysis-of-data-from-machines-in-bookm... (accessed 4.11.21)

[51] Forrest, D. and McHale, I.G. (2016). *Tracked play on B1 gaming machines in British casinos*, Responsible Gambling Trust: https://www.begambleaware.org/sites/default/files/2020-12/tracked-play-revision-14-12-16.pdf (accessed 29.10.21)

2.1.4 Concentration of spending

Distribution of spending across accounts

In most businesses, regardless of industry, a relatively small proportion of customers accounts for the majority of purchases and profits. For example, based on data from 339 American companies, McCarthy and Winer (2019) found that, on average, whether a business provided physical goods or else services, the top-20% of customers contributed 67% of turnover.[52] However, using self-report survey data from France, Germany and Québec, Fiedler et al. (2019)[53] reported that for the gambling sector, concentration was even greater. This is potentially a cause for concern. Tom et al. (2014)[54], working with bwin account data and an online survey, reported that the small percentage of heavy spenders included a disproportionately high number of bettors who tested positive on a short problem gambling screen. It follows that there is likely to be a tension in the sector between commercial objectives and social responsibility.

Whilst do not have information on the problem gambler status of account-holders, we are able from account rather than survey data, to gauge the degree of dependence of online betting on what Tom et al. (2014) termed the "vital few" of heavy players. In a gambling context, Deng et al. (2021)[55] found that concentration of spending is under-estimated if windows of observation shorter than one year are used to capture the distribution of losses across customers.[56] Our calculations below are able to use data for each customer measured over a full one-year period.

Figure 7 shows the distribution of wins and losses over the year. Characteristics of players in each band of winners and losers are discussed later. For now, it may be noted that, over the year, a substantial proportion of accounts (23.0%) delivered a net win for the customer. This poses a problem for producing a meaningful analysis of concentration in customer spending (GGY from the operator perspective). Spending is negative for nearly one-quarter of accounts. Arithmetically, customers who lose have to make up for the operator pay-outs to successful clients before they begin to contribute to operator GGY, which results in estimates that the share of some groupings of the heaviest bettors in total GGY is far in excess of 100%. Such estimates would be conceptually unappealing; and they would be likely to mislead because there is an element of chance in whether customers win or lose over the year. For example, the sustainability of an operator's business may depend heavily on the accounts of all high staking customers but each year some of them will by chance be big winners (in the following year, they may be big losers). Estimates of concentration would not be

[52] McCarthy, D. & Winer, R.S. (2019). The Pareto rule in marketing revisited: Is it 80/20 or 70/20? *Marketing Letters, 30*, 139-150: https://doi.org/10.1007/s11002-019-09490-y. The authors noted also that, from preliminary results, concentration in terms of profits might be greater than concentration in terms of turnover, particularly in e-commerce.

[53] Fiedler, I., Kairouz, S., Costes, J-M. & Weißmüller, K.S. (2019). Gambling spending and its concentration on problem gamblers, *Journal of Business Research, 98*, 82-91: https://doi.org/10.1016/j.jbusres.2019.01.040

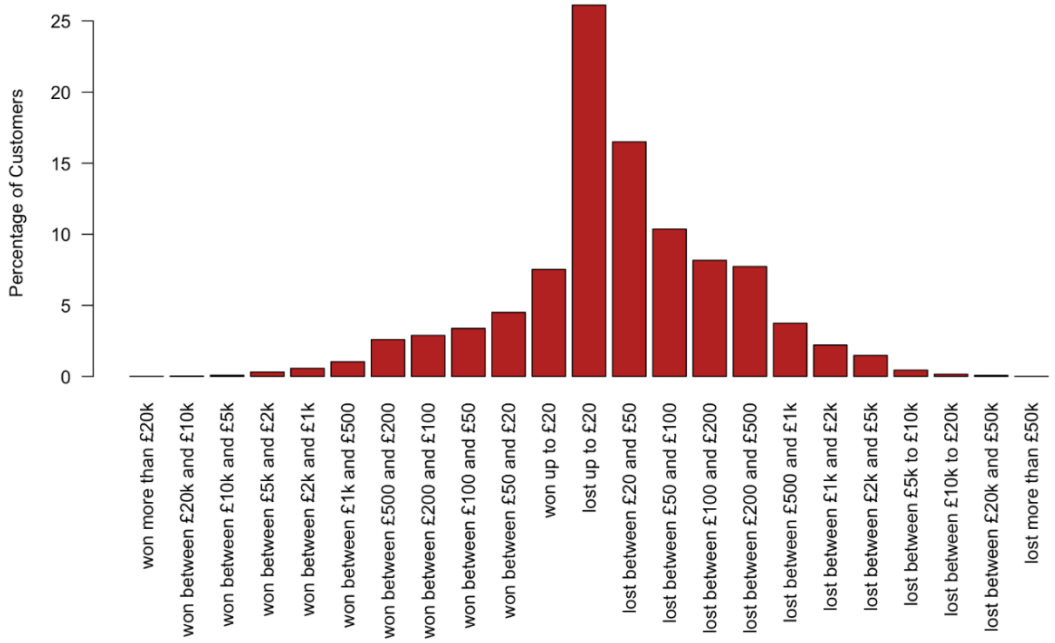
[54] Tom, M.A., LaPlante, D.A. & Shaffer H.J. (2014). Does Pareto rule internet gambling? Problems among the "vital few" and the "trivial many". *Journal of Gambling Business and Economics, 8(1)*, 73-100: https://doi.org/10.5750/jgbe.v8i1.798

[55] Deng, X., Lesch, T. & Clark, L. (2021). Pareto distributions in online casino gambling: Sensitivity to time-frame and associations with self-exclusion, *Addictive Behaviors, 120*, Article 106968: https://doi.org/10.1016/j.addbeh.2021.106968

[56] Gamblers who contribute the most to industry revenue tend to be heavily engaged. Using short periods to evaluate concentration fails to capture that their spending is maintained over a long period. Measured over a short period, their contribution may not seem more significant than that of customers who gamble more occasionally and may not return in the following period.

meaningful if membership of the “vital few” were restricted solely to those who lose this year.

Figure 7: Distribution of wins and losses from betting over one year



Deng et al. (2021) recognised that it would be counter-intuitive to estimate that any sub-set of customers is responsible for more than 100% of GGY. Because this paradox arises from the presence of players with negative spending (i.e. winners), they re-code the spending figures for winners to zero, thus including each of them in the calculations as zero spenders. We follow a different strategy because theirs discards information. Further, their context is online casino games where returns to customers are not likely to be much influenced by player skill. In betting, it should also be taken into account when producing concentration estimates that heavier players may make choices which give them systematically superior outcomes compared with lighter players.

We proceed as follows. First we show the degree of concentration in turnover (total stakes) by rank-ordering customers according to volume of betting, to allow statements such as ‘the top x% of bettors provide y% of turnover’. Next we demonstrate that higher volume bettors achieve less adverse rates-of-return than lower volume bettors. Finally the data then allow us to make statements such as ‘the top x% of players by volume provide y% of GGY’. All these statements should be qualified by the caveat that they are estimates only and dependent on data about the inevitably rather low numbers of very heavy bettors captured in the sample.

Concentration in betting volumes

For betting overall (and also for sports and race betting separately), Table 9 in the Data File illustrates that bookmaker turnover is very concentrated in a relatively small number of bettors. When rank-ordered by total amount bet over the year:

- **the top-1% of bettors accounted for 52.5% of betting volume**; everyone in this group had total stakes of **more than £52,060**
- **the top-10% of bettors accounted for 88.2% of betting volume**; everyone in this group had total stakes of more than £5,635
- **the top-20% of bettors accounted for 94.9% of betting volume**; everyone in this group had total stakes of more than £710

When comparing sectors in terms of their degree of dependence on a small number of buyers, it is common to use the *Pareto ratio*, which is the share in total sales of the top 20% of customers. As noted above, 67% was the average value of the Pareto ratio across a range of American industries (McCarthy & Winer, 2019). For online betting, we estimate the Pareto ratio as approximately 95%. This confirms that **dependence on a "vital few" customers is unusually great in the betting sector**. The converse is that, even more than in other sectors, the mass of customers comprise what are essentially a "trivial few". One-half of all accounts used for betting together accounted for just 0.8% of operator turnover.

Turnover versus profit

However, not every bettor placing high stakes will be a high-value customer for the operator. It is probable that those staking large amounts of money over the year will be better-informed or more skilled bettors than those who participate on only a casual basis: 'big money' represents 'smart money' (Suhonen et al., 2018). High volume bettors may also benefit from incentives which effectively enhance the odds at which they bet, which will be reflected in their rates-of-return calculated from their account data.

We investigated this issue with the following thought-experiment. We rank-ordered all betting customers by their volume of betting over the year. We then took successive tranches of turnover from this list of accounts. For example, we extracted the 1% of the total stakes originating with the very highest volume clients. Note that here the percentage tranches are of turnover money rather than percentage segments of customers.[57]

The 1% of stakes from the very highest turnover accounts in fact provided only 0.01% of betting GGY. When the process was repeated for individual betting activities, the contribution to GGY of the 1% of stakes placed by the very highest turnover accounts was never far from zero and was actually negative in the cases of boxing, golf and in-play football. This demonstrates that, when one considers only the most extreme bettors defined by volume, they were as a group sufficiently skilled to play out a virtually break-even game against the bookmakers.[58] As we defined further tranches of turnover money, the bookmakers tended to become more and more successful, demonstrating that the percentage of stakes retained by operators becomes greater as the depth of engagement of the customer reduces.[59] This suggests that the dependence of operator profits on high volume customers may not be (quite) as great as suggested by estimates of the concentration of turnover.[60]

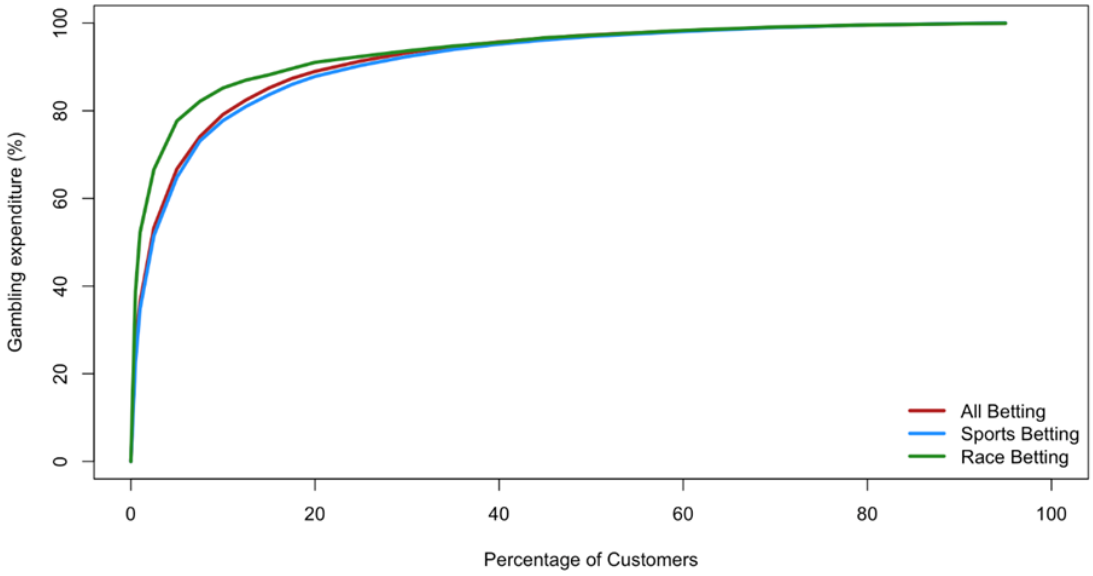
Accordingly, we present in Table 11 of the Data File data on twelve *customer segments* defined by where they rank in share of betting turnover. Moving progressively to lower-turnover customers, average rates-of-return on stakes placed worsen monotonically. Indeed the median return falls to -100% in the lowest-turnover segments (i.e. a majority of low-volume bettors lost all their money). **The result of differential 'performance' by different groups is that the relative contribution of high-volume bettors to GGY is not as great as their share of betting volume. Nevertheless, the degree of**

[57] For example, we estimate that 0.01% of bettors (just 815 individual accounts) were responsible for 10% of stakes.
[58] Some may use computers to identify arbitrage opportunities. Others may have access to either inside information or a faster stream of information from the sports venue.
[59] Golf betting presented an anomalous case where the bookmakers lost heavily to bettors who were mid-ranked by volume.
[60] Table 10 in the Data File provides full data on the experiment described in this and the preceding paragraph.

the operators' dependence on these high-volume customers remains high because, although such customers win back a relatively high percentage of their stakes, they bet so much more than the mass of customers that they are still the "vital few" from the industry's perspective.

This is illustrated starkly by the *Lorenz curves* in Figure 8 (which includes curves for betting overall and for sports and race betting separately). Consider the Lorenz curve for betting overall. The horizontal axis represents customers in rank-order of total amount staked over the year, with the heaviest bettors to the left of the diagram. The vertical axis shows the proportion of operator win (GGY) accounted for by a given sub-set of bettors. For example, on the curve for 'all betting', 20 on the horizontal axis refers to the 'top-20% of customers' and the corresponding figure on the vertical axis is 89.0. This indicates that the top 20% of bettors generated 89.0% of betting GGY (to be within this top-20%, a bettor had to have staked at least £710).

Figure 8: Lorenz curves for betting



Although the Pareto ratio (now defined over operator profit rather than turnover, and here 89.0%) is a recognised metric for use in comparing concentration across business types, it is instructive also to consider the shape of the rest of the curve for 'all betting'. The very steep gradient to the left of the diagram points to a strong degree of dependence on a much smaller group than the top-20%. The top-1% already account for more than one-third of GGY and the top-5% for more than two-thirds. Therefore, **more than two-thirds of operator profit from betting transactions originated with customers who placed bets totalling more than £5,635 in a year**.

The Lorenz curve quickly becomes very flat as it edges towards 100% on the vertical axis. This demonstrates again that most customers may aptly be included in what Tom et al. (2014) termed the "trivial many". We noted above that the 'bottom-50%' of customers accounted for only 0.8% of betting turnover. Because their betting outcomes are typically worse than those of the heavier bettors, they make a greater proportionate contribution to GGY, but still only 2.7%. Thus, the very large number of account-holders with low levels of activity are of somewhat marginal direct importance to the industry (though in the longer-term, some may progress to deeper engagement and others may deliver profit by being recruited to other gambling activities, such as slots).

The curves in Figure 8 representing race and sports betting as distinct products reveal a degree of concentration only a little different from that for 'all betting'. Our estimate for the Pareto ratio, defined over GGY, was 87.8% for sports betting and 91.0% for race

betting. Among the major sports, concentration was greatest in tennis and lowest in football.

2.1.5 Accounts with largest losses

Figure 7 above showed the distribution of wins and losses across online bettors. Table 12 in the Data File presents these data in more detail and with summary statistics on the composition of customers in each win/loss band in terms of age, gender, area-deprivation and how many incurred most of their win or loss from sports betting/ race betting. In general terms, the groups of big winners and the groups of big losers had common demographic characteristics: members of each tended to be more likely to be male, older and to reside in somewhat less deprived areas than other bettors. One difference was that large wins over the year were more likely to be associated mostly with race betting whereas large losses over the year were more likely to be associated mostly with sports betting.

As is usual with gambling data sets, **a large majority of bettors either finished ahead or else lost only modest amounts** (when compared with spending on other common leisure pursuits):

- 23.0% of accounts won money over the year
- 84.5% either won money or lost less than £200
- 95.6% either won or lost less than £1,000

On the other hand:

- 4.4% of accounts lost more than £1,000 over the year
- 2.2% lost more than £2,000
- 0.7% lost more than £5,000

The proportion of accounts with a 'large' loss is small but still represents a significant number of individuals. For example, our estimate that 2.2% of account-holders spent more than £2,000 over the year implies that more than 190,000 bettors with the seven operators incurred that level of loss.[61] Many of these will have been betting 'safely' and within their means. Nevertheless, levels of expenditure in the thousands of pounds a year would challenge most budgets given typical household income levels in Great Britain.[62] It is therefore plausible that the greatest harm from unwise gambling behaviour is likely to be found among these atypically heavy players rather than among those whose spending is closer to the median. In fact, Russell et al. (2019) reported that, for betting, high expenditure was predictive of moderate-risk and problem gambling even in the presence of a multitude of controls representing demographics and other metrics of betting behaviour such as frequency.[63] Further, the follow-on survey of holders of accounts included in our sample found higher spending in the account data to be predictive of greater risk of PGSI problem gambler status in

[61] More of their customers may have been found to have spent on online betting to that level if it had been possible to observe an individual's activity over more than one website.
[62] According to the Office for National Statistics, median household disposable income in the United Kingdom in 2018-19 was £29,400: https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/householddisposableincomeandinequality/financialyearending2019provisional (accessed 31.12.21)
[63] Russell, A. M. T., Hing, N. & Browne, M. (2019). Risk factors for gambling problems specifically associated with sports betting, *Journal of Gambling Studies, 35(4)*, 1211–1228: https://doi.org/10.1007/s10899-019-09848-x

2021 and of endorsement of 'ever' having had problems with gambling.[64] We therefore profiled online bettors with the highest level of losses in the data period.

Key findings derived from data in Table 12 in the Data File include:

- **the heaviest-loss bettors were much more likely to be male than the generality of bettors**; we estimate that 92.9% spending more than £1,000 and 94.2% spending more than £2,000 were men; for comparison, where gender was known, 78.4% of all betting-active accounts were registered to males
- **on average, the heaviest-loss bettors were somewhat older than the generality of bettors**; we estimate that the mean age of bettors spending more than £1,000 was 39.8 and it was 40.6 for those spending more than £2,000 for comparison, the mean age of 'all bettors' was 35.9
- the proportion of bettors losing between £1,000 and £2,000 who lived in the 20% most deprived areas was 24.1%
- **21.9% of bettors who lost more than £2,000 lived in the 20% most deprived areas**
- 50.2% of those who lost more than £1,000, and **49.4% of those who lost more than £2,000, incurred more than 80% of their total loss when betting on sports**
- 23.3% of those who lost more than £1,000, and **25.5% of those who lost more than £2,000, incurred more than 80% of their total loss when betting on races**
- thus about three-quarters of 'heavy losers' had losses driven mainly by *either* sports betting *or* race betting while about one-quarter had losses which were more spread out across betting activities.

Heavy loss days

Table 13 in the Data File focuses on customers who lost significant sums on a single day of betting. We adopt thresholds of £500 and £1,000 to define 'heavy loss' days and distinguish between accounts where such a loss was experienced only once and those where there were two instances or else three or more. Customers in each case are profiled by gender, age, IMD and the activity which accounted for most of their loss.

During the year, only a small proportion of customers experienced a one-day loss at these levels. We estimate that 2.0% of accounts used for betting had at least one day when the customer loss exceeded £500 and that **0.9% of accounts used for betting had at least one day when the customer loss exceeded £1,000**. These proportions represented nearly 180,000 customers across the seven operators in the case of the £500 threshold and more than 81,000 in the case of the £1,000 threshold. For many, such a loss was a one-off within the year. But we estimate that more than 75,000 accounts registered a loss above £500 at least three times and nearly 27,000 a loss above £1,000 at least three times. Using either threshold, the proportion of males among those with such repeat experience of high-loss days was about 92%, which is significantly higher than for the generality of bettors, and average age (about 40) was also higher than for the generality of bettors. On their heavy-loss days, only slightly more had losses linked to sports betting rather than race betting. Given the relative market shares of sports and race betting, this indicates that **there was a greater propensity to incur high one-day losses when betting on races**. Mean IMD was only marginally higher than the 5.38 mean for all bettors, indicating that high loss days were not strongly correlated with area deprivation.

[64] See Technical Report 3: Follow-on survey stage, chapter 2.3.1.

2.1.6 Riskiness of bets

Risk can be viewed in more than one dimension. It could refer to the amount of money put at risk. Alternatively, risk could refer to how likely it is that the money will be lost. In the context of betting, Kainulenen (2019)[65] proposed a new metric which would combine these two concepts in a single summary measure. He termed this indicator *maxbetreturn*, which is the maximum amount which could be paid out to the bettor once the outcome of the bet becomes known. Stipulation of the 'maximum amount' rather than just the 'amount' acknowledges that there are complex bets where 'partial wins' are possible (e.g. an each-way bet pays the maximum amount if the horse wins and a lesser amount if the horse is placed).

The metric is necessarily somewhat *ad hoc* but is nevertheless intuitively appealing, if a single indicator is required to summarise risk-taking, because the measure increases if either a greater stake is placed or if the odds chosen are longer. Operators in the present study were requested to supply *maxbetreturn* for every bet placed by every customer in the study year, to allow us to analyse patterns of risk-taking among online bettors. Since the stake size of the bet was also to be recorded, this would also allow us to calculate the *pseudo-odds* of the bet. The pseudo-odds of the bet will be the same as the actual odds in the case of simple win-lose bets. Some types of bet are complicated and there are two or more levels of potential pay-back to the customer such that no single figure can summarise odds, but using pseudo-odds still allowed revelation of distinct differences between bettors.

Some operators' records were not adequate for them to supply the *maxbetreturn* data that had been requested. Consequently, *in this section only*, our analysis is based on data from only three operators. We estimate that, collectively, these operators had more than 3.2m customers who had used their accounts for betting during the study year.

Table 14 in the Data File presents detailed summary data which illustrate risk-taking behaviour by age-band and IMD decile, separately for all betting, football betting and horse betting. Here we take an overview of the principal findings.

When it is measured (for all betting) by taking the median value for all bets placed by those in each particular group, the risk measure proposed by Kainulainen (2019) shows risk-taking to be highest for the age-groups covering 21-34.[66] However, differences between age-groups were relatively modest because there were offsetting trends in the two components behind the risk measure. On the one hand, median stake size tended to increase with age (for example £5 for 21-24-year-olds, £7.59 for 75+). On the other hand, 'median median pseudo-odds'[67] tended to be shorter for older age-groups (for example, 11.00 for 21-24-year-olds, 7.50 for 75+). Thus, **the typical older bettor placed more money at risk on an individual bet compared with the younger bettor (and also placed many more bets) but at the same time wagered more conservatively by choosing shorter odds**. Across IMD areas, a broadly similar pattern was observed. Residents of more deprived areas tended to score higher on the

[65] Kainulainen, T. (2019). A new measure of risk-taking in gambling, *International Gambling Studies, 19(1)*, 167-182: https://doi.org/10.1080/14459795.2018.1526312

[66] Mean values of *maxbetreturn* fluctuate erratically between groups. The very high values, in the hundreds of thousands of pounds, shown in Table 14, reflect the presence in the data set of some combination bets covering multiple events (say, ten or twenty) where a relatively small stake could produce a life-changing maximum return.

[67] For each individual account in a particular demographic, we took the median pseudo-odds across all bets placed from that account. Then we took the median across all the accounts of each of these individual-bettor values to get the 'median median', our representation of the typical choice of odds by members of each group.

maxbetreturn measure, despite having slightly lower median stake size, because they tended to wager at longer odds. **As with young bettors, the longer-odds choices made by typical bettors in more deprived areas contributed to their having worse rates-of-return from their betting outlay**.

These differences across age-groups and IMD deciles in part reflect differences in the distribution of their betting activity between the two principal products, football and horseracing, for which the data demonstrate different patterns in the riskiness of bets. In terms of choice of odds, the typical ('median median') value of pseudo-odds is uniformly lower in horse than in football betting, across all age- groups and throughout the deprivation range. Football matches have only three possible outcomes (home win, draw, away win) and the two competing teams in a fixture will usually be relatively closely matched (because clubs are organised into hierarchical divisions). Horse races typically have eight or so runners and therefore multiple possible outcomes. Therefore, simple bets on the result should, on average, be shorter in football than in horseracing. But our statistic on the odds attached to a typical bet in either sector show the reverse relationship: typical bets on football are at longer odds than typical bets on horseracing. This is indicative of a much greater presence of combination bets in football. Combination bets require the bettor to predict more than one event, for example, the winner of each of several matches or the winner of a single match together with the half-time score and the identity of the first goal scorer.

Within horse race betting, there is no systematic variation in the median median value of pseudo-odds by either age or area deprivation. Its value is always in, or only just outside, the range 8 to 9, which implies that wagers are 'typically' placed at about 7-to-1 or 8-to-1.[68] Median stake size is, however, higher in older age-groups and less deprived areas. Thus, overall risk-taking on individual bets is typically greater for older groups and residents of less deprived areas: they bet at similar odds but put more money at risk. This relationship is pronounced across age groups, with the risk indicator *maxbetreturn* twice as high at the median in the oldest than in the youngest age-band. Across the deprivation range, median *maxbetreturn* increases with less deprivation but the gradient of the relationship is not as steep as that for age.

Football betting presents a different pattern. While median stake is close to £5 for all groups (except 75+, where it is £8), there is a strong variation in choice of odds between typical bettors in different age-groups and different deprivation deciles.

In age-groups covering 21-34, median median pseudo-odds is above 14 whereas it falls below 10 after age 55 and to 5 for the oldest age-group. This signals that the **younger age-groups tend to have a greater preference for long-odds combination bets**. This preference results in much higher values for *maxbetreturn* in younger than in older age-groups. For example, it is above £180 in each of the age-groups covering 21-34 but below £80 in each of the two oldest age-groups. Across the age range, typical bettors generally place similar sized bets but younger bettors typically seek bigger pay-offs to their bets.

The picture is similar across the deprivation range. Again, *typical* stake size differs little across the range (even if mean stake size is increasing sharply because there are more 'big stakes' bettors in less deprived areas). But typical odds, while similar to each

[68] Odds in Britain were traditionally represented by such as '7-to-1', which implies that a customer who wins will have his stake returned plus winnings of £7 per £1 bet. Online betting has made the decimal odds format more common. These odds refer to the payment due to a winning customer including the return of stake. So 7-to-1 would translate to decimal odds of 8.00. Calculations for pseudo-odds and *maxbetreturn* follow the decimal odds convention of including return of stake.

other throughout the middle of the deprivation range, are much longer in the very most deprived areas compared with the very least deprived areas: the median median pseudo-odds figure is 17 in the most deprived decile and only 9.5 in the very least deprived decile. **This leads to the highest value for the risk indicator *maxbetreturn* being that for the most deprived decile. The high risk is related to bettors choosing wagers where success is very unlikely**.

For operators, expected gain is higher for long-odds combination bets and Newall et al. (2019)[69] express concern that marketing appears often to direct potential bettors towards such bets. Whether marketing around combination bets is more effective in the most deprived areas has not been assessed but it is not necessarily so: even unstimulated, demand in more deprived areas may be stronger for bets from which a successful outcome would make a material difference to lifestyle, at least in the short-run. Any link to gambling harm is difficult to make. In an early example of the use of account data, Xuan and Shaffer (2009) reported short-odds choices as characteristic of online bettors experiencing problems.[70] Harm may be associated more with spending a lot to try to win a little rather than with spending a little to try to win a lot.

2.2 Gaming

All tables referenced in this section can be found in the Data File.

2.2.1 Overview

A range of gaming activities were available from the seven online operators participating in the study. We defined the following product categories: live and virtual casino games; slots; bingo; poker and tournament poker; and instant wins.[71]

Based on the sample, we estimate that the GGY (from bingo, casino games and poker, and slots) of the seven operators over the data period was £1.24b. From regulatory returns, as documented in relevant issues of the Gambling Commission's *Industry Statistics*, the total GGY from these activities for the whole remote sector in Great Britain was £3.29bn (over the exact same period). Compared with betting, we therefore estimate that a much lower share of total GGY (37.5%) was captured by the seven operators cooperating in the research.

Within online gaming as we define it (but excluding the very small instant win product for which only three operators reported):

- the shares of GGY in our estimates were 60.1% for slots, 35.8% for casino games and poker, and 3.6% for bingo
- in the data from the Gambling Commission, the shares were 64.9% for slots, 29.7% for casino games and poker[72], and 5.4% for bingo.

[69] Newall, P. W. S., Walasek, L. & Ludvig, E. A. (2019). Gambling advertising and problem gambling: A content analysis of TV adverts from the 2018 World Cup, preprint: https://doi.org/10.31234/osf.io/5dw9g

[70] Xuan, Z. & Shaffer, H. (2009). How do gamblers end gambling: Longitudinal analysis of internet gambling behaviors prior to account closure due to gambling related problems, *Journal of Gambling Studies, 25(2)*, 239-252: http://dx.doi.org/10.1007/s10899-009-9118-z

[71] Instant win games are somewhat akin to online scratchcards. The data request document may have been insufficiently precise in defining 'instant wins' and not all operators reported data under this heading. Some caution should therefore be exercised when considering results regarding this product grouping.

[72] Gambling Commission data treat 'casino games and poker' as a single product group.

The under-representation of bingo in our operators' revenue may be associated with the success of specialist bingo sites. That our data appear to have a larger share for casino games than whole-industry data could have several explanations including that five of our operators are betting-focused and so significant gaming revenue may derive from cross-selling to bettors (whose choices may differ from those whose first preference is for gaming).

Despite these discrepancies, the dominance of slots over casino gaming in our data set is similar in magnitude to that observed in aggregate Great Britain data– this makes us more confident that patterns of gaming among customers of the seven operators will adequately represent patterns of gaming in the online sector as a whole.

The data set provided 84,572 accounts which had been used at least once for taking part in a gaming activity for money during the study year (free play was not recorded). Based on this sample, and applying appropriate weights, we estimate that 39% of all active online accounts with these operators were used for gaming. This represents just over 4m. customers, 52.8% of whom participated in only one of the five categories of game (in Section 2.2.2 we provide more information on combinations of games in which different groups of account-holders took part). By far the most commonly played was slots, reflected in its dominance in data on the online sector in Great Britain as a whole. According to regulatory returns for the four quarters covering our data period and documented by the Gambling Commission in successive editions of *Industry Statistics*, online slots across all licensed operators generated GGY of £2.1b and all the other gaming activities together only £1.2b. For comparison, betting GGY over the same period was £1.8b. Despite lower participation than in betting, slots may therefore fairly be represented as the most important driver of revenue in the online gambling industry in Great Britain.

Based on accounts where the holder's gender was known[73], 69.7% of gaming-active accounts belonged to men, making this sector somewhat less male-dominated than betting. Customers' ages ranged between 17 and 100.[74] In all activities, the customer base was more concentrated in relatively deprived areas than was the case for betting. In Sections 2.2.3 and 2.2.4, we explore differences in gaming behaviour by gender, age and the deprivation status of the area where a customer resided, focusing on metrics such as choice of gaming activity, frequency of play[75], spending levels and time spent gaming.

As was perhaps to be expected given that most products in online gaming are games of pure chance, with no scope for players to exercise skill to beat the house, a lower proportion of gaming customers than of betting customers ended up winners over the year. 16.0% finished in profit but only 3.5% won more than £200.[76] Among those who lost money, the loss was modest in the large majority of cases. But, as typically found in gambling data sets, a relatively small number of customers lost much more than the average. For example, 3.2% of accounts recorded a net loss on gaming activities in excess of £2,000 in the year, and the highest one-year loss recorded in the data was £1.14m. In Section 2.2.5, we present a picture of the distribution of expenditure levels across customers and provide detailed evidence of the degree to which the online

[73] After weighting, 9.3% of accounts could not be assigned gender.
[74] Age is defined as of July 1, 2018, the first day of the data period. Players who were 17 would not have been permitted to open their account until the point in the data period when they attained majority. The presence of '17-year-olds' in the data set should not be taken as indicating under-age play.
[75] The mean number of days on which a customer played was 15.6 but the number ranged up to 365.
[76] The largest one-year profit for a customer in the sample was £346,078.

gaming industry depends on a small number of highly engaged customers. In Section 2.2.6, we focus on the customers who lost the most money over the year, investigating their characteristics in terms of gender, age, deprivation status of their account address, and the product that was the main source of their loss. The remaining parts of the Gaming section address issues such as the incidence of very long gaming sessions, the speed of play in slots and whether late night play differs in any systematic way from gaming activity in the rest of the day.

2.2.2 Principal gaming activities

Among customers with gaming-active accounts, **slots and virtual casino games attracted the greatest interest**:

- 72.2% of accounts were used at least once to play slots and this product group accounted for 60.1% of operator GGY from gaming
- 53.0% of accounts were used at least once to play virtual casino games and 19.5% at least once to play live casino games; respectively these generated 24.2% and 8.8% of operator GGY from gaming
- bingo was a significant product in terms of participation (played from 15.4% of gaming-active accounts) but its relative contribution to gaming GGY was modest (3.6%)
- both poker and tournament poker were niche products, respectively attracting 4.3% and 4.1% of gaming customers and together making only a marginal contribution (2.8%) to the gaming GGY of these operators
- instant wins were purchased at least once from 10.5% of gaming-active accounts but their GGY share was only 0.5% given much lower spending-per-customer than for other products

Table 15 in the data file shows the proportions of accounts where various combinations of activities were played. Here virtual and live casino games are now treated as one product and similarly for poker and tournament poker. The maximum number of activities that could have been played was therefore five:

- 52.8% of account holders confined themselves to just one activity, most commonly slots (27.0%) or casino games (21.2%)
- nearly one-quarter (23.7%) played both
- relatively few bingo players played only bingo; bingo was played by 15.4% of accounts used for gaming but just 1.8% played *only* bingo; the high proportion who purchased other gaming products as well suggests the possibility that bingo is more important for the seven businesses than its own contribution to GGY might imply[77]
- **2.5% of account holders engaged in either four or all five gaming activities**; this represents a little over 100,000 customers

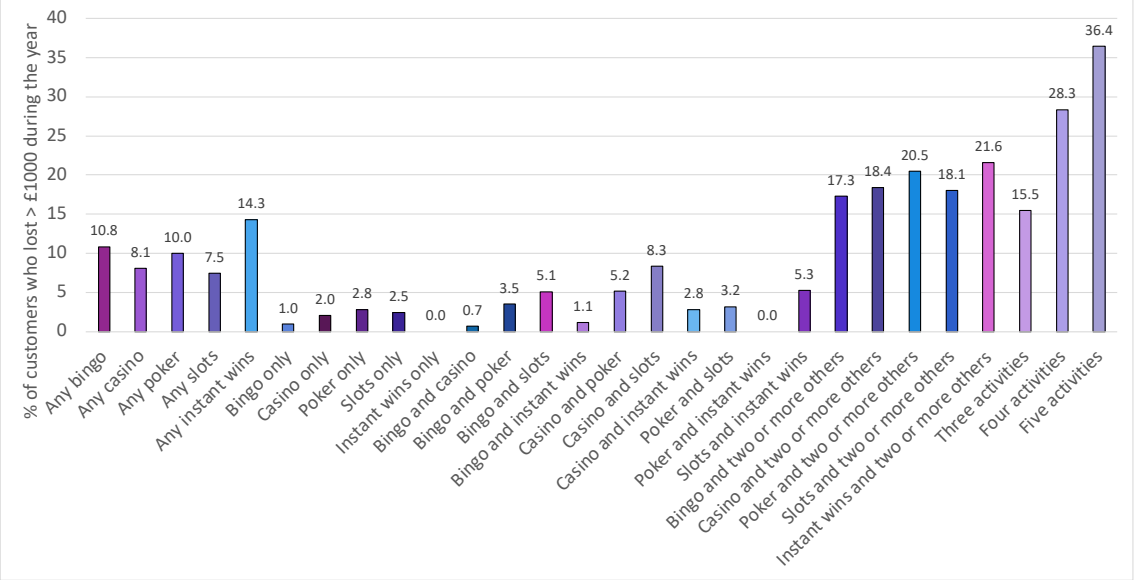
Taking part in a large number of distinct online gambling activities is believed to be an independent marker for elevated risk of problematic play (LaPlante et al., 2014) and a strong correlation between breadth of engagement in gambling and an individual's problem gambling status was reported in the gambling supplement of the Report on the *Health Survey for England, 2018* (Table 17). The mechanisms driving this relationship

[77] Suppliers to the online gaming market in Great Britain include a specialist operator which offers only bingo and low-stakes slots games. Its approach to marketing is to promote itself as a 'soft gambling' website and it has achieved significant market share. It is plausible that the proportion of online bingo players who play only bingo would be estimated as much higher had this operator been included in the data set.

have not yet been identified definitively, but Carbonneau et al. (2015)[78] argued that trying different games suggests a novelty-seeking personality, which is a problem gambling risk factor in itself. Welte et al. (2016)[79] proposed that exposure to different games raises the risk that a player will find one so attractive that it becomes a vehicle for problem gambling. Whatever the mechanism, the more than 100,000 customers of these gambling operators who play all or almost all of the full range of gaming activities merit particular attention when play is tracked to monitor for risk of gambling harm.

While we are not able to demonstrate a correlation between the number of activities played and problem gambling status, it is clear from Table 15 in the Data File, and illustrated further by Figure 9 here, that **total gaming spend increases with breadth of involvement**. For example, for those who took part in just one activity, the proportion of those who had a one-year loss from gaming of more than £1,000 was in the range 0.95% to 2.76%, depending on which activity it was. Among those who played three different products, the proportion was 15.5%, increasing to 28.3% for four products and 36.4% for five products. In the group which recorded four activities, one-quarter of players lost in excess of £1,178 and in the five-activities group, one-quarter lost more than £1,870. These two groups of 'omnivore' players, which evidently include a high proportion of heavy spenders, present a profile even more skewed towards deprived areas than the generality of gaming customers. **About 40% of them have addresses in the 20% most deprived areas.**

Figure 9. Percentage of customers who lost more than £1,000 over the year in groups defined by which combinations of games they played



[78] Carbonneau R., Vitaro F., Brendgen M. & Tremblay, R.E. (2015). Variety of gambling activities from adolescence to age 30 and association with gambling problems: a 15-year longitudinal study of a general population sample, *Addiction, 110(12)*, 1985-93: https://doi.org/10.1111/add.13083

[79] Welte, J.W., Tidwell, MC.O., Barnes, G.M. *et al.* (2016). The relationship between the number of types of legal gambling and the rates of gambling behaviors and problems across U.S. States, *Journal of Gambling Studies, 32(2)*, 379–390: https://doi.org/10.1007/s10899-015-9551-0

2.2.3 Demographics

Gender

In the section on online betting, we reported our estimate that, based on cases in the sample where gender was known, 78.4% of customers were men. **For some online gaming activities, the dominance of male accounts in the playing population was of a similar or even greater order of magnitude: 88.5% in poker, 87.2% in tournament poker, 82.8% in live casino games and 75.0% at the virtual casino. In slots, the biggest online product, the gender balance was somewhat more even but, still, nearly two-thirds (66.0%) of participants were men. However, in bingo, men were in a minority, making up only 38.0% of customers.**

To compare the gender splits with those in the offline world, we used raw data from the *Health Survey for England, 2018* to calculate the proportions of men among participants in those in-venue activities where a close match to the online product was available in the data:

- according to *Health Survey* data, 89.5% of those who played 'poker in pubs or clubs' were men; according to our online data, 88.5% of poker players were men
- according to *Health Survey* data, 64.2% of 'slot machines' players were men; according to our online data, 66.0% of slots players were men
- according to *Health Survey* data, 80.9% of those who played table games in offline settings were men; according to our online data, 82.8% of live casino customers were men
- according to *Health Survey* data, 31.7% of offline bingo players were men; according to our online data, 33.3% of online bingo players were men

Essentially, then, **the gender balance was very similar for each activity where the data sources permitted a comparison between online and offline versions of the same product.** There has been long-expressed concern that, because the internet may be seen as less of a male domain than in-venue gambling, online may disproportionately attract women, for whom it offers accessibility from home, anonymity, privacy and a less intimidating milieu. On this basis, for example, Corney and Davis (2010)[80] expected online participation to become more gender-balanced over time; but our data suggest that the gender composition of offline audiences for gaming activities was replicated in the online space in 2018-2019 and that, in this dimension at least, the drift to using websites may just have been channel shift similar to that observed in markets for other consumer services.

Differences in behaviour when participating in gambling are more readily observed in the online environment. Table 16 in the Data File shows, for all players and then separately for male and female players, key summary behaviour metrics by age group. It includes summary data for 'all gaming' and also for each of the individual products. Comparison of the tables relating to men and women permits several generalisations to be made.

Based on accounts where gender was known, we estimate that 69.7% of all gaming-active accounts at these operators were held by men and these contributed 74.0% of operator GGY. The figures imply that men were slightly 'better' customers for the industry. However, the data for 'all gaming' show that **female customers tended in fact to be more active and more heavily engaged players than male customers**:

[80] Corney, R. & Davis, R. (2010). The attractions and risks of internet gambling for women: A qualitative study, Journal of Gambling Issues, 24: https://doi.org/10.4309/jgi.2010.24.8

- for example, the mean number of sessions over the year was 33.9 for women and 27.1 for men; women, on average, played more sessions than men in all age-groups except for the small under-21 and 75+ groups
- we calculated the mean session length for each player and then took the average across all players; average session length was greater for women (29.0 minutes) than for men (21.5 minutes) and this was true in each one of the eight age-groups
- the finding that women tended to be more active players than men broadly held also at the level of the individual gaming product, indicating that the general finding was only partly driven by product choice:
- in bingo, the mean session length was similar for men and women but, on average, women played far more sessions over the year (24.5 versus 14.1)
- in slots, women on average played more sessions than men (30.1 versus 25.0) and their mean length of session was noticeably higher than that for men (33.1 minutes versus 25.6 minutes)
- for casino games, the story is more complicated: the mean number of sessions was higher for men, markedly so in the top half of the age-range, but women played for a longer time per session, again with the most pronounced differences among older customers; combining the two, estimated average time spent on casino games over the year was about one-quarter higher for women than for men

Taking medians rather than means did not change the general picture: women who engaged in online gaming tended to be more active than men**. Across gaming activity in the aggregate, the median number of individual gambles over the year was 320 for women and 147 for men.**

But how much individuals spent during the year depends not only on how active they were but also their choice of stake size per gamble. **Taking the aggregate of all gaming activities, median stake size was much higher for men than for women, £1.14 compared with £0.68. Nevertheless, the greater activity level of typical female customers offset this such that, over the year, the *typical* female customer still spent nearly half as much again as the *typical* male customer**. However, if mean values are considered instead of medians, the relativity changes. Mean one-year spend was £360.21 among men, £291.33 among women. So, even though female customers tended to be more active, they were as a group less profitable for the operators on a per-customer basis. The reasons for the seeming paradox are that there was **a higher proportion of very high spenders amongst the men**, and, even at typical levels of play, men tended to choose a much higher stake level.

This general picture for gaming as a whole does not hold for every individual product. In bingo, mean as well as median spending was higher for women than men. In casino games, the average number of gambles by a female player was only marginally higher than for men but men's much higher staking levels made them very much 'better' customers from the operator perspective[81]: per-customer spend among casino games players was £211.00 for men and only £82.24 for women.

Age

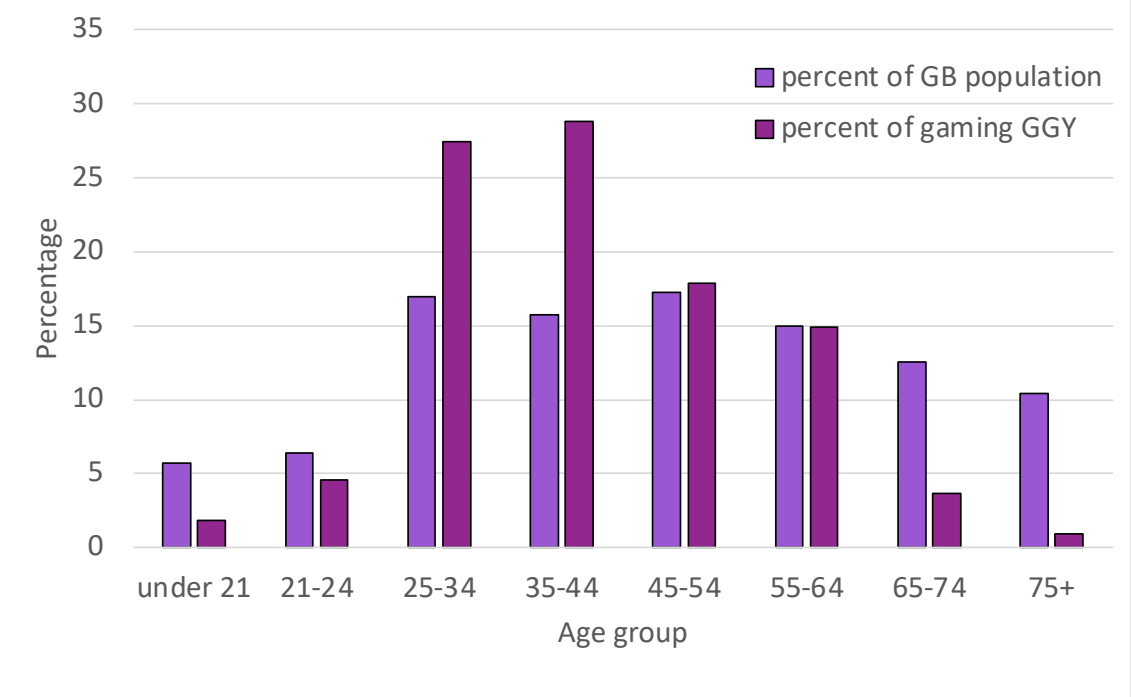
Table 17 In the Data File compares the proportion that that group represented in the British adult population in mid-2018 with its proportionate importance in online gaming

[81] This was true even though women collectively lost 3.6% of their stakes to the operator, compared with only 2.9% for men. This might be because, on average, women played a different mix of casino games from men.

activity at the operators included in the data set. Figure 10 compares population shares with shares of gaming GGY

- as with betting, **the age-bands covering ages 25-44 represented a key demographic for the online gaming sector**: while comprising only 32.7% of the adult population, members of these groups held 58.4% of accounts used for gaming and generated 56.2% of operator GGY
- **under-25s (especially those aged 21-24) also held a disproportionately high share of online gaming-active accounts but they spent relatively little**: these groups comprised 13.2% of the adult population, held 18.9% of gaming-active accounts, but contributed only 6.4% of operator GGY
- **members of older age-groups were very much less likely to have an active online gaming account but those who did tended to be relatively heavy spenders**
- **mean spending-per-account on online gaming increased almost monotonically across our eight age-bands**, from £81.65 for the youngest group to £658.00 for 55-64-year-olds and still £581.73 for the two 'senior citizen' groups combined
- **for every age-group, spending-per-account was substantially higher than the corresponding figure for betting**; for example, spending-per-customer in the 55-64 group was £658.00, compared with £290.42 as the average spend-per-betting-customer in the same age-group

Figure 10. Shares of the adult population and of gaming GGY for each age-band



The pattern of participation in online gaming may also be illustrated by our estimates of the number of gaming-active accounts held at these seven operators per 1,000 population. The age-groups covering 21-34 were far more likely than others to have an active online gaming account. Among those aged 21-24, there were 145 such accounts per 1,000 population and the figure (166) was higher again for those aged 25-34. Thereafter this indicator fell steadily and there were only 8 accounts per 1,000 people

in the population aged 65 or over.[82] **This pattern in participation by age is similar to what is observed in the offline world.** The *Health Survey for England, 2018*, for each of slot machines, casino table games and bingo, reported the participation-rate as rising with age to peak at 25-34 and falling thereafter, reaching minimal levels in the oldest age-groups. Just as with gender, the relative popularity of gaming between age-groups differs little whether one considers offline or online play.

Turning to the behaviour of those who participated in online gaming (and referring now to Table 16 in the Data File), the almost monotonic increase in spending-per-customer across the age range (from below £100 in the youngest age-groups to nearly £700 in the oldest) occurs in spite of a tendency towards lower average stake size per gamble in older customers. The positive relationship between spending and age is associated with **steady and substantial increases in activity levels as one moves up the age range**:

- the mean number of days on which gaming took place increases from about 7 in the youngest age-group to more than 30 in the two senior citizen age-bands
- the mean number of gaming sessions over the year increases from about 11 in the youngest group to about 63 in the senior citizen age range
- 'mean mean' session length[83] increases from below 18 minutes in the youngest group to more than 29 minutes in the oldest
- because of greater frequency and duration of sessions, **the mean number of individual gambles over the year increases from below 1,000 in the youngest age-group to more than 10,000 in the 65-74 group**

Although median values for spending and indicators of activity levels are always well below the corresponding means, the general finding that spending and volume of gaming increase with age remains when one considers 'typical' behaviour rather than 'average' behaviour. It is clear that, **while the 25-44 age-group collectively delivers more than half of the operators' win, their individually most lucrative accounts more often belong to customers who are significantly older**.

The patterns observed when one looks at online gaming in the aggregate remain broadly similar at the level of the individual product. Though older players are represented markedly more heavily in the set of bingo players than in accounts used for slots, casino games, poker and instant wins, even here the largest number of customers, as in the other activities, come from the 25-44 age-groups. But, for all five products, the elevated activity levels of older customers lead to their making a disproportionate contribution to GGY:

- in slots, those aged 55+ comprised 9.6% of players but delivered 19.3% of operator GGY
- in casino games, those aged 55+ comprised 8.1% of players but delivered 18.6% of operator GGY
- in bingo, those aged 55+ comprised 17.2% of players of but delivered 36.0% of operator GGY
- in poker, those aged 55+ comprised 9.9% of players but delivered 16.3% of operator GGY

[82] If comparing these figures with corresponding data for betting accounts, it should be borne in mind that the market share of operators participating in the study was much lower in the gaming sector.
[83] To obtain 'mean mean' session length, we calculated the average session length for each individual player and then took the average of those numbers across players.

- in instant wins, those aged 55+ comprised 6.2% of players but delivered 21.0% of operator GGY

Deprived and less deprived areas

For online betting, the data revealed only modest variation across the deprivation range in terms of participation and contribution to GGY. In gaming the picture is different. Both participation and (to a lesser extent) spending are disproportionately concentrated in the most deprived areas.

Detailed summary statistics, for gaming in the aggregate and for each gaming product separately, are presented in the Data File (Table 18).

Before making more detailed comments, we offer a comparison between the 20% of most deprived areas and the 20% of least deprived areas:

- the 20% **most** deprived areas provided 29.2% of players and 25.2% of operator GGY (£296.5m) from gaming
- the 20% **least** deprived areas provided 12.9% of players and 15.0% of operator GGY (£183.2m) from gaming

The trend for participation to fall across the range from most to least deprived areas was continuous across the ten groupings of IMD. On the other hand, mean one-year spending per customer increased almost monotonically across the range, from £244.25 in the most deprived decile to £384.79 in the least deprived decile, mitigating to an extent the disproportionate dependence of total operator revenue on more deprived areas. However, although mean spending was lower in more deprived areas, this was the result of a lower number of 'heavy spenders'. In terms of 'typical' behaviour, a customer's spending was in fact higher, the *more* deprived the area. In IMD10 (very low deprivation), median spend was £19.81 but in IMD1 (very high deprivation), median spend was £31.98.

The higher **mean** spending levels in **less** deprived areas derived entirely from higher staking levels. Mean stake-per-gamble increased almost monotonically across the range from IMD1 to IMD10, from £1.01 in IMD1, the most deprived decile, to £3.38 in IMD10, the least deprived decile. But, although players from **more** deprived areas tended towards lower stakes, their activity levels were markedly higher on all metrics. They played on more days in the year and over more and longer sessions; the number of individual gambles per customer was more than 5,000 in each of the two most deprived deciles but only 3,806 in IMD9 and 3,266 in IMD10. There was a similar pattern of activity across the deprivation range in terms of median values.

Amongst individual products, the concentration of players in the most deprived areas was strongest in bingo (and instant wins). In bingo, 23.3% of customers had addresses in the 10% most deprived areas and 39.0% in the 20% most deprived areas. There appeared to be no systematic differences in levels of spending on bingo between residents of different deprivation deciles, so operator GGY was roughly proportional to participation. Thus, for example, we estimate that GGY of £9.6m was drawn from the 10% most deprived areas, compared with £1.1m from the 10% least deprived areas. Broadly, this pattern of demand mirrors that in the offline world. Evans & Cross (2021)[84] mapped the locations of bingo halls across Great Britain and reported that 49% were

[84] Evans, J. & Cross, R. (2021). *The Geography of Gambling Premises in Britain*, Personal Finance Research Centre, University of Bristol: https://www.abrdn.com/docs?editionId=c8d6f9b5-1c8b-4b97-9bb4-c3099938f737 (accessed 14.11.21)

located within the 20% most deprived areas; and, according to the *Health Survey for England, 2018*, participation in offline bingo was twice as high in the most deprived quintile as in the least deprived quintile. In fact, participation is even more skewed in online than in offline bingo even though physical accessibility is not an issue in this case. Differential participation in the bingo game across the deprivation range therefore appears to reflect underlying preferences rather than simply ready access to premises.

In online slots, participation was again skewed towards more deprived areas (especially among female players) even if to a lesser degree than in bingo. 31.0% of slots customers had addresses in the 20% most deprived areas (and only 11.6% in the least deprived quintile). But, in contrast to bingo, different patterns of play could be readily observed across the deprivation range. Measured at the median, the number of gambles tended to be higher in more deprived areas but average stake size was lower. Together, these differences resulted in modest and non-systematic variation in spending level by area type if one considers the typical player. However, mean spending shows stronger variation and, per-player, is highest in IMD8 (i.e. in areas that are advantaged but not quite the most advantaged). In IMD8, average spend per player was £374 (compared with £197 in the most deprived category). The combinations of participation-rates and levels of spending yielded the outcome that the most deprived quintile contributed disproportionately heavily (25.5%) to slots GGY and the least deprived quintile disproportionately lightly (14.3%). In-between areas delivered similar amounts as each other to operator GGY, roughly in line with their population shares.

For online casino games, the data showed a somewhat similar pattern. Participation was highest in the most deprived quintile and lowest in the least deprived quintile. On the other hand, spending per head was lower in the most deprived areas than anywhere else. The most lucrative customers for operators in terms of spend per head were those in upper-middle areas (IMD7, IMD8). The combined effect of differences in participation, activity level and stake size, was that operator GGY from casino games was fairly evenly spread across the deprivation range.

In the more niche activity of online poker, there was yet again a concentration of players in more deprived areas. However, there was no readily discernible pattern in activity and spending levels across the deprivation range.

Regular players

In each gaming activity, data are heavily influenced by the presence of many occasional players. In Table 19 in the Data File, for each gaming product, we present key metrics by age-group and gender for 'regular players'. 'Regular' is defined here as describing any customer who engaged in at least 50 sessions in the year where the particular gaming product was played.

Bingo
According to our estimates, there were 46,685 regular players with these operators and collectively they spent £27m, accounting for 61.1% of operator GGY from online bingo. They had a much older profile than the generality of bingo players: 61.6% were aged 45 or over. Just over three-quarters were women. Mean activity and spending levels were highest for the older regular players. In the 'senior citizen' age range, the average number of days on which bingo was played during the year was about 130 and one-year spending approximately £700.

Slots
According to our estimates, 324,354 regular players spent £514.2m with these operators during the study year, which was 69.0% of GGY from online slots. The predominant demographic was male (63.5%) and 59.6% of regulars were in the age range 25-44. However, it was the older regular customers who were most active in

terms of frequency and duration of play and it was they who spent the most. Average one-year spending among regular players aged 45 or above was £2,261. Typical spending levels (medians) were much lower, the highest value being for the 55-64 age group (£780).

Casino games
99,882 regular players are estimated to have spent £250.1m with these operators over the study year, which accounted for 68.8% of GGY from all casino games customers. 89.4% were male and the demographic was younger than for regular slots players, with 48.7% under 35 years. Females amongst the regular players were particularly likely to have had addresses in more deprived areas. The younger regular players typically played less frequently and in shorter sessions than older regulars but with much higher stake size. Median one-year spend was lowest (£289) in the under-21 group of regulars and highest (£625) for 65-74. But in all age-groups the behaviour of players losing far more than the median pushed mean one-year spend among regular players to high levels. For men, this average spend was £2,816.15 and for women it was £1,274.85.

Poker
We estimate that 33,981 regular players spent £20.0m with these operators during the study year, which was 58.0% of GGY from poker. 89.4% were men and just over one-half were in the age-range 25-44. The distribution of regular players by area deprivation was only a little skewed towards deprived areas for men but more so for women. Generally, activity levels were higher for older regular players but stake size was typically highest in the 25-44 age-range. Regular players spent, on average, £589.74 over the year but typical spend (the median regular player) was never above £183 in any of the eight age-groups. Regular poker play was therefore much less associated with high spending than either casino games or slots.

Instant Wins
The number of regular players in the sample was too small to make confident generalisations about differences in the behaviour of different demographics but strong over-representation of more deprived areas was very evident in the data. Amongst regular customers for instant wins, per capita spending was slightly more than £500 over the year but the median much lower.

2.2.4 Concentration of spending[85]

For online betting, we reported a *Pareto ratio*[86] of 89.0, which indicated that the 20% of customers with the highest betting volume generated 89% of operator GGY from betting. This represented a substantially higher dependence on a "vital few" customers than has been found in most sectors of the economy. When we calculated the Pareto ratio for online gaming, it proved to be very similar to that for online betting: 90.2. **The 'top-20% of players' accounted for just over 90% of operator win**.

Because 'gaming' covers heterogeneous products, between which figures for volume (total stakes) may signify different depths of engagement, we also calculated Pareto ratios product-by-product. It was lowest for bingo (82.8) and here the threshold for inclusion in the 'top-20%' by volume was very modest (one-year stakes of at least £67). While this might indicate a lower degree of dependence on 'heavy' players, it should nevertheless be noted that the one-half of one percent of customers who staked more

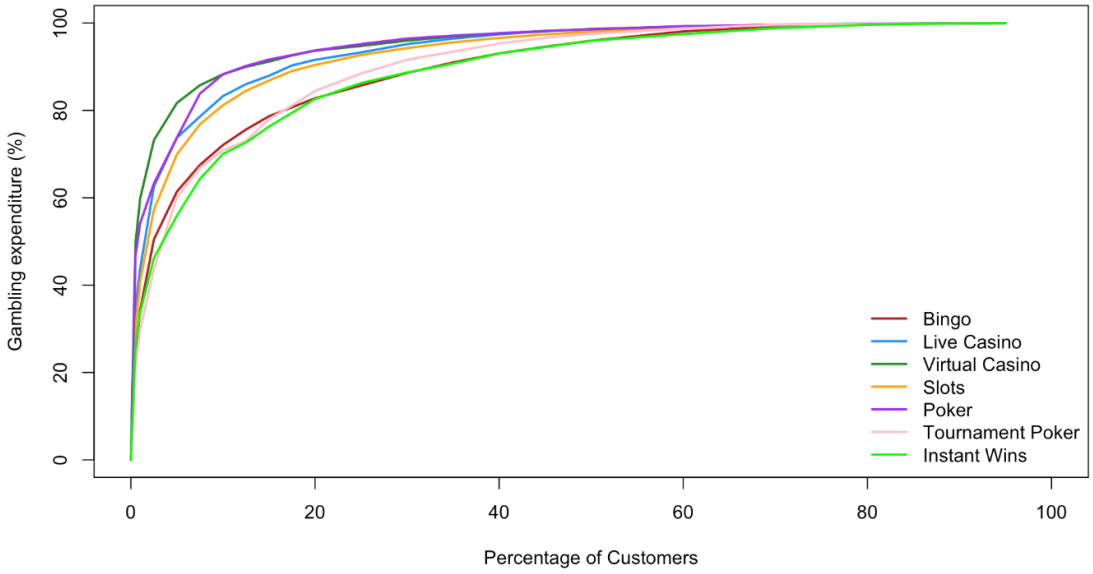
[85] Commentary in this section is supported by product-by-product data displayed in the Data File (Table 20).
[86] Here and below we define the Pareto ratio in terms of contribution to GGY rather than turnover.

than £6,737 over the year delivered more than one-quarter (26.5%) of bingo GGY. Therefore, even for bingo, there is validity in the notion that current levels of profits in the online space depend critically on a "vital few" players.

For the most played product in online gaming, slots, the Pareto ratio was higher, 90.4, but again the importance of high volume players is more starkly illustrated by looking at the top half-per-cent or top one-percent of customers. According to our estimates, those who staked more than £155,433 over the year generated 29.7% of operator win while those staking more than £89,408 contributed 40.7%. On average, players in the top half-per-cent of customers by volume lost £14,464 each over the study year and those in the top one-percent cent on average lost £10,491, revealing that a very significant proportion of revenue derived from exceptionally high-spend players.

Figure 11 shows Lorenz curves for individual gaming products, constructed similarly as those for betting and defined and explained in Section 2.1.5 above. It may be noted that the steepest slope to the left of the chart pertains to virtual casino games, which is the second-highest-earning product for the seven operators. Though inevitably based on a relatively small number of cases in the sample, our best estimate is that **the top one-half-percent of customers generated about one-half (49.6%) of all operator GGY from virtual casino gaming**. The Pareto ratio, the share of revenue from the top-20% of customers, was 93.7. Here, just as for the other products shown, the contribution of the "trivial many" was indeed relatively trivial (the 'bottom 50%' of players provided only 1.4% of operator GGY).

Figure 11: Lorenz curves for gaming products



Distribution of spending across accounts

Figure 12 illustrates the distribution of wins and losses over the study year and Table 21 in the Data File profiles the customers in each win-loss band.

As is usual with gambling data sets, **a large majority of bettors either finished ahead or else lost only modest amounts** (when compared with spending on other common leisure pursuits):

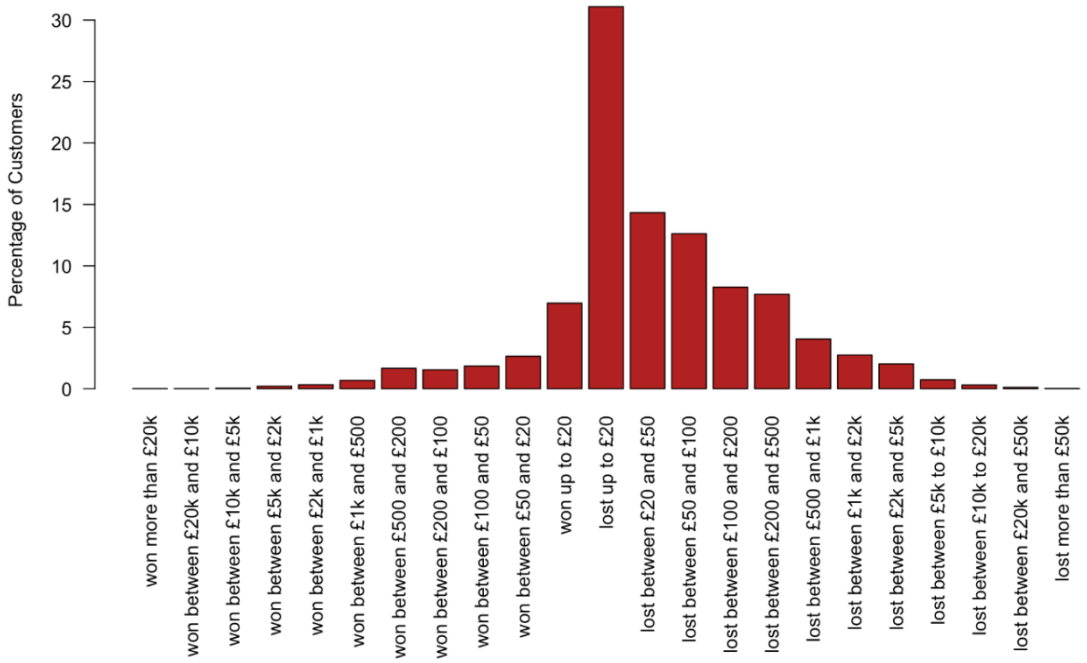
- 16.0% of accounts won money over the year
- 82.3% either won money or else lost less than £200
- 94.0% either won or else lost less than £1,000

On the other hand:

- 5.9% of accounts lost more than £1,000 over the year
- 3.2% lost more than £2,000
- 1.2% lost more than £5,000

Although high losses were incurred by only a small proportion of customers (though not as small a proportion as was observed for betting), the number of those who lost, for example, more than £2,000 in gaming at these operators over the year, was nevertheless nearly 129,000 according to our estimates. It should be noted that, in contrast to betting, where the seven operators were dominant in the online market, they captured less than half of the regulated market in online gaming. Further, according to the follow-on survey carried out within the Patterns of Play project, gaming customers are more likely than betting customers to have been gambling at more than one website (see Technical Report 3: Follow-on survey Data), such that many more players may have breached the £2,000 threshold had all their play been observed. **It may therefore not be unreasonable to speculate that the number of those losing more than £2,000 in the whole online gaming market in Great Britain might be twice as high as our estimate from the information available in our data set.**

Figure 12: Distribution of wins and losses from gaming over one year



2.2.5 Accounts with the largest losses

Key findings derived from Table 21 in the Data File include:

- players in the loss bands covering £1,000-£20,000 were only a little more likely to be male than the generality of those who took part in any gaming activity; however, **men were over-represented among customers whose one year loss exceeded £20,000**
- on average, the heaviest-loss players were somewhat older than the generality of players; for example, we estimate that the mean age of those spending more than

£2,000 was 40.6 whereas the mean age of all gaming customers was only 35.6; the very biggest losing players had an average age close to 45

- the proportion of players losing between £1,000 and £2,000 who lived in the 20% most deprived areas was 24.1%
- **30.4% of players who lost £2,000-£5,000 lived in the 20% most deprived areas and 22.9% of players who lost more than £5,000 lived in the 20% most deprived areas**
- we investigated the principal source of a heavy one year loss by defining a particular activity as the principal source if it accounted for more than 80% of the customer's spending
- 56.3% of those who lost more than £1,000, and **54.5% of those who lost more than £2,000, had slots as their principal (or sole) source of loss**
- 22.7% of those who lost more than £1,000, and **25.3% of those who lost more than £2,000, incurred all or more than 80% of their total loss while playing casino games**
- heavy losers were more likely than those with more typical spending to have their loss focused on just one activity

The last point may appear to contradict the finding that there is a strong positive correlation between total player loss and the number of activities in which he or she has taken part. However, the two findings together in fact yield an additional insight: **those who participate in several activities nevertheless tend very often to have one particular activity which accounts for the large majority of their losses from gaming.** On average, omnivores lose far more money than typical customers but it may not be the breadth of activity per se which causes high losses but rather that breadth of activity signals high commitment to gambling in general.

Heavy loss sessions

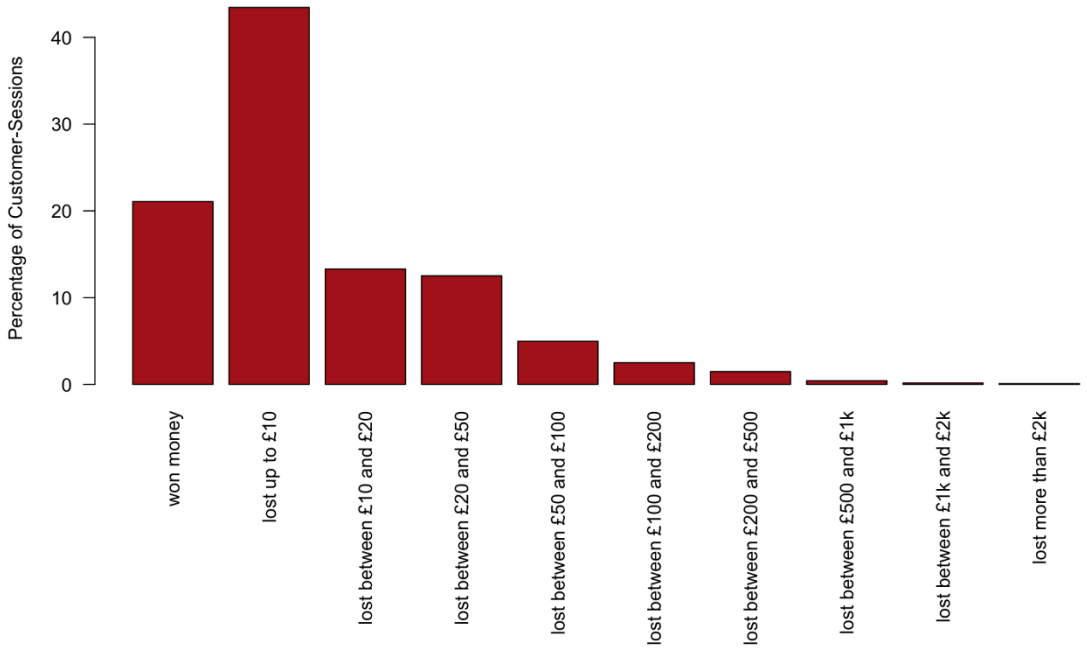
We have examined levels of annual expenditure on online gaming but it is relevant also to look at the outcomes of individual sessions of play. Just as with alcohol, a single episode may generate harm, independent of the pattern of use of which it is a part. In particular, for many or perhaps most people, a heavy loss, in the hundreds (or thousands) of pounds, incurred on a single occasion, seems likely to have the potential to generate serious financial stress, leading to harm in many domains.

Figure 13 shows the distribution of individual gaming sessions according to amounts won or lost. 64.4% of gaming sessions ended with the player showing either a win or else a loss of less than £10. 77.8% cost the player less than £20. Thus a substantial majority of gaming events represented activity which would not necessarily be considered expensive relative to other common leisure pursuits. On the other hand, 2.2% of all gaming sessions resulted in a loss of £200 or more. Though a small fraction of sessions, this still means that, over the year, there were more than 2.3 million instances of a loss of at least £200. We estimate that 396,910 customers (9.9% of all gaming customers) experienced such a loss at least once during the year.

Some sessions yielded a much higher loss. We estimate **that 4.1% of gaming customers (163,321 accounts) recorded a loss of £500 at least once and 1.9% (76,754 accounts) recorded a loss of £1,000 at least once**.

We explored the question of how often such very high losses were part of a pattern of repeat behaviour. Whether a high-loss session was defined with a threshold of £500 or £1,000, about one-half of those who ever incurred such a loss did so only once during the year, although a significant proportion had three or more instances of such a loss.

Figure 13: Distribution of individual gaming sessions by amount won or lost



We estimate that 1.5% of accounts (58,147) used for gaming at these operators incurred a loss of more than £500 on at least three occasions. The account holders concerned were more likely to be male than the generality of gaming customers (80.8% were men) and their average age was 39. Their area deprivation profile was a little 'more deprived' than the general British population but 'less deprived' on average than other gaming customers. Slots was the product most commonly associated with these repeat heavy loss sessions. In 52.4% of cases, either all or most (>80%) of the losses during these heavy loss sessions was incurred from slots play. Another 40.8% of players in this group incurred all or most of their losses during their heavy loss sessions from casino games (and 1.9% from poker). Bingo and instant wins were rarely the principal source and the remaining 'repeat heavy losers' had no dominant game type as measured by spending.

Few customers (0.6%) qualified as 'repeat big losers' with the threshold set at £1,000. Still, our estimates indicate that this represented 23,452 individuals. In this group, 84.5% were male and average age was 40. The mean value of IMD was 5.45, which indicates a deprivation profile similar to that of the British population (i.e. drawn fairly equally across less and more deprived areas), rather than that of the population of online gaming customers (which is skewed towards more deprived areas). In this group of 'repeat *very* big losers', there were more cases of the sole or dominant source of the losses being casino games (48.0%) rather than slots (45.2%). Since casino games have significantly lower participation across the whole customer base than slots, it follows that casino games players had much the greater propensity to take part in repeat heavy loss sessions if these are defined by a £1,000 threshold.

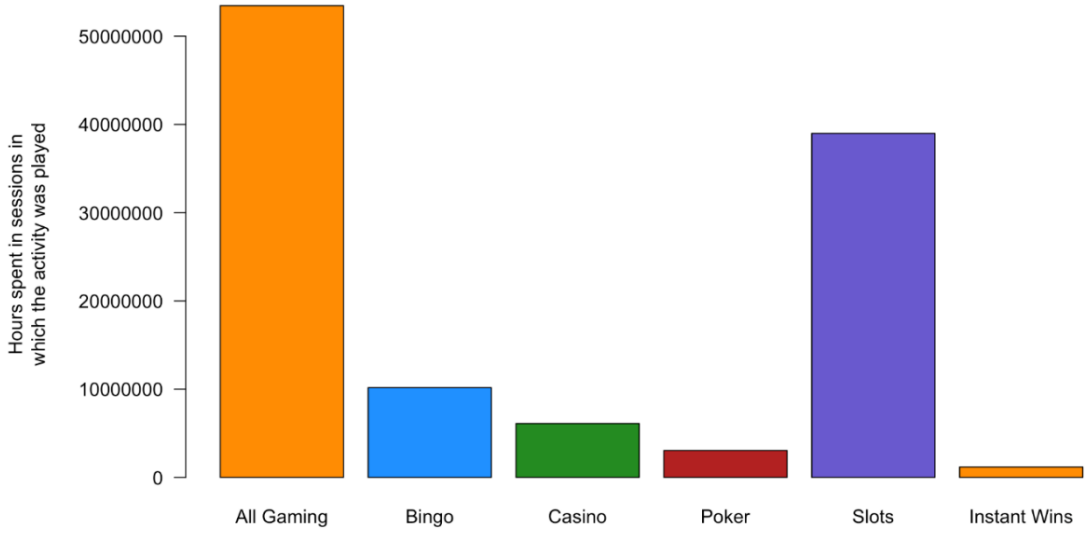
2.2.6 Time spent on gaming activities

In terms of amount of consumer expenditure, slots and casino games were comfortably the most important product groups in online gaming provided by operators in the study (and, according to *Industry Statistics*, by the licensed online sector as a whole). Next we consider time spent rather than money spent.

We divided the data recording customer activity into 'sessions'. Within each session, we could observe which activities were played and how much was staked and won or

lost on each. However, where more than one product was used, we could not observe how much time was devoted to each. In estimating total minutes spent on an activity, we allocated the whole time represented by a session to the particular activity (for example, bingo) if the session included that activity. There is therefore an element of double-counting in our estimates, presented in Figure 14. However, the relative estimates of total time spent are so different across the products that this degree of approximation would not be expected to distort the general picture.

Figure 14: Aggregate hours spent on online gaming activities over the study year

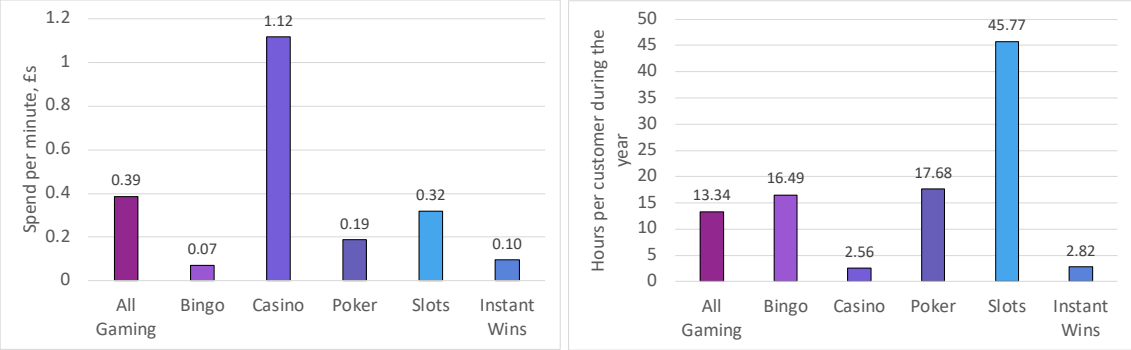


In terms of aggregate time spent, slots was the dominant online gaming product, just as it was in terms of GGY. **We estimate that customers of these operators spent 39m hours over the year in sessions during which slots games were played, which gives a rate of spending of 31.8 pence per minute.** In terms of aggregate playing time, bingo rather than casino games was the second-ranked activity. **We estimate that sessions where bingo was played involved aggregate time of 10.2m hours. It takes precedence over casino games ranked on the time criterion because it is played as a time-intensive rather than a money-intensive activity. From our estimates, bingo play in the aggregate yielded a spend of 7.2 pence per minute whereas the figure for casino play was £1.12**. Poker also stands out as a time-intensive rather than money-intensive activity, with a rate of spending of 18.9 pence per minute.[87]

Figure 15 also illustrates contrasts between activities in terms of money- and time-intensity but on a per-customer basis. The left panel shows mean spend per minute for each type of game and the right panel the mean number of hours played over the year among those who played. Average hours played was far higher for slots than for other activities but those taking part in casino games tended to spend at a far higher rate per minute while they were playing.

[87] The spend-per-minute numbers quoted here (and in Table 23) will be over-estimates because of the issue of double-counting raised in the text. The sum of the estimates for hours spent on each activity exceeds our estimate of total time spent on gaming by a margin of 11.3%. However, the relative ranking of activities by spending intensity are similar to those documented below when we restrict analysis to sessions where only one activity was played. The characterisation of bingo as time-intensive and casino games as money-intensive remains valid.

Figure 15. Mean spend-per-minute and mean hours played for different gaming activities



At the individual level, only a small proportion of account holders who took part in gaming activities appear to have devoted a substantial amount of time to them over the one year period (Figure 16). According to our estimates, 2.9% gave time of more than 96 hours (four full days), which would be equivalent to playing two hours or more in most weeks. 1.2% of account holders spent more than 192 hours (eight full days), which would be equivalent to playing for four hours or more in most weeks. Table 22 in the Data File profiles customers in different groups according to time spent over the year and Figure 17 here illustrates a strong correlation between time spent and money spent. **In the group of nearly 50,000 customers who played for more than 192 hours, median spend was more than £3,000 and the winsorised mean (a measure which reduces the influence of the most extreme values) was only a little under £5,000**. These, then, are 'average' spending levels for the minority of customers who played, on average, for more than about four hours per week across the year. **Nearly half of them were women, which is over-representation relative to the gender-split in the whole customer base. On average, they were older than other gaming account holders and from a more deprived area. For over 70% of them, slots accounted for a large majority (>80%) of their time spent on online gaming.**

Figure 16. Time spent on gaming over the year

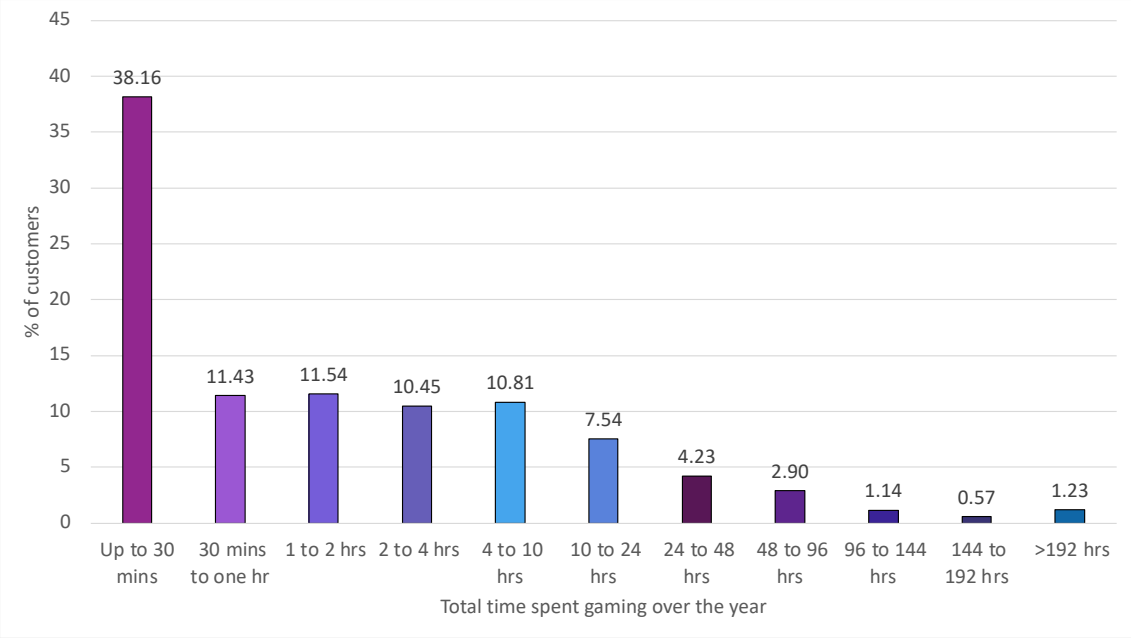
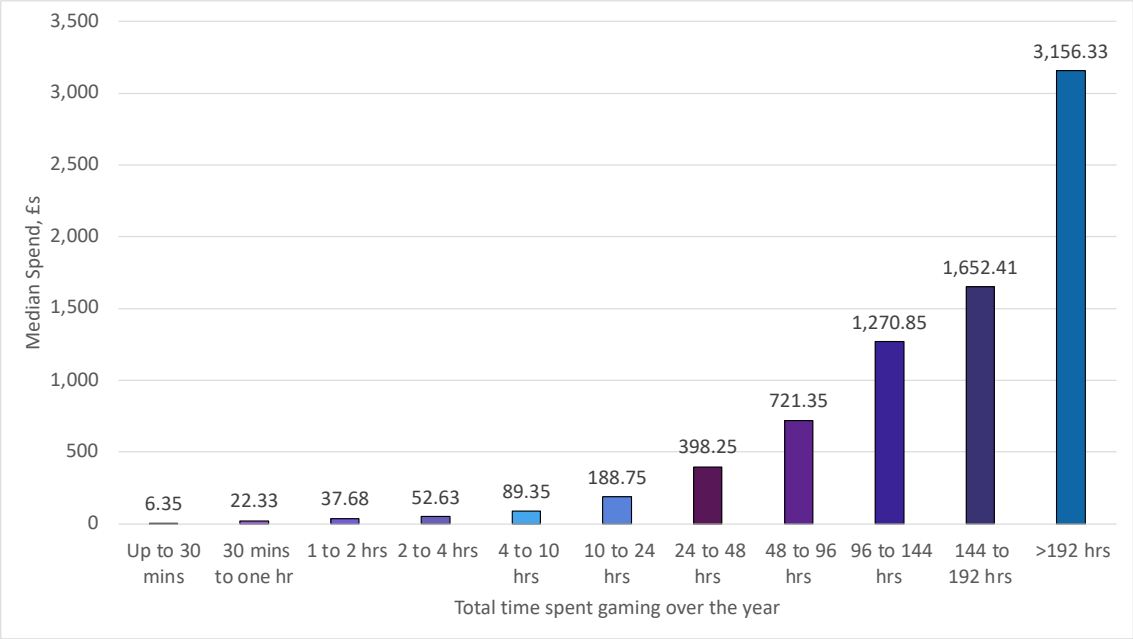


Figure 17. Median gaming loss over the year for groups of customers defined by time spent on gaming activities



Duration of individual sessions

Table 24 in the Data File focuses on instances of long-duration play. Because different products have very different structural characteristics, we present analysis of activity game-by-game and confine it to sessions where only one game type was played. This time we distinguish between live and virtual casino play and also separate out 'tournament poker' from regular online poker.

Regardless of product, **the large majority of sessions lasted for less than one hour**, for example 93.4% of slots sessions. But the interest lies in 'long sessions' since these are potentially events where there has been loss of control and where the ability to lose large sums of money may have been enhanced. In land-venue gaming, Delfabbro, Thomas & Armstrong (2016)[88] reported that those who endorsed having spent more than three hours gambling (without a break longer than 15 minutes) had about twice the odds of 'problem gambler' status compared with other gamblers. Most of our comments here relate to sessions over three hours.

In poker (excluding tournament poker), we estimate that 1.47% of all sessions lasted more than three hours and in bingo the figure was 1.33%. These were the products where the incidence of long sessions was highest. Incidence of long sessions was lower for slots (0.75%) but slots are the most popular product and, in terms of absolute numbers, **slots games accounted for the majority (70.3%) of sessions lasting longer than three hours**. A similar pattern emerged when we adopted five- and six-hour thresholds for defining a 'long session'.

Slots had the highest proportion of players (5.5%) who ever played for longer than three hours but more than half of them did so only once. Nevertheless, we estimate that 1.1% of all slots customers with these operators took part in a slots-only session of more than three hours on at least four occasions in the year. In bingo, 2.7% of

[88] Delfabbro, P., Thomas, A. & Armstrong, A. (2016). observable indicators and behaviors for the identification of problem gamblers in venue settings, *Journal of Behavioral Addictions 5(3)*, 19-28: https://doi.org/10.1556/2006.5.2016.065

customers played a bingo-only session lasting more than three hours at least once during the year and 0.7% did so four or more times. Such lengthy sessions in bingo were much less likely to be late at night than in the case of slots (15.7% late-night versus compared with 31.8% for slots).[89]

Except for casino games, the session spend by players did not appear to increase in proportion to session length because intensity of play tended to be lower in long sessions. For example, in slots-only sessions up to one hour, average spent was 68 pence per minute but for all sessions over three hours it was 9 pence per minute, and for all sessions over four hours it was only 5 pence per minute. It is possible only to speculate on the reasons for such a pattern. Possible explanations include: longer sessions are more likely to include some short breaks; some of those who prefer long play are money-poor but time-rich and so choose long, slow sessions; some sessions become long because the player has been winning money and chooses to use winnings to buy extra play. The last explanation would reflect a 'house money effect' and that this is relatively common behaviour is suggested by very low average accumulated losses at the end of long bingo or poker sessions. Spending winnings on more play may represent a benign choice, although Walker et al. (2015)[90] warned that problem gamblers' financial stress often originates in a refusal to pocket winnings to offset inevitable losses on other days.

In any event, for most products, the result of their lower spend intensity meant that, in long sessions (longer than three hours), the typical player loss was fairly modest, for example, the median was £6.68 for bingo and £21.80 for slots. In slots, the mean was lower than the median, implying that many long sessions may have ended with a win (negative spending by the customer). However, casino games have higher spend intensity than other activities at all duration levels and in virtual casino games the data show no less intensity of play in sessions longer than three hours compared with sessions less than one hour. The high mean player loss in long sessions, £234.70, reflects some outliers with very much higher losses than this. However, long casino sessions were rare and the estimates in this case are based on relatively few observations.

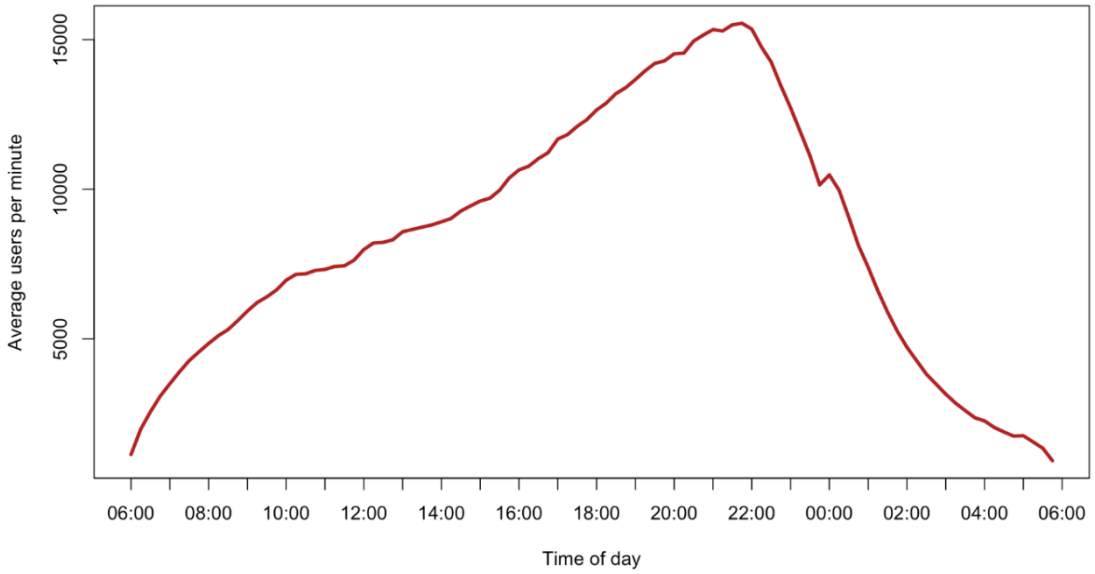
2.2.7 Patterns of activity

Time of day

Figure 18 charts how many accounts (on average across the year) were in use for a gaming session at each minute of the day. **Activity builds during the day to peak at around 10 p.m., falling off quite quickly after that point. Nevertheless, on an average day, we estimate that around 4,000 accounts of these operators were being used to take part in online gaming at 2 a.m.**

[89] We counted a session as 'late night' if either it started between midnight and 5.59 a.m. or it finished between 2 a.m. and 5.59 a.m. or both.
[90] Walker, D.M., Litvin, S.W., Sobel, R S. & St-Pierre, R.A. (2015). Setting win limits: An alternative approach to "responsible gambling", *Journal of Gambling Studies*, 31(3), 965-986: https://doi.org/10.1007/s10899-013-9384-7

Figure 18: Average number of gaming accounts in use at each minute of the day



Past research suggests that gaming activity late at night or in the early hours, whether in-venue or online, is associated with higher intensity of play. Forrest & McHale (2016) reported that the average per-minute loss of slots players in British land casinos peaked at 2 a.m. Nower et al. (2017)[91] analysed online casino data from New Jersey and reported that, relative to the peak activity time of 9pm to midnight, mean stake was one-fifth higher between midnight and 3 a.m. and one-half higher between 3 a.m. and 6 a.m. Given the possibility that late night play may be characterised by elevated risk, we undertook further analysis of late night sessions. We again defined a session as 'late night' if it started between midnight and 5.59 a.m. or if it finished between 2 a.m. and 5.59 a.m. (or both). To allow product-specific analysis, we considered only sessions where only one type of game (slots, bingo, etc) was played. Our comments are informed by Table 25 (and comparisons between it and Table 24). Lengthy late-night sessions in tournament poker and instant wins were rarely observed in the sample and, in these cases, projections to the whole customer base shown in Table 25 should therefore not be given much significance when interpreting the data.

Of all slots-only gaming sessions during the year, 10.8% were 'late night', making our estimate of the total number of late night slots-only sessions with these operators during the year more than 6.5m. The fraction of sessions which were late night was only slightly lower for most other game types (live casino 10.4%, poker 9.2%, virtual casino 8.5%, bingo 8.6%) but these games are much less often played than slots, so in terms of absolute amount of activity, **slots play dominated the late night online gaming landscape just as it did during the day**.

Only a minority of late night sessions (10.5% in the case of slots) featured extended play (beyond one hour) and just over half of those customers who played such a session did so only once. Still, there were customers who took part in extended play on several occasions during the year, for example we estimate that 26,248 did so at least six times, which was 0.9% of all slots players. Other products had far fewer players who regularly played long sessions late at night.

[91] Nower L, Caler K. & Peters E. (2017). *The Prevalence of Online and Land-Based Gambling in New Jersey, Report to the Division of Gaming Enforcement*: https://www.nj.gov/oag/ge/2018news/ResponsibleInternetGamingReportDrNower2016.pdf (accessed 23.11.21)

Consistent with previous research on slots players at land casinos (Forrest & McHale, 2016) we found that, on average, **there was elevated intensity of play in late night sessions:**

- mean spend-per-minute across all slots-only sessions lasting up to 1 hour was 68 pence per minute; but it was 76 pence in late night sessions; for sessions lasting more than 1 hour the corresponding loss rates were 15 pence and 23 pence
- across all live casino sessions lasting up to 1 hour, mean spend per minute was £1.20 but it was £1.75 for those which were late night; for virtual casino play, corresponding figures were 91 pence/ £1.07.
- across all live casino sessions lasting more than 1 hour, mean spend per minute was 71 pence but it was 94 pence for those which were late night; for virtual casino play, corresponding figures were 64 pence/ £1.32

There were, then, clear signs that gambling among night time players was, as a whole, more intense than at other times of day. Because this is an observational study, it is not easy to assign causation. Late night gambling might be undertaken with less inhibition or even less self-control than daytime gambling simply because of the time of day; but it is also likely that a factor driving the data is that the set of people who play late at night are just different sorts of people than the majority of customers. Moreover, even were the same people to gamble with different levels of intensity over the day, this might be planned or unplanned behaviour.

A subtle twist to the general picture that money tends to be lost more rapidly late at night is that, when one looks only at extremely long sessions (>4 hours), mean spending intensity becomes negative for bingo, live casino, virtual casino and tournament poker. In other words, in each of these activities, sessions lasting more than four hours yielded, on average, a positive return to the player. This suggests the possibility that a common reason for night time play to become extended to several hours is that some winning players decide to continue to play (but still terminate play before all their gains are spent).[92]

Speed of play in slots

Effective November 1, 2021, the Gambling Commission introduced new constraints on the speed at which online slots games could be played, with the game cycle to be at least 2.5 seconds (thus enforcing a maximum number of spins-per-minute of 24) and autoplay (a feature which had facilitated very fast play since no buttons had to be pressed) to be prohibited.[93]

Survey work for the Gambling Commission during December, 2020 had found use of autoplay common among online slots players. 41% of 358 respondents indicated that they had used autoplay in the preceding 12 months; a further 10% claimed to have used it in an earlier time period beyond 12 months.[94] Our data confirmed that it was common for slots players to have recorded at least one *15-minute window* of activity where the number of spins was consistent with use of autoplay but the profile of such players was not different from that of the generality of players. However, the set of

[92] In the particular case of tournament poker, the finding may to an extent be tautological to the extent that players who are eliminated early will be losers and those who survive to the end will be winners.

[93] https://www.gamblingcommission.gov.uk/news/article/gambling-commission-announces-package-of-changes-which-make-online-games (accessed 24.11.21)

[94] https://www.gamblingcommission.gov.uk/consultation-response/online-games-design-and-reverse-withdrawals/summary-of-responses-prohibiting-auto-play-functionality-for-online-slots#ref-3 (accessed 24.11.21)

players who had engaged in at least one *whole session* across which speed of play was greater than 30 spins per minute was much smaller in size, 1.5% of all slots players.

Using this metric runs the risk of picking up false positives from short one-window sessions where we assume play to have been 7.5 minutes whereas it will have been longer in some cases. Nevertheless, it appears to identify a distinctive player group in terms of propensity to gamble relatively heavily. We estimate that 23.9% of those who engaged in at least one whole session with more than 30 spins-per-minute lost more than £2,000 from all their 'gaming' activities during the year; this compares with 3.2% as the proportion of all gaming accounts which lost more than £2,000 in the year. The difference is sufficiently striking to conclude that **there was an association between fast play, such as might be associated with autoplay, and propensity to spend at unusually high levels**.

2.3 Overall activity of online gamblers

2.3.1 Overall activity of online gamblers

In this section, we look at the whole gambling activity of account holders, betting and gaming together.

Relative to preceding sections, the analysis here is subject to additional caveats. The operators participating in the study captured a much greater share of the online betting market than of the online gaming market. Consequently the level of spending on betting relative to that on gaming is considerably overstated compared with that which holds across the whole population of Great Britain. Even at the level of the individual who takes part in both activities, incorrect inference may be made if attempting to generalise to the behaviour of everyone in the population who does both. First, the majority of accounts available for study are held with operators with strong betting brands. The behaviour and preferences of their 'dual' customers between betting and gaming may differ systematically from those of individuals who choose to hold an account with an operator better known for gaming products. Second, a general limitation of the whole study is that we do not observe the total online betting and gaming activities of people who have active accounts with more than one operator. This limitation seems likely to apply more strongly if considering betting and gaming together. It is plausible that many of those who operate two or more accounts will choose separate websites on which to conduct their betting and their gaming activities. For example, they may judge that one operator offers a superior user interface for bettors whereas another is preferred for, structurally very different, gaming products. For all these reasons, this section should be regarded as painting a picture of patterns of play within the businesses of operators included in the study rather than one necessarily representative of the whole population of online gamblers in Great Britain.

Nonetheless, some findings seem likely to have wider applicability, including the stylised fact that dual customers are very much more lucrative for operators than those who participate in either betting or gaming alone.

A sample of 139,152 accounts was available for analysis. Applying appropriate weights and extrapolating to the 10.2m active accounts held with the operators in the study, we estimate that:

- 60.8% of accounts were used only for betting and yielded a GGY-per-customer of £134.98

- 14.0% of accounts were used only for gaming and yielded a GGY-per-customer of £296.20
- 25.1% of accounts were used for both betting and gaming and yielded a GGY-per-customer of £601.91

In fact, **dual customers were so lucrative for operators that, while holding only one-quarter of accounts, they delivered 55% of operator win**. Perhaps the result is not surprising, given that greater breadth of activity in gambling predicts a higher level of spending; but the starkness of the figures underlines powerfully that operators may have a strong incentive to adopt marketing strategies which aim at converting betting-only customers to dual customers (or indeed aim to attract bettors to register for the first time in the expectancy that they will present cross-selling opportunities).

2.3.2 Demographics

Gender[95]

Based on cases where gender was known, we estimate that 73.8% of holders of active accounts with these operators were male and they contributed 83.6% of GGY from all gambling activity. Thus, **on average, a male customer spent substantially more (£345.82) during the year than a female customer (£191.42). This disparity was evident for each of the age-groups into which we divided the data.**

Mean spend-per-active day proved very similar between the genders. Therefore, arithmetically**, the difference in spending-per-customer over the year was almost wholly due to females, on average, using their accounts on fewer days**. The mean number of active days was 32.4 for men and 18.7 for women.

The distribution of spending between product categories (betting and gaming) was also very different between male and female account holders. **In the case of male customers, the share of spending accounted for by betting was more than one-half in every one of our eight age-groups. In the case of female customers, the betting share was below one-quarter in every one of our eight age-groups**. Altogether, the estimated betting share for men was 53.9% and for women 17.3%. Clearly there is a very substantial difference in gambling preferences by gender. The difference illustrated here is consistent with numerous prior studies demonstrating that women tend to display a preference for games of pure chance over activities where there is a real or perceived role for the application of skill, such as betting (Baggio et al., 2018; Romild, Svennson & Volberg, 2017).[96] This has implications for policy intended to reduce harm from online gambling. For example, **campaigns built solely around betting may fail to be perceived as relevant by the high proportion of women whose main or only online gambling is on games of pure chance**.

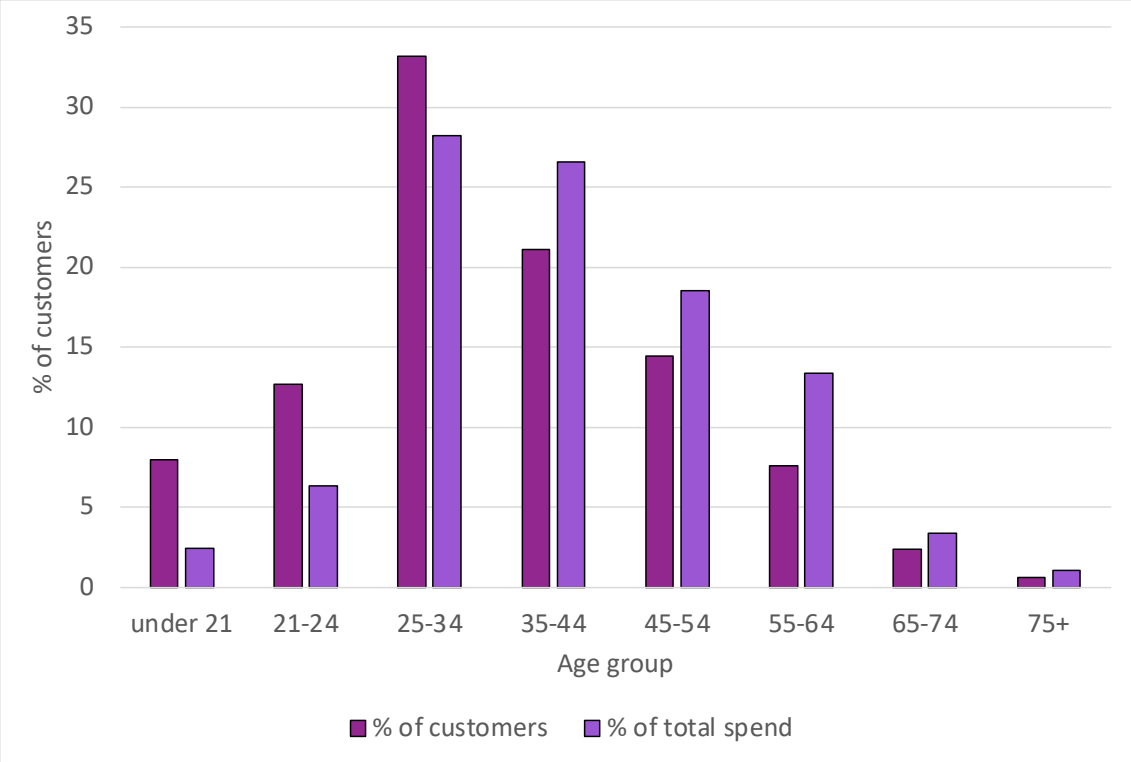
[95] Discussion here is based on data summarised in the Data File (Tables 26 and 27).
[96] Baggio, S., Gainsbury, S.M., Starcevic,V., Richard, J-B *et al.* (2018). Gender differences in gambling preferences and problem gambling: a network-level analysis, *International Gambling Studies, 18(3)*, 512-525: https://doi.org/10.1080/14459795.2018.1495750
Romild, U., Svennsson, J. & Volberg, R. (2017). A gender perspective on gambling clusters in Sweden using longitudinal data, *Nordic Studies on Alcohol and Drugs, 33(1)*, 43-60: https://doi.org/10.1515/nsad-2016-0004

Age

Data summarised in the Data File (Tables 26 and 27) and in part in Figure 19 reinforce findings from separate analyses for betting and gaming that **the age-groups covering 25-44 are of key importance to the operators included in the study**:

- while comprising only 32.7% of the adult population, customers aged 25-44 held 54.3% of all active accounts and generated 51.5% of operator GGY
- **under-25s (especially those aged 21-24) also held a disproportionately high share of active accounts but they spent relatively little**: these groups comprised 13.2% of the adult population, held 20.7% of active accounts, but contributed only 8.8% of operator GGY
- **members of older age-groups were very much less likely to have an active account but those who did tended to be relatively heavy spenders**
- **mean spending-per-account increased almost monotonically across our eight age-groups**, from £85.02 for the youngest group to £483.26 for 55-64-year-olds and still £407.65 for the two 'senior citizen' groups combined

Figure 19. Share of customers and share of spending in each age-band



The pattern of participation in online gambling may also be illustrated by our estimates of the number of active accounts held at these seven operators per 1,000 population. The age-groups covering 21-34 were far more likely than others to have an active online gambling account: there were 389 accounts per 1,000 population. Thereafter, this indicator fell steadily and there were only 26 accounts per 1,000 people in the population aged 65 or over. The relative rates of account-holding across the age-groups were very similar to the relative participation-rates in "any online gambling or betting" reported from the *Health Survey for England, 2018*.

Deprived and less deprived areas[97]

According to our estimates, customers in the 20% of most deprived areas held 18.2% of accounts with these operators which were used only for betting, 33.0% of accounts used only for gaming and 26.5% of dual-purpose accounts.

When customers' total account activity is considered (i.e. betting and gaming together) it is evident that both the customer base of the operators and operator profit were drawn to a somewhat greater extent from the most deprived quintile of areas than from the least deprived quintile:

- the 20% of most deprived areas provided operators with 22.6% of their account holders and 23.2% of their GGY from all activities
- the 20% of least deprived areas provided 17.2% of their account holders and 16.7% of their GGY

The contrast in share of customers reflects **a clear tendency across the whole deprivation range for the operators to have had more account holders the more deprived the area. However, the relationship between contribution to GGY and area deprivation status is less clear-cut.** The very most deprived areas generated more spending than the very least deprived areas. But, in areas which were in-between, neither very high nor very low deprivation, each IMD decile accounted for quite close to 10% of operator GGY, which would be what one would expect were online providers to draw revenue equally from each type of area. In very broad terms, **it would, then, be fair to characterise the operators in the study as having drawn their revenue fairly equally from across the deprivation range.**

It is though possible to detect significant differences between types of area in respect of gambling preferences, which reflect that accounts registered to addresses in deprived areas were disproportionately likely to be used for gaming and not at all for betting. So, generally, **gaming accounted for a higher share of total expenditure, and betting a lower share of total expenditure, in areas with greater deprivation**. Thus, in the most deprived quintile of areas, gaming accounted for 46.2% of customer one-year losses whereas, in the least deprived decile, gaming had a share of only 39.6%. Again it might be noted that, while there is a contrast between the most deprived and the least deprived areas, the relationship across the whole deprivation range is by no means linear. The relative spending on betting versus gaming does not seem to vary systematically between area types across more than half the range. It is only towards the top (least deprived) of the deprivation range that tastes are observed to shift somewhat towards spending on betting rather than gaming.

What is clear is that any tendency for operators to draw revenue disproportionately heavily from the most deprived areas can be attributed largely to greater spending on gaming rather than betting products. In this context, it is worth noting again that the operators cooperating in the study were collectively dominant in the online betting sector but captured less than half of online gaming revenue in the regulated industry in Great Britain. This implies that the importance of gaming relative to betting in the online industry as a whole is understated in the results presented here. To the extent that demand for gaming products appears to be relatively high in more deprived areas, it follows that any tendency for more revenue to be extracted from more deprived areas would probably be shown to be stronger at the level of the whole online industry were it possible to analyse data from all operators rather than from just the sample of operators included in our study.

[97] Discussion here is based on detailed data included in the Data File (Table 28).

2.3.3 Concentration of spending

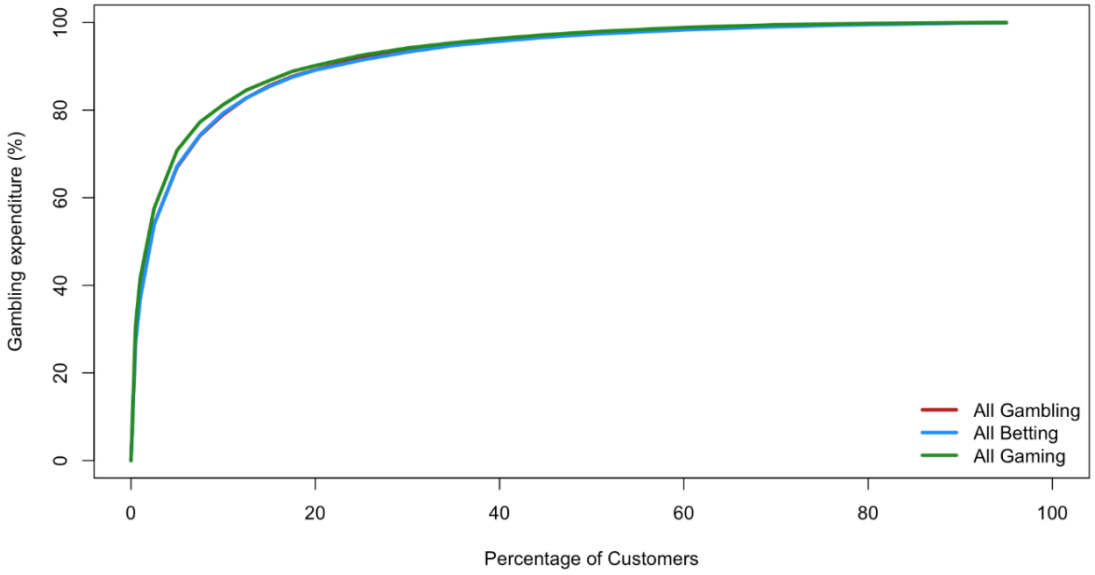
When we considered betting and gaming sectors together, we found once again that, **relative to other consumer goods industries, online gambling firms were much more dependent on a "vital few" customers**. We ordered all account holders by gambling volume (total stakes over the year):

- the top-1% of account holders generated 37.4% of operator GGY
- the top-10% of account holders generated 79.0% of operator GGY
- the top-20% of account holders generated 89.2% of operator GGY

The qualifications for entering each of these groups were exceeding volume thresholds of £70,175, £4,568 and £1,388 respectively.

Figure 20 shows the Lorenz curve for 'all gambling', with the separate Lorenz curves for betting and gaming included for comparison. In all three cases, the steep gradient to the left of the chart demonstrates high concentration of spending.

Figure 20: Lorenz curves for 'all gambling', 'betting' and 'gaming'



It is conventional to summarise the degree of concentration by referring to the Pareto ratio. Here, for 'all gambling', it is 89.2, i.e. the top-20% of customers by volume of gambling accounted for 89.2% of operator win. However, the qualification for entering the top-20% was rather modest: for most players, the threshold of £1,388 total amount gambled would convert to an expected loss in the low hundreds of pounds over a year. Those who exceeded the threshold by only a little would have been spending at or below the limit where, on the basis of evidence from Australia[98], risk of harm is thought to start to rise significantly.[99] Therefore it might be more relevant to focus on accounts in the top-10% when considering risk of harm as there expected losses would be beyond the 'safe gambling limit'. **Gamblers who qualified for the top-10% provided 79.0% of operator GGY**. Dowling et al. (2021) reported that only a minority (7-12%) of gamblers exceeding safe gambling limits were found to have experienced gambling

[98] Dowling, N.A., Youssef, G.J., Greenwood, C., Merkouris, S.S. *et al.* (2021). The development of empirically derived Australian low-risk gambling limits, *Journal of Clinical Medicine, 10*, 167: https://doi.org/10.3390/jcm10020167

[99] Of course many customers will be spending to higher levels, taking into account their activity with other online operators and at land venues.

harm but it is still a dilemma for the industry that 79% of revenue derives from a group where a significant proportion of customers may be harmed by their play. It underlines the need for effective monitoring of the activity of the "vital few" on whom their profits depend.

Distribution of spending across accounts

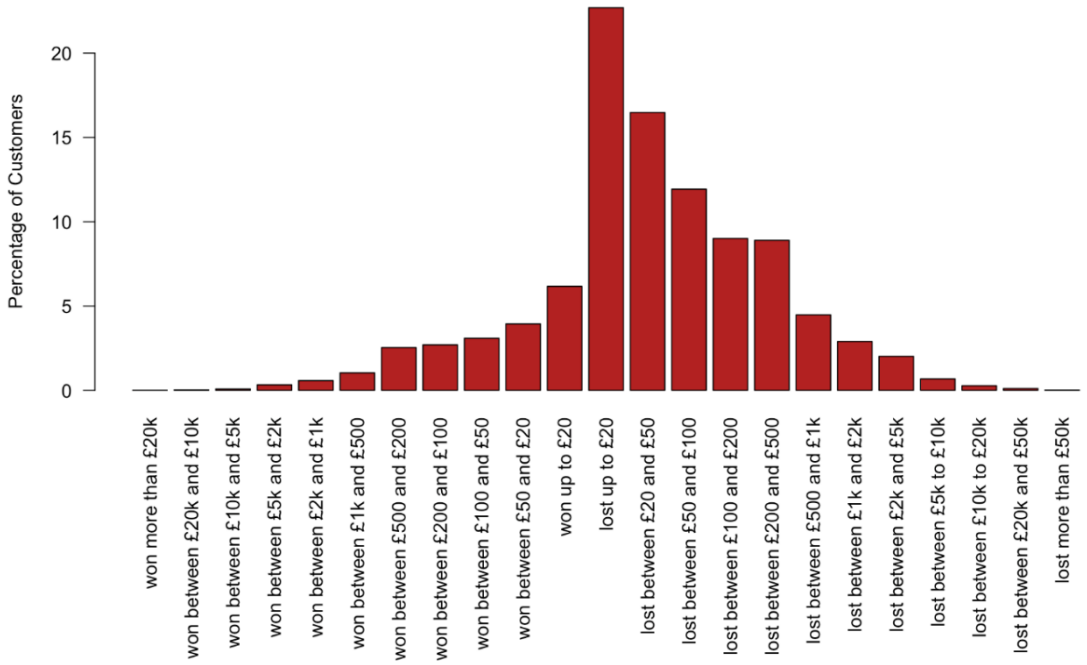
Figure 21 shows the distribution of account holders according to their win or loss over the year (Table 29 in the Data File provides additional supporting information). The shape of the distribution is similar to that shown earlier for betting and gaming analysed separately. **A small proportion of customers won money over the year, most customers lost a modest amount, and a small proportion lost what might often be viewed as a significant amount of money**, likely to cause financial stress in many households[100]:

- 80.6% either won money or else lost less than £200
- 94.0% either won or else lost less than £1,000

On the other hand:

- 6.0% of accounts lost more than £1,000 over the year
- 3.1% lost more than £2,000
- 1.1% lost more than £5,000

Figure 21: Distribution of wins and losses from all gambling over one year



[100] Evidence reported in Technical Report 3 (chapter 2.1.3) finds, from a follow-on survey of customers whose accounts had been included in the sample here, that, when asked about their finances back in December, 2018, those who lost higher sums of money on their account in 2018-19 were more likely to recall having found it hard to manage financially.

The heaviest losses

The groups with the heaviest losses were comprised mainly of males and the average age was in the early forties. For example, if one focuses on those with a one-year loss in excess of £2,000, 83.5% were men and the average age was 40.4 years (with a higher threshold than £2,000, there would be a still higher proportion of men and average age would shift towards the mid-forties). Of those who lost more than £2,000, 24.0% had addresses in the 20% most deprived areas. This was a little higher than the share of customers with addresses in these areas. It can therefore be noted that, if anything, an account holder from IMD1 or IMD2 had a slightly elevated probability of losing more than £2,000 compared with the generality of customers. Of those who lost more than £2,000, 54.7% had lost all or most (>80%) of their money betting and 31.7% had lost all or most (>80%) of their money from gaming activities. Bearing in mind that more than twice as many accounts with these operators were used for betting as for gaming, this implies that **a lower proportion of betting-focused than of gaming-focused customers experienced a heavy one year loss from their online gambling**.

According to our estimates, only 25.1% of accounts with these operators were used for both betting and gaming during the study year. However, 6.8% of such accounts fell within the category of those with a one year loss of more than £2,000 from all gambling activity (compared with 3.0% of gaming-only accounts and just 1.6% of betting-only accounts). Consequently, dual-customers were strongly over-represented in the group of customers with a loss in excess of £2,000. They comprised 55.2% of 'heavy losers' when the loss threshold was set at £2,000; and this figure would increase to 58.6% with a threshold of £5,000. It is clear that **dual customers have a very elevated probability of being 'high spenders'**, which is consistent with breadth of gambling being correlated with risk of harm.

2.4 Safer gambling: self-management tools and operator interventions

2.4.1 Background

As in many sectors of the economy, gambling has seen a steady channel shift which has taken activity from offline to online settings. In the most recent full year covered by the Gambling Commission's *Industry Statistics* (April, 2019-April, 2020), online play accounted for 56.2% of the total GGY of the British gambling industry.[101] On the basis of trends in other jurisdictions, this market share seems likely to grow further in coming years, particularly in light of the additional momentum given to channel shift by the closure of land venues during the coronavirus pandemic.

Whether online play is inherently more likely than offline play to cause harm has yet to be established empirically because causal effects are hard to identify. Intuitively, it could be expected that individuals who have problems with their gambling might have those problems aggravated because of the ready accessibility of gambling through computers and mobile 'phones. On the other hand, an advantage of the new reality of having the majority of gambling conducted online is that the technology allows players to be provided with tools to help them keep their gambling under control. It also allows operators to monitor customers' gambling to identify patterns of play suggestive of harm, making targeted interventions as appropriate. Thus the shift to online gambling offers at least the potential for gambling as a whole to be made safer. But it should be

[101] own calculation; the calculation excludes lotteries.

noted that how effective measures to minimise harm are in practice is still not clear and evaluation of safer gambling tools and operator interventions is a priority identified in the National Strategy to Reduce Gambling Harms.[102]

It is beyond the scope of this Report to provide evaluation of measures put in place to make online gambling safer. However, the data set records not only all gambling transactions on each customer account but also use of self-management tools made by each customer and all interventions made by the operators on the basis of concerns over customer play. We are therefore able to provide information on how often these tools and interventions were used and to explore something of the characteristics of the players involved.

Section 2.4.2 focuses on the self-management tools available to account-holders. International evidence is that take-up of such tools is low, partly because they are perceived as 'for problem gamblers'; and indeed survey evidence from Australia found that take-up was much higher than average among PGSI moderate-risk and problem gamblers (Gainsbury et al., 2020).[103] [104]

We will present evidence on the take-up of self-management tools by customers of the operators included in the present study. These tools fell into three categories:

- *reality checks*- the account-holder can opt to receive pop-up reminders of how long he or she has been playing; when one is set up, the customer chooses how frequently he or she will receive the reminder; the data set records each time a reality check was set up and each time it was removed or changed for more or less frequent reminders
- *deposit limits*- customers can set up a hard cap on the amount allowed to be deposited into their accounts; this will involve setting an amount and a period (e.g. £100 per day, £1,000 per month, etc); any subsequent increase in the limit cannot take effect until the current period (week/ month/ etc) has expired; the data set records when a deposit limit was set up or changed or removed altogether
- *time-outs* / *self-exclusion*- licensed operators are required to offer customers the facility to exclude themselves from gambling on a temporary or permanent basis; *time-outs* can be for as short a period as one day; *self-exclusion* is when the customer opts formally to be barred from gambling with the operator for a period of six months or more, and this can be extended to all GB-licensed online operators through GAMSTOP if the customer chooses; the data set records every time each account-holder used these facilities and the length of time chosen for the time-out or self-exclusion to apply

Section 2.4.3 focuses on operator 'social responsibility interventions', typically made after an account has been flagged as a case for concern by behavioural tracking

[102] https://www.gamblingcommission.gov.uk/strategy/national-strategy-to-reduce-gambling-harms/research-to-inform-action-what-works-in-industry-based-harm-minimisation (accessed 05.12.21)

[103] 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: https://doi.org/10.1007/s10899-019-09859-8

[104] High-quality empirical studies of whether use of these tools succeeds in moderating subsequent play are rare and there is too little evidence to be confident yet that their use is typically effective rather than just a marker for problem gambling (Ivanova, E., Rafi, J., Lindner, P., & Carlbring, P. (2019). Experiences of responsible gambling tools among non-problem gamblers: A survey of active customers of an online gambling platform, *Addictive Behaviors Reports, 9*, 100161: https://doi.org/10.1016/j.abrep.2019.100161).

algorithms.[105] An intervention may be made through a chat room or a pop-up or by text message, but by far the most common means of communication recorded in the data set was an e-mail message. Cases may also be escalated to the level of a personal telephone call and, since these are likely to be made to account-holders where the level of concern is greatest, we will pay particular attention in Section 2.4.3 to profiling the customers involved and will illustrate changes in behaviour associated with such interventions.

Finally, in Section 2.4.4, we consider a regulatory intervention intended to reduce harm. From April 14, 2020, use of credit cards for gambling (other than on lottery products) was prohibited in Great Britain. The data set employed in the present study pre-dates the ban and records customers' use of credit cards to place deposits with the operators. We are therefore able to provide information on how many and which sorts of customer used a credit card to gamble during the study year, which is relevant to the question of whether the ban was likely to have affected customers with a profile suggestive of elevated risk of gambling harm.

2.4.2 Self-management tools

Table 30 in the Data File supports much of the commentary in this and in the following section. It profiles groups which used each type of self-management tool and which received operator interventions.

Reality checks

According to data from online surveys carried out on behalf of the Gambling Commission, 3% of all gamblers questioned in 2018 had used a reality check tool in the past year but in the 2019 survey the proportion fell to 1%.[106] But in each case the question was asked of all past-year gamblers, including offline-only, so the proportion of users in the relevant (online) population was probably higher.

Based on the present sample, we estimate that, over the one-year period, which was from mid-2018 to mid-2019, a 'reality check event' (setting up, modifying or terminating a reality check arrangement) was recorded in 90,239 unique accounts; this represents only about 0.9% of accounts. While these accounts are guaranteed to have been part of the reality check scheme for at least part of the year, there will also have been an unknown number of other account-holders who had put a reality check arrangement in place before July 1, 2018 and did not modify their settings during the study year. Comparing our 0.9% estimate with the (rounded) estimates from survey data reported by the Gambling Commission is therefore problematic but the order of magnitude is not

[105] Behavioural tracking to identify account-holders who are at risk of harm has increasingly employed machine learning techniques, typically using indicators such as number of betting days, and metrics capturing variability in play and gambling trajectory, to predict voluntary self-exclusion (taken to be a proxy for problem gambling); whether identification of cases and subsequent interventions are effective requires further evaluation as it has been rare to employ rigorous testing akin to randomised control trials (Deng et al., 2019). An exception is Auer and Griffiths (2016), which found that interventions in a randomly selected sample of players on the Norsk Tipping platform resulted in moderation of behavior compared with a control group. M.M. Auer & M.D. Griffiths (2016). Personalized Behavioral Feedback for Online Gamblers: A Real World Empirical Study. *Frontiers in psychology*, *7*, 1875. https://doi.org/10.3389/fpsyg.2016.01875

[106] Gambling Commission (2020), Gambling participation in 2019: behaviour, awareness and attitudes, Annual Report, retrieved from: https://assets.ctfassets.net/j16ev64qyf6l/7uIxjm1SNQMygdOFV2bzxN/ea74db1104925f015edb11db0596f98b/Gambling-participation-in-2019-behaviour-awareness-and-attitudes.pdf (accessed 19.10.21)

dissimilar and confirms **low usage of the facility to receive on-screen reminders of the duration of a gambling session**.

We estimate that, of all the 'reality check events' recorded at these operators, 73% were set-ups and 20% cancellations. This implies that use was growing over 2018-2019, contrary to the trend reported by the Gambling Commission. Of the other 7%, rather more saw the customer ask for more frequent reminders than ask for less frequent reminders. On the other hand, of those who set up a reality check during the study year, 13.3% cancelled it during the year.

Just 35% of users of reality checks were betting-only customers despite this group comprising 61% of all account-holders. But this under-representation was to be expected given that the structural characteristics of betting differ from those of gaming in that betting may involve a small number of discrete actions rather than continuous play. Reminders of the passing of time therefore appear likely to be less relevant to bettors than to customers who take part in gaming.

In terms of demographics, the profile of those who used reality checks was similar to that of the generality of customers but they showed a strong tendency to be more engaged gamblers. Nearly twice as many were dual customers as opposed to gaming-only customers. 13.1% spent more than £1,000 on their gambling during the study year and 9.3% spent more than £2,000. In the whole sample, only 3.1% of players lost more than £2,000 and even among dual customers the figure was only 6.4%. This suggests that, **despite low usage overall, the reality check facility had somewhat greater take-up among 'high spenders', a group for whom a means of controlling their gambling was likely to be more relevant**.

Deposit limits

The general concept of *pre-commitment* has been identified by psychologists as a common strategy for improving self-control in any sphere by limiting one's own future choices (Elster, 2000)[107]. It refers to attempts by individuals to put in place arrangements which will protect them from the possibility of engaging in impulsive behaviour which would not be in their longer-term interest. For example, they may recognise in themselves a tendency to over-spend and so arrange for an automated deduction from their pay to be channelled into a savings scheme. Smokers intending to give up may make bets with their friends that they will succeed, making it more costly for them to relapse in the future. Casino gamblers may take a limited amount of cash to the venue, and leave their credit cards at home, because they want to make it hard for themselves to chase losses and spend more than they could afford to lose.

The facility for setting deposit limits is intended to provide an easy way for customers to follow a pre-commitment strategy in the context of online gambling. **We estimate that 21.5% of all account-holders set a deposit limit at least once during the study year**. They may have been setting a limit for the first time or they may have been varying a limit set earlier. We were not able to observe cases where an account-holder had set a limit prior to the study year and left it unchanged during the whole year, since no 'deposit limit transaction' would have been recorded in the data set. The 21.5% 'participation-rate' should therefore be regarded as a lower-bound estimate. The estimate is somewhat higher than that reported by Heirene, Vanichinka & Gainsbury

[107] Elster J. (2000). *Ulysses Unbound: Studies in Rationality, Pre-Commitment and Constraints*, Cambridge University Press

(2021)[108] from a sample of nearly 40,000 account records with leading Australian operators, covering a one year period in 2018-2019, finding that just under 16% of account-holders had used deposit limits.

Across all occasions where a limit was set, 35% involved choosing a daily limit, 32% a weekly limit and 33% a monthly limit. Daily, weekly and monthly limits are not strictly comparable with each other: for example, a restriction to £50 each day leaves the account with fewer degrees of freedom than where the cap is £350 over seven days. Nevertheless, to illustrate the levels of cap typically set, we expressed each limit set in terms of its monthly equivalent. Figure 22 shows the distribution of the size of cap across instances where a new or revised deposit limit was set by the customer. The information embodied in Figure 22 is also presented as Table 31 in theData File.

Figure 22: Size of deposit limits

Research by the Behavioural Insights Team (2021)[109] with Bet-365 customers trialled the effect of different ways of presenting the choice of deposit limits on screen; their control group continued to see a screen with the same style customers will have faced during our study period. Their Report converted all deposit limits set to per-day equivalents and quoted the median cap set in the control group as £14.30; this converts to about £430 in per-month terms. This is rather lower than that across the broader range of operators with whose data we worked. But, as with the Behavioural Insights Team, we observed a very significant proportion of account-holders who set what appear to be very high limits. In more than one-third of the cases where a limit was set, it was in excess of £50,000 monthly equivalent. These account-holders were very numerous relative to the number who gambled at levels where they would be likely to need buffers of this size to support their activity and day-to-day variation in wins and losses. Some customers even set limits in the millions of pounds. Thus, **although participation in limit setting appears to have been relatively high, a significant proportion of limits self-imposed by customers seem unlikely to have been meaningfully binding on their future behaviour**.

[108] Heirene, R.M., Vanichkina, D.P., & Gainsbury, S.M. (2021). Patterns and correlates of consumer protection tool use by Australian online gambling customers, *Psychology of Addictive Behaviors*, accepted manuscript: https://doi.org/10.1037/adb0000761

[109] Behavioural Insights Team (2021). *Applying behavioural insights to define better safer gambling tools. Part1: Anchoring*: https://www.bi.team/wp-content/uploads/2021/01/Remote-Interventions-gambling-anchoring-report-Final-Jan-15th-2021.pdf (accessed 5.12.21)

Amongst those who used the deposit limits facility at least once during the study year, the balance between betting-only, gaming-only and dual customers was remarkably similar to that in the whole customer base. So too was their gender balance, their mean age and their mean IMD. Their average spend (£310) was only a little higher than that of the generality of customers (£275) and included a slightly higher proportion of 'high spenders'. 7.3% had losses exceeding £1,000 over the year and 3.9% lost more than £2,000. The corresponding proportions across all account-holders at these operators were 6.0 and 3.1%.

Time-outs and Self Exclusion

Under the Social Responsibility Code, which is part of the regulatory regime which online providers are obliged to follow as a licence condition, the Gambling Commission requires that account-holders have the facility to bar themselves from gambling activity for 24 hours, one week, one month, or "such other period as the customer may reasonably request, up to a maximum of 6 weeks".[110] Such breaks from gambling are intended by the Commission to give players the opportunity to take a break, to keep track of how much they are spending, to keep a clear mind and stop the feeling of being overwhelmed, and to make sure they are not becoming dependent on gambling.[111]

The Social Responsibility Code also requires operators to offer customers the opportunity to self-exclude themselves from gambling activity on a longer-term basis, for a period of at least six months. Self-exclusion is a much more formal step than a time-out. Operators have to close the account and return all funds held therein, maintain a register to prevent future access to gambling during the self-exclusion period, remove the customer from all their marketing databases related to gambling, and signpost the customer to counselling and support services.[112]

Though time-outs and self-exclusion are intended to serve different needs among gamblers, each involves customers barring themselves from gambling for a greater or lesser period and the data set did not distinguish them as separate categories. However, for each account-holder the data recorded, as well as the date and time at which the account-holder self-barred from gambling, the duration for which the exclusion would apply, indicated by five duration bands, ranging from 'less than six months' to 'more than five years'. We treated all instances where the duration was less than six months as time-outs and all instances where the duration was six months or more as self-exclusion.

For each account-holder the data recorded the date and time at which the account-holder self-barred from gambling and the duration for which the exclusion would apply. Sometimes the duration was longer than six weeks (the upper-limit for a time-out as required to be allowed by the Social Responsibility Code) but shorter than six months. We treated all instances where the duration was less than six months as time-outs and all instances where the duration was six months or more as self-exclusion.

From the data set**, we estimate that 2.5% of customers of these operators used the time-out facility at least once during the study year**. This level of usage is of a

[110] https://www.gamblingcommission.gov.uk/licensees-and-businesses/lccp/condition/3-3-4-remote-time-out-facility (accessed 06.12.21)
[111] https://www.gamblingcommission.gov.uk/public-and-players/guide/page/give-yourself-timeouts-from-gambling (accessed 06.12.21)
[112] https://www.gamblingcommission.gov.uk/licensees-and-businesses/lccp/condition/3-5-3-remote-sr-code (accessed 06.12.21)

similar order of magnitude as that reported in survey evidence from the Gambling Commission (which found, for a time around that to which our data relate, that 3% of past-year gamblers had used time-out)[113], and in Heirene et al. (2021) (who found, from one year of Australian online account data, that 1.6% of customers had taken a 'short time-out', defined as less than six months).

Of those who used a time-out, many did so often: nearly one-third of them called a time-out at least twenty times during the study year. Users were, on average, slightly younger than the generality of customers, their mean IMD indicated a slightly more deprived profile, and 81% were male. The percentage-split between betting-only, gaming-only and dual customers was 44%/11%/45%. Since dual customers comprised only 25% of the customer base of these operators, this indicates that **dual customers were more than twice as likely as other customers to have used time-out**.

On average, users of time-out tended to experience significantly higher losses over the year than the generality of customers. Mean spending per account was £865.29 (compared with £274.96 for 'all customers'). The proportion who lost more than £1,000 was 22.5% (compared with 6.0% for 'all customers') and the proportion of those who lost more than £2,000 was 11.2% (compared with 3.1% for 'all customers'). Since high spending is likely to be correlated with problem gambling risk, it may be concluded that the use of the time-out facility was to some extent a signal that the individual might be experiencing issues with his or her gambling.

Although usage of time-outs was low relative to the whole customer base, it was much higher among those who were likely to be at elevated risk of gambling harm. For example, 23.4% of customers who ended the year with a gambling loss in excess of £2,000 used the facility at least once. The finding is consistent with self-report evidence that problem gamblers are disproportionately likely to make use of time-outs (Gainsbury et al., 2020). It is encouraging to the extent that, despite low overall usage, the tool is used by significant numbers of those who may be experiencing gambling harm.

Self-exclusion

We estimate from the sample that **2.3% of those who held an account applied self-exclusion during the year**. A little more than one-quarter of instances of self-exclusion were for a period of up to twelve months and almost exactly one-half were for five years or more. 80% of self-excluders were men and the average age was 34. Again, **dual customers were heavily over-represented in the group, (47%). By contrast, self-exclusion was particularly uncommon among betting-only customers (61% of accounts but only 30% of self-excluders).**

The mean spend of self-excluders over the whole year was £931.25. 20.3% lost more than £1,000 and 10.2% lost more than £2,000. It should be borne in mind that, because they self-excluded, their gambling year, at least with the operator, was always shortened. Consequently, these numbers are very high when set against the behaviour of other customers (who had the whole year to gamble).

On the other hand, Catania and Griffiths (2021)[114] report, from analysis of self-exclusions of British customers of Unibet, that significant numbers of self-excluders had

[113] for reference, see footnote 105 above.

[114] Catania, M. & Griffiths, M.D. (2021). Understanding online voluntary self-exclusion in gambling: An empirical study using account-based behavioral tracking data, *International Journal of Environmental Research and Public Health 18(4)*, 2000: https://doi.org/10.3390/ijerph18042000

had very low activity levels and were motivated by factors unrelated to safer gambling issues, for example annoyance with the operator. They were able to separate out loss-levels for those (n=141) who had self-reported a gambling problem to customer services when closing their account and compared their activity levels with more than 7,000 other customers who had self-excluded for six months. For the latter group, spending levels prior to closure had been unremarkable. But for those who declared a gambling problem, the mean loss level over five months was just over £2,500. Although our study finds that a high proportion of self-excluders were 'high spenders', it is plausible that the proportion would be higher still if were we able to restrict the analysis to those who were using self-exclusion as a safer gambling tool rather than for some other purpose.

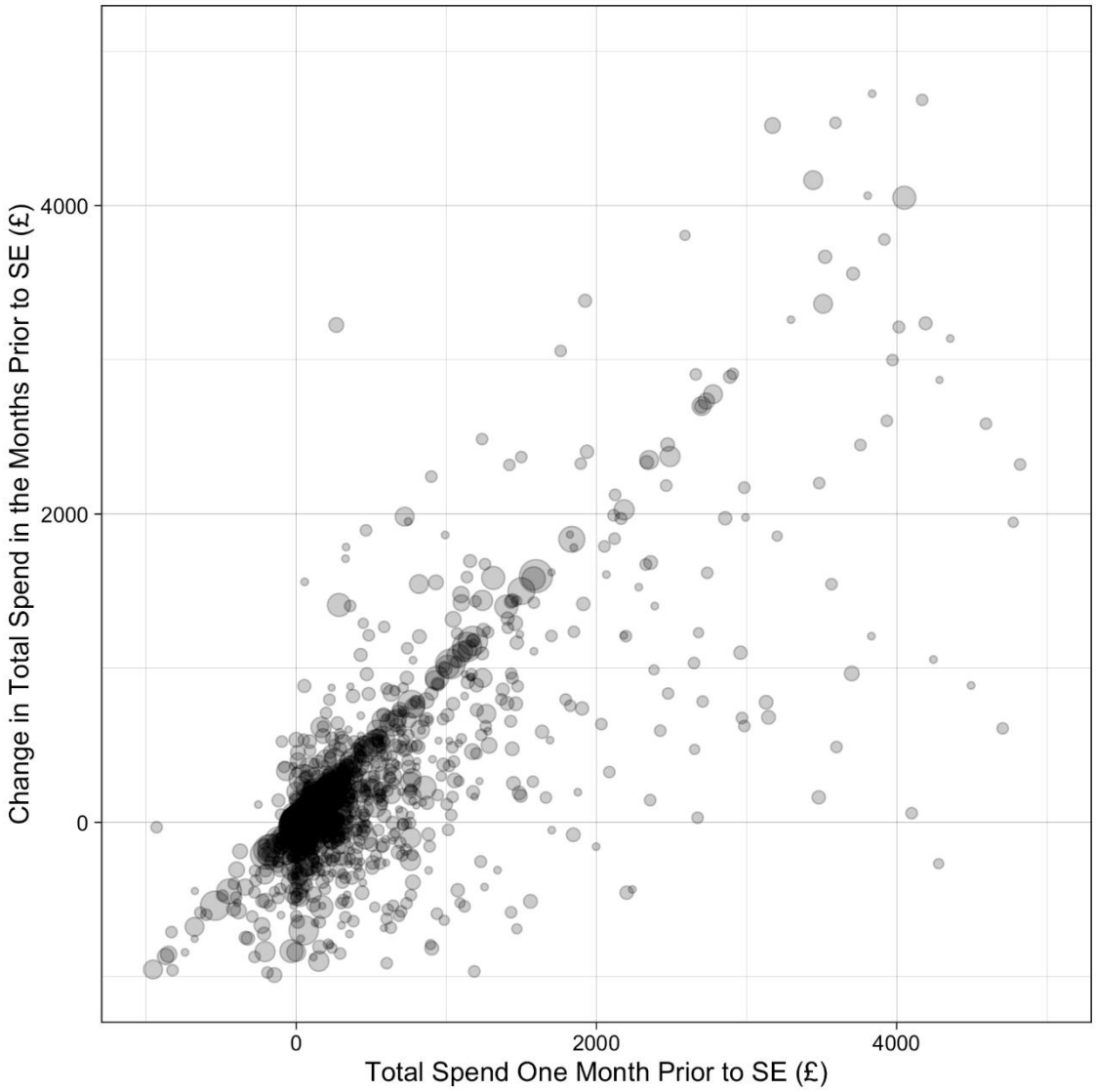
We investigated the recent behaviour of self-excluders by considering their levels of spending in the one and two months prior to self-exclusion. The months here are not calendar months but rather are defined with respect to the exact date of each case of self-exclusion. Self-exclusions during July and August, 2018, were not included in the analysis because the account records did not cover two full months prior to self-exclusion.

The set of self-exclusion cases displayed great heterogeneity in terms of prior behaviour. For example, in the month before applying self-exclusion, there were winners as well as losers (indeed customers with net gains in six-figures in the prior month). Nevertheless, some general patterns emerged, captured in Figure 23, a scatter-plot which on the horizontal axis shows the account-holder's spending in the month before self-exclusion and on the vertical axis shows the change in spending compared with the month before that. Dots are in proportion to the sample weights (i.e. a larger dot indicates that the individual 'represents' a greater number of players in the whole customer base). A small number of cases of self-exclusion are not shown in the plot because they had extreme values of win or loss which fell outside the range of values accommodated on the horizontal or vertical axes.

In a minority of cases, self-excluders had had negative spending in the immediately preceding month (i.e. they had won money). From the leftmost part of the plot, it will be observed that, unsurprisingly, almost all of these account-holders had decreased spending compared with the month before, which is to say that they had won last month but in the month before that had either lost money or won not so much money. This group is in a minority but the number of cases is not trivial and indicates that winning is sometimes followed not long afterwards by a self-exclusion.

However, most self-excluders had lost money in the month before self-exclusion and some had lost what might be regarded as a large amount. Based on the sample, we estimate that, while 70.9% of self-excluders had either won money or lost less than £200 in the prior month, 16.7% had lost more than £500, 9.5% had lost more than £1,000 and 0.8% had lost more than £5,000.

Figure 23: Self-excluder's spending in the two-months before self-exclusion



Observations above 0 on the vertical axis in Figure 12 are cases where spending in the prior month had been higher than in the month before. Similarly, observations below 0 on the vertical axis relate to cases where there had been a fall in the account spend in the prior month. It may be noted that, for smaller losses in the prior month, there is no strong trend for the change in spending compared with the month before to be above or below 0. However, beyond about £1,000 spend in the prior month, the very large majority of cases show that spend had increased compared with the month before. In this group, where the recent level of loss has been high, it appears to be the case that the monthly loss has taken on an upward trajectory. It is plausible that, were it possible to identify and set aside cases where self-exclusion had been just a convenient way of ending contact with the operator rather than in response to a gambling problem, it would emerge that exercise of the option to self-exclusion is associated with increasing spend over time (which may in turn sometimes indicate a loss of control over one's gambling).

2.4.3 Operator interventions

Overview

From the sample, we estimate that, during the study year, the operators in the study made more than 990,000 'social responsibility contacts' to 395,430 customers. Thus, contact was made with 3.9% of all account-holders at least once. 0.7% of all account-holders were contacted four or more times. The average age of those who received an intervention was 36, 81.5% were male and a mean IMD of 4.68 suggests a skew towards less deprived areas. A disproportionate number of them (61%) were dual customers.

A striking feature of the group of customers receiving a contact was their very much stronger propensity to high spending compared with the generality of customers. Their mean spend was £2,184.35 and 44.0% spent more than £1,000 (28.1% more than £2,000). Others of course may have had heavy losses at some point in the year but the operator intervention may have been effective in preventing them from reaching these thresholds.

That dual customers and those with heavy losses (relative to average customers) should be particularly likely to have been subject to an intervention was to be expected given that breadth of engagement and a high level of spending are each markers for problem gambling. **The algorithms which trigger interventions were therefore likely to have been effectively selecting accounts where there was cause for concern. At the same time, we note that 64.5% of those who lost more than £2,000 did not receive an intervention of any sort. Since these customers fell within the top 3% of account-holders by total loss over the year, it is perhaps surprising that so many did not receive even one precautionary message on the subject of safer gambling (even if the majority of them were likely to be gambling safely).**

Contacts were by e-mail messages in the large majority (84%) of cases. Chat rooms and pop-up messaging were very rarely used. 12.8% were categorised as 'other' in the data set and this we presume to refer mainly to text messages (which did not have their own category in the list of types of intervention).

Telephone calls

Only exceptionally concerning cases appear likely to have been escalated to the level of a telephone intervention and in fact **just 1.4% of 'social responsibility contacts' initiated by the operator were by telephone call. On the basis of the sample, we estimate that 13,016 customers (0.13% of all customers) of operators cooperating in the study received such a call during the one year period.** Most of them (97%) received only one call but there were cases in the sample where up to six calls had been made.

81.5% of those contacted by telephone were male and the average age was 36. **Betting-only customers comprised only 16% of the group even though betting-only customers held 60% of all accounts, implying that it was much rarer for betting activity than for gaming activity to provoke a high level of concern.**

The group which received telephone intervention included extreme spenders and the mean spending level over the whole year was £5,867.05. The proportion who lost more than £1,000 over the year was 35.5% and the proportion who lost more than £2,000 was 20.5%. These are figures for the whole year. Others may have breached the thresholds without the intervention of the operator. **Clearly the operators' criteria for**

evaluating risk of harm include exceptional level of spending. However, it has to be noted that most high spenders were not subject to this level of intervention. In fact, only 0.84% of those who lost more than £2,000 were recipients of a call. Such heavy spenders were more than six times as likely as an average account-holder to receive a telephone contact but, even so, their probability of receiving a call was still less than 1%. It would be interesting to explore with operators what factors they took into account when deciding not to check with the customer where the account was generating substantial losses (albeit some customers may have provided reassurance in calls made prior to the study year and therefore not observed in the data set as having received an intervention).

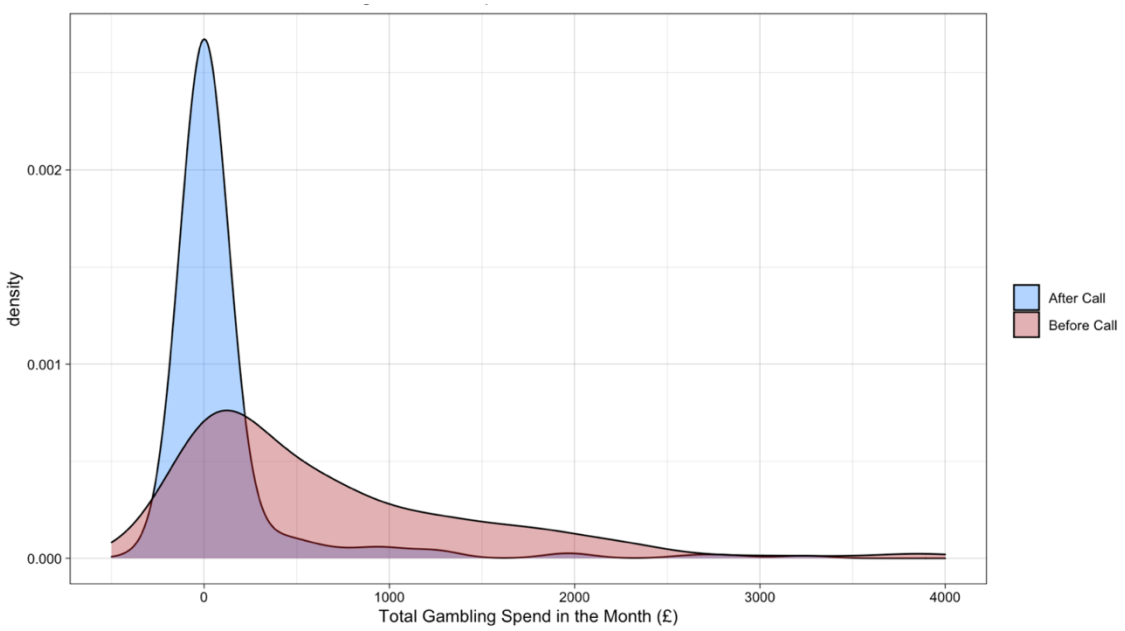
Data from the *Health Survey for England, 2018*, provide an estimate roughly concurrent with our data period that 4.2% of those who had gambled online in the past year (not counting on lotteries) were 'problem gamblers' according to either the PGSI or DSM-IV screen. 5.8% were at 'moderate risk' of gambling harm according to their PGSI score. These estimates suggest that operators might have been expected to show curiosity about something of the order of 10% of their customers, if their procedures were sensitive in terms of flagging those most at risk of harm. That only 3.9% received any sort of intervention and only 0.13% received a telephone contact suggests the possibility that the sensitivity of operator systems for identifying cases of concern was lower than might reasonably be expected. We recommend that thresholds for triggering an intervention through the algorithms should be lowered and that operators should display transparency regarding the systems of behavioural tracking they use and the criteria staff employ where a decision is made whether or not to make personal contact with the customer.

Before and after a telephone intervention

It is beyond the scope of the present project to attempt an evaluation of the effectiveness of safer gambling interventions made by operators. However, we were able to investigate whether telephone interventions were associated with a moderation of gambling behaviour. We considered telephone interventions recorded during the middle ten months of the study year. This allowed us to observe key metrics for a full month before and a full month after the date of each intervention. Only the first call made to a customer during the one year data period was included in analysis. In some cases, the customer may have received a prior call which had been before the start of the data period and therefore was not recorded in the data.

Figure 24 plots the distribution of total spend amongst customers who were called, in the month before and after a call. The horizontal axis has a negative segment because some customers won money (negative spending).

Figure24: Distribution of total gambling spend in the month before and in the month after a telephone intervention

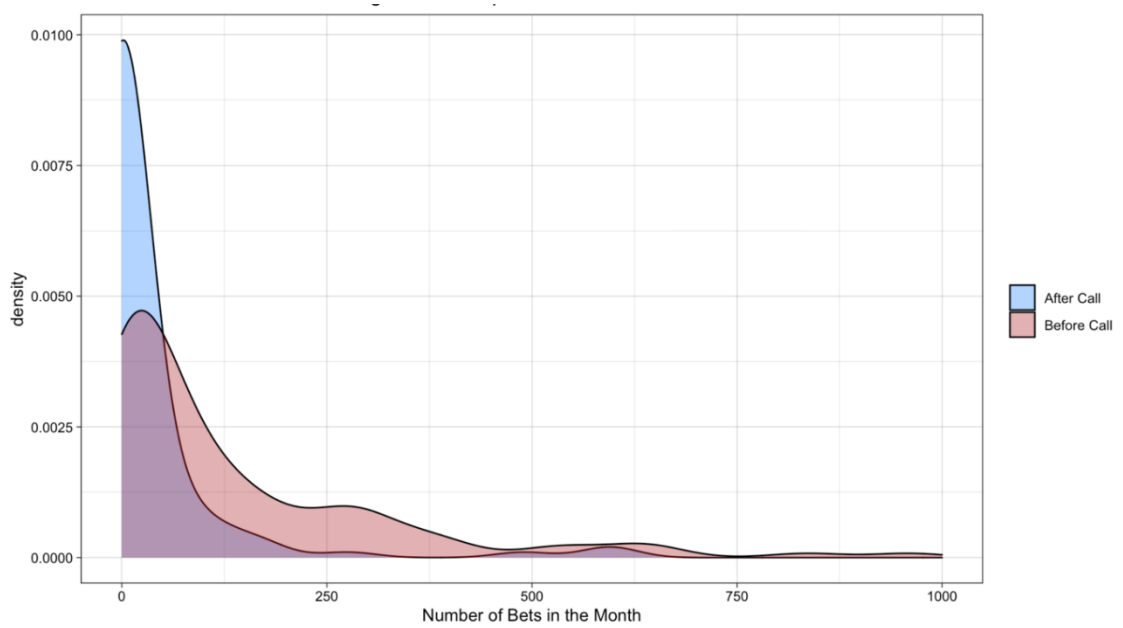


In the 'after' distribution, the peak at zero will reflect that some recipients of a call will have abstained from gambling altogether in the following month (e.g. they may have decided to self-exclude). In the positive part of the spend range, the picture is one of substantial moderation in the size of losses, reflected in higher frequency of 'small' monthly losses and very much lower frequency of 'high' monthly losses. **Across the set of customers who were called, there is therefore substantial evidence of moderation of behaviour.**

Figure 25 plots the distribution of the number of bets placed in the month before and after a telephone call. In the month before, there are customers who placed zero bets (i.e. in that month, or often for the whole year, they were gaming-only players). After the telephone contact, there are many more zeros, because many recipients of a call have ceased to bet. To the right of zero, comparing the distributions reveals a strong tendency towards placing fewer bets in the first month after the intervention. **Again, this is very strong evidence of moderation of behaviour.**

We produced similar plots (included in Appendix C) which investigated changes in betting stakes, gaming spend and gaming duration. All pointed towards significantly reduced engagement by those who had received a call.

Figure 25: Distribution of number of bets in the month before and in the month after a telephone intervention



These results are very encouraging for operators in terms of the possible effectiveness of their interventions (though implicitly prioritising specificity over sensitivity may create the appearance of effectiveness even while many cases with elevated probability of harm are not addressed at all). However, the charts illustrate only an association between intervention and moderation of behaviour. The moderation may reflect a reversion-to-the-mean effect, i.e. those exhibiting extreme behaviour in one period may shift in the direction of more average behaviour in the following period with or without an intervention. Forrest & McHale (2016) demonstrated in a longitudinal study of slots players in land casinos that extreme play observed in any one month tended not to be sustained for long into the following months. Reversion to the mean may occur, for example, because the extreme play in one month was the result of 'special occasions' or because financial losses compel a reconsideration of gambling behaviour (in the limit, all funds may be exhausted). To establish how much causal effect there was from interventions, the change in the behaviour of the 'treated' group (those with an intervention) would have to be compared with that of a control group with similar patterns of behaviour but where there was no intervention.[115]

Credit cards

Finally, we consider an intervention made directly by the regulator. Much of the case for the credit card ban it introduced during 2020 rested on the fact that financial institutions treat payments for gambling as cash advances and therefore subject them to immediate interest charges from the date of the transaction. While consumers may not have been aware of these charges the first time they used a credit card for gambling, ongoing use involving significant outlay would seem unlikely to have been common where they had the funds to use a debit card instead. Many gamblers who used a credit card to gamble could therefore probably do so only by borrowing money, which is itself a sign of probable gambling harm and indeed explicitly one of the criteria

[115] A further caveat to the strong evidence that an intervention was associated with moderation of behaviour is that some subjects may just have responded by diverting activity to other regulated or unregulated operators in order to avoid further telephone calls or the possibility of having restrictions placed on the account.

included in the PGSI and other screens for problem gambling. Some of them may have resorted to multiple credit cards to finance gambling, thereby rapidly accumulating debt, with resultant harm.[116] The ban was intended to deter such a pattern of behaviour by introducing friction into the process of borrowing money to fund gambling (e.g. funds from the credit card account could still be used but would require withdrawal from a cash machine and transfer to a current account). Although the effectiveness of the ban could have been undermined by gamblers seeking out alternative and more costly ways of borrowing money to gamble, an Interim Evaluation issued by the Gambling Commission in November 2021, using a variety of sources, found little evidence for such 'unintended consequences'.[117] A full evaluation has been commissioned from NatCen Social Research and is expected to be published in early 2023.

We investigated the use of credit cards across the distribution of accounts in our data set, organised by size of losses and wins. 8.7% of all account-holders made use of a credit card. But both those who recorded big wins and those who lost most heavily over the year had an elevated propensity to use a credit card and this was much more pronounced for the heaviest losers:

- of those who lost more than £2,000 over the year, 23.2% used a credit card
- of those who lost more than £5,000 over the year, 26.2% used a credit card

Those who accumulated the largest losses over the year were therefore about three times more likely to have used a credit card than the generality of customers. GREO (2020)[118] notes from Gambling Commission survey data that use of a credit card was also correlated with breadth of gambling activities and with propensity to gamble daily, both markers for problem gambling. Our account data therefore add to indications from survey data that the ban on credit cards was appropriately targeted at a group with elevated risk of gambling harm.

[116] GREO (2020) presents findings from a Rapid Evidence Review on the question of links between credit card use and gambling harm. Gambling Research Exchange Ontario (GREO). (2020). *The Role of Credit Cards in Gambling*: https://www.greo.ca/Modules/EvidenceCentre/files/GREO_04_2020_CreditCardRER.pdf (accessed 20.2.22)

[117] https://www.gamblingcommission.gov.uk/news/article/gambling-commission-publishes-interim-evaluation-on-the-successful (accessed 06.12.21)

[118] Gambling Research Exchange Ontario (GREO) (2020). *The Role of Credit Cards in Gambling*, Report prepared for the Gambling Commission: https://doi.org/10.33684/2020.001 (accessed 06.12.21)

3 Summary and recommendations

3.1 Betting

The operators which cooperated in the research accounted for more than 85% of gross gambling yield in the domestic online betting industry, and it is therefore reasonable to assume our data is an accurate representation of patterns of play in online betting in Great Britain. The operators provided betting opportunities for a wide range of sports and other events but football and horse racing were dominant in their revenue streams. Football generated about half of operator revenue and horse racing more than 30%. While it was common for betting-active accounts to have been used to wager on both sports, there was a significant tendency for younger customers to spend mainly on football betting and older customers to focus on horse racing. This poses a risk for horse racing because its viability and that of associated industries is crucially dependent on betting-related income, which would be threatened if younger bettors do not change their betting preferences as they age.

Online betting proved to be very much a male world. We estimated that more than 94% of industry revenue derived from accounts belonging to men. To a substantial extent, this was explained by much higher participation in betting but other contributing factors were that, on average, male bettors wagered much more frequently than female bettors and at somewhat higher stakes. Further, the prevalence of very high spending was strikingly greater for men. That many women who gamble online eschew betting in favour of gaming activities (slots and bingo in particular) implies that recent safer gambling public awareness campaigns will have failed to reach out successfully to female gamblers because the campaign content focused on football betting, which will have had little relevance to many women who gamble.

Patterns of play by age were broadly similar in both the online betting and online gaming markets. In betting, those in the 25-44 age-groups held more than half of all active accounts and provided more than half of all operator revenue. Under-25s also held a share of active accounts which was disproportionately high relative to their share of the adult population but they tended to be low spenders, on average, and so generated only about 10% of betting industry revenue. In contrast, the age-groups from 45 upwards had a much lower propensity to take part in online betting but those who did so typically spent to significantly higher levels than younger account-holders, such that, while comprising only 25% of bettors, over-45s delivered more than 35% of total revenue. There was a clear tendency across the age range for both spending level and frequency of betting to increase with age within the population of online bettors.

The account data did not include any information on individual account-holders beyond gender and age but did include an indication of the deprivation status of the neighbourhood in which the account address was located. We established that operator revenue from betting was drawn fairly evenly across different types of area defined by level of deprivation. This broad finding conceals detail such as that football betting revenue was to some extent drawn disproportionately from the most deprived areas and horse race betting revenue disproportionately from the least deprived areas, the latter explained mainly by higher staking levels and in spite of a tendency for less adverse returns-to-stake for bettors in those areas. Among betting products outside football and horse racing, participation in betting on virtual events was particularly skewed towards the most deprived areas (even if levels of engagement were typically low). Perhaps this is unsurprising because outcomes of simulated sports events are determined by random number generation and so the product could almost be

regarded as a themed slots game and have attractions similar to slots games where, in contrast to betting viewed in totality, operator revenue was extracted disproportionately heavily from the most deprived areas.

There is abundant prior research which shows that, in virtually all industries supplying consumer goods and services, a high proportion of profit derives from a small proportion of customers, the “vital few”. However, the account data demonstrated that online betting is even more dependent on a relatively small number of customers than is usually found to be the case in other sectors of the economy. For example, we estimated that the top-1% of customers ranked by volume of betting (total staked in bets placed over the year) generated 36.4% of operator win and the top-10% generated 79.1% of operator win. To have qualified for the top-1%, a bettor had to have wagered at least £30,493 over the year and for the top-10% at least £5,639. We found that these ‘top’ bettors achieved superior outcomes than other bettors (i.e. they lost a lower fraction of their stakes) but they still spent to a level such that their contribution to profit was completely disproportionate to their numbers. Here is encapsulated a major problem for the industry. Its social licence to operate relatively freely may depend on its being seen successfully to address gambling harm. But the commercial viability of the industry at its current scale appears to depend to a substantial extent on the activity of a (possibly ever-changing) cast of high spending customers, which, because problem gambling is correlated with spending levels, is likely to contain many individuals who experience gambling harm. Channel shift has made the dilemma for the gambling sector more transparent because account-based data can be used to demonstrate the extreme concentration of spending in a small proportion of gamblers, which was never possible from survey data where responses to questions about spending were notoriously unreliable and where sample sizes were necessarily too limited to allow harvesting of sufficient numbers of heavy spenders for estimation of their numbers to be accurate. At the same time, the shift to online play offers the possibility that, if techniques used in player tracking become sufficiently refined, it may be possible to distinguish between heavy spenders likely to be experiencing harm and those who are gambling safely consistent with their preferences.

As implied by the high concentration of spending, most account holders spent to a modest level but a relatively small fraction incurred what many would regard as significant losses from betting. We estimated that 4.4% of accounts lost more than £1,000 over the year, 2.2% lost more than £2,000, and 0.7% lost more than £5,000. Though the percentages may appear low, the implied absolute numbers of accounts which incurred such losses were significant. For example, we estimated that the number of accounts with the operators in the study which had betting losses in excess of £2,000 was more than 190,000. This is likely to under-estimate the number of individuals who lost to that level while online betting because some account-holders will have lost additional amounts at other operators than their sampled account.

Online bettors with the largest losses over the year were disproportionately likely to be male and their average age was around 40. A significant number had addresses in deprived areas. For example, 21.9% of those with a loss of £2,000 or more were from the 20% most deprived areas (though it should be noted that not all of these may have been disadvantaged individuals: more wealthy individuals in deprived areas may spend some of their extra income, compared with their neighbours, on gambling). About half of those who lost more than £2,000 incurred the bulk of their loss from ‘sports betting’ and about one-quarter from ‘race betting’. The number of different sports bet on during the year was a strong predictor of risk of falling into a ‘high spend’ group, which is consistent with prior research findings that breadth of gambling activity is a strong marker for problem gambling.

A novel feature of the data set was the availability of an indicator for the odds at which bets were placed. In horse race betting, there was little systematic difference in the typical choice of odds across either the age range or the deprivation range (though stake size increased with age and as the area of residence became less deprived). Football betting presented a different picture. While typical stake size was close to £5 for all groups, younger bettors and those from more deprived areas typically chose longer odds bets. Indeed, typical odds for these groups were at levels which suggest a strong preference for combination bets where the bettor has to predict several different outcomes within one match or across matches. For many young football bettors and for bettors from deprived areas, the favoured bet was a £5 bet which was very unlikely to win.

3.2 Gaming

'Gaming' covers a variety of types of gambling: slots games, casino games, bingo, poker and instant wins. According to our estimates, the seven operators included in the project captured 37.5% of the online gaming market in Great Britain during the one year data period, which was less than half their market share in online betting. Nevertheless, there was a fair degree of similarity between the proportions of GGY accounted for by each type of game as between the operator data and the whole-market data, allowing some confidence that the data set would yield useful general insights into patterns of play in online gaming in Great Britain.

We examined both aggregate spending and aggregate usage of time while playing each type of game. Slots games accounted for the majority of spending (60.1%) on gaming activities, reflecting its dominance in the online gambling sector (where its GGY comfortably exceeds that of betting). Within gaming, slots also occupied more of customers' time than other game types. Casino games generated 33.0% of the operators' yield from online gaming, leaving bingo with a minority share of gaming GGY. Nonetheless, in the aggregate, bingo accounted for more hours of play than casino games. This reflects significant differences in the degrees to which different products are money-intensive or time-intensive activities. We estimated that, on average, players lost £1.12 per minute playing casino games, slots players 31.8 pence per minute, poker players 18.9 pence per minute and bingo players only 7.2 pence per minute. At the level of the individual, it was rare to have allocated a substantial amount of time to play over the year as a whole but 1.2% of holders of accounts used for gaming (close to 50,000 individuals) spent the equivalent of eight full days playing over the study period. More than 70% of this group were players for whom slots accounted for at least 80% of their gaming spend and, on average, they spent nearly £5,000 on online gaming during the year. 46.1% were female, which means that female gaming customers were much more likely than male gaming customers to fall within the group who spent more than eight full days on the activity.

We had found for online betting that less than a quarter of customers were women. The same proved true for casino and poker. However, in slots, the proportion of females was somewhat higher, about one-third, and women made up the majority (62%) of those who took part in online bingo during the year. In the cases of slots and bingo, representation of women was higher still if one considers only regular players, defined as those taking part about once a week or more often.

We compared the gender split for four types of gaming with the gender split for corresponding offline products as estimated by the *Health Survey for England*, carried out around the same time as our data. For each of the four gaming activities, the proportion of women amongst players in the online data was very close to that estimated for offline activity. This challenges the notion that the online space offers a

different enough environment from land venues that it will change the relative participation-rates in gambling according to gender.

In contrast to betting, we found that females who participated in gaming activities were typically more active and engaged players compared with men. Women took part in more and longer sessions. On the other hand, women tended to stake at lower levels than men. Even so, considering all gaming products together, their greater activity still resulted in the median female player spending half as much again over the year as the median male player. Broadly, this trend held at the level of each individual product though in casino games the sharply higher average stake size for men made male customers significantly more lucrative for the operators than female customers. Further, the proportion of male players included in the group of the very highest spending accounts was higher than the proportion of female players.

Relative participation-rates by age observed in the data for each game type were also similar to those reported for gambling at land venues. As with betting, the 25-44 demographic was the most important from the industry perspective, accounting for more than 58% of customers and more than 56% of revenue. Younger adults held a far greater proportion of active gaming accounts than their share of the adult population but average spending in this group was low and the under-25s contributed only 6.4% of online gaming GGY, according to our estimates. By contrast, older adults were very much less likely to be an online gaming customer but those who did take part in online gaming tended to spend to higher levels than members of other groups. Generally, mean spending by online players increased steeply across our eight age-bands, to peak in the 55-64 group (and over-65s on average spent only a little less than those 55-64) and a similar pattern emerges if one considers median rather than mean values. At the level of the individual product, over-55s always made a disproportionately high contribution to operator GGY, with the most extreme case being bingo.

In every one of our eight age-groups, the figure for online spending on gaming was higher than the corresponding figure for betting. The discrepancy increased with age and in each of the three age-groups above 55 years, the average gaming customer spent more than twice as much over the year as the average betting customer. This confirms that, while online betting is more popular than online gaming among the British population, spending levels per customer tend to be much higher in gaming.

Perhaps the most striking contrast between the betting and gaming sectors was in the distribution of both customers and industry revenue across areas defined by level of deprivation. In gaming, both participation and revenue were strongly skewed towards the most deprived areas. Across gaming in the aggregate, the 20% most deprived areas provided 29.2% of players and 25.2% of operator GGY whereas the 20% least deprived areas provided 12.9% of players and 15.0% of operator GGY. There was a strong tendency for gaming customers with addresses in more deprived areas to be more active players than those in less deprived areas though they also tended to play with a lower stake size.

The skew in participation towards more deprived areas was observed for all categories of gaming product but was greatest in bingo where the 20% most deprived areas delivered 39% of players. The concentration of players in deprived areas was also particularly high for female slots players. The interaction of the probability of having an active account, the frequency of play and the average stake size led to differences between product categories in terms of the distribution of industry revenue by area deprivation. The most deprived areas contributed disproportionately to GGY from bingo and slots but in casino games and poker revenue was fairly evenly spread across the deprivation range.

As with betting, the online gaming sector had heavy dependence on a “vital few” customers. The ‘top-20%’ of customers by volume generated just over 90% of revenue. However, there are structural differences between gaming products such that a given ‘volume’ (amount staked) of play signifies different things in different setting (for example, slots play can be rapid with winnings immediately recycled into further spins; and payback-rates vary considerably by product). Therefore, it is likely to be more meaningful to consider concentration of revenue product-by-product. The most popular product is slots. Here just one percent of players generated a little more than 40% of GGY and in this group the average loss over the year was £10,491. Thus, a large proportion of revenue derived from exceptionally heavy spenders. Concentration of spending was even higher for the second-most popular product, virtual casino games, and lowest for bingo. Bingo not only had the lowest level of concentration of revenue but also, with its typically low spending levels, the threshold for being counted in the ‘top-10%’ or even ‘top-1%’ of players was fairly modest. Nevertheless, the top one-half of one percent of bingo players, where the threshold to be passed was £6,737 gambled (equivalent to an expected loss close to £1,000), provided 26.5% of bingo GGY. Thus, it could be claimed for every product that the industry was very dependent on a “vital few” customers.

As with betting, a large majority of gaming customers spent to modest levels but non-trivial numbers incurred losses which many would consider heavy. For each of the thresholds we used to define high spending, the proportion of customers who qualified for inclusion was appreciably higher than in the case of betting. We estimated that 5.9% of players lost more than £1,000 over the year, 3.2% lost more than £2,000 and 1.2% lost more than £5,000. These estimates imply, for example, that the operators in the study had 129,000 customers who lost more than £2,000. Our estimate from the betting data was that 190,000 customers lost more than £2,000. However, findings from the follow-on survey include that gaming customers were more likely to use multiple operators than betting customers. Further, the seven companies in the study captured only 37.5% of the online gaming market (compared with 85.5% of the betting market). Bearing these factors in mind, it seems plausible to speculate that the number of ‘heavy losers’ in online gaming in Great Britain may be as high as in online betting notwithstanding that its participation-rate is very much lower.

On average, heavy losers tended to be aged in their low- or mid-forties. The probability of a male customer being within a heavy loser group was only a little higher than for females except that those who lost more than £20,000 were overwhelmingly male. Slots games were the principal source of losses among heavy losers. For example, 54.5% of those who had a one-year loss in excess of £2,000 incurred at least 80% of their loss on slots games. Just over a quarter had all or more than 80% of their loss from casino games. Most of the rest had losses spread over multiple activities.

The heavy spending groups included many players with addresses in very deprived areas. For example, 30.4% of players who lost more than £2,000 lived in the 20% most deprived areas and just over one-quarter of those who lost £2,000-£5,000 lived in the 20% most deprived areas. Again, the concentration of high spenders in areas of deprivation is strikingly high relative to comparable figures for betting. The numbers are of concern because the levels of loss are high relative to typical income levels in deprived areas. However, we caution that we were unable to establish how many of the account-holders in question were themselves in disadvantaged households and how many were in fact relatively privileged individuals living in poorer areas.

We examined a number of other issues through analysis of the account data. Individual sessions where a heavy loss was incurred (for example, more than £1,000) were relatively rare and usually one-offs for the customer. Nevertheless they merit attention because of the possibility that loss of control resulted in significant financial harm to the player. 1.9% of holders of gaming-active accounts experienced a single-session loss of

more than £1,000 at least once during the year and 0.6% of players lost £1,000 at least three times. Such instances of high loss on a single occasion were most likely from playing casino games. We also investigated behaviour by time of day. Prior research from land venues suggests that greater risks are taken when gambling occurs very late at night. In our analysis of the betting data, we found that amounts staked were significantly higher in the early hours than during the day and from the gaming data we established that intensity of play (loss-per-minute) was higher than during the day. This was most strongly evident in the case of casino games. It was not possible to establish whether the late night setting itself causes greater risk taking or whether the findings were more due to a selection effect (late night play attracts different sorts of people) but it is clear that late night play merits greater scrutiny. We have added to the research base by showing that this applies to remote as well as to in-venue gambling. Finally, in summarising the findings from analysis of the gaming account data, we note that fast slots play was a strong risk factor for incurring heavy losses from online gaming. During the data period, fast play was facilitated by the ability of customers to choose 'autoplay'. Since then, new regulation has prohibited autoplay and introduced a restriction on how short the gap between spins can be. From our analysis, this will disproportionately affect those who lose the greatest amount from gambling and the regulatory interventions appears to that extent to have been well-targeted.

According to the *Health Survey for England*, problem gambling prevalence[119] around the time to which our data relate was 8.5% among those who had participated in 'online gambling on slots, casino or bingo games' and 3.7% among those who had participated in 'online betting with a bookmaker'. This suggests greater risk of harm from online gaming than from online betting. The account data could not determine which customers were experiencing harm but raised several 'red flags' suggestive of greater harm in the gaming part of the market. Gaming was associated with an appreciably higher probability of incurring heavy losses, and, of those who spent to the highest levels, an appreciably higher proportion had addresses in the most deprived neighbourhoods. Much of recent debate on the potential harm of gambling has focused on betting and public awareness campaigns have been built on imagery associated with betting. However, slots play alone generates more revenue for the online industry than betting and some rebalancing may be appropriate to focus more attention on the risks when taking part in gaming activities.

3.3 Overall gambling

Having presented detailed analysis of patterns of play in the online betting and gaming markets, the obvious next step was to put the two together to form a picture of the whole (recorded) activity of players in the online gambling space. However, it was more difficult to argue that the data were representative to an adequate extent to allow this to be carried out convincingly. The major operators which co-operated in the project tended towards being betting-led to the extent that their revenue yield from betting exceeded that from gaming. But, from regulatory returns for the whole domestic online market, it is known that GGY from online gaming was about half as great again as GGY from betting during 2018-2019. Hence the balance between betting and gaming observed in the data is not representative of the picture in the market. The data therefore allow only a description of patterns of play at these major operators, with limited scope for generalising beyond this.

Nevertheless interesting patterns emerged, particularly with respect to the distinctiveness of dual customers (those who participated in both betting and gaming).

[119] An individual was termed a 'problem gambler' if he or she satisfied the criteria on either or both of the PGSI and DSM-IV screens.

These customers were particularly lucrative from the operator point of view. From the data, we estimated that per-account GGY during the one year data period was £601.93 for dual customers (compared with £296.20 for gaming-only and £134.98 for betting-only). In fact, while comprising only about one-quarter of accounts, 'duals' delivered more than one-half (55%) of operator GGY.

The greater average spending level of dual customers was reflected in the proportion of them who qualified for classification as 'heavy losers'. We estimate that 1.6% of betting-only accounts, and 3.0% of gaming-only accounts recorded a one year loss of more than £2,000 but for dual accounts the proportion was 6.8%. The relative risk of dual play increased further when we set a £5,000 threshold for defining a high level of spending.

It is clear that dual customers comprise a high-risk group by virtue of their propensity to high spending and this is consistent with prior research findings that breadth of gambling activities is a strong marker for problem gambling.

Considering the whole set of customers who lost more than £2,000 from all their gambling activity with the sampled account, 83.5% were men and the average age was just over 40, i.e. a little older than the generality of customers. 24.1% had addresses in the 20% most deprived areas. We regarded customers who had incurred at least 80% of their total loss from betting as 'betting focused' and defined 'gaming focused' similarly. 54.5% of heavy (greater than £2,000) losers were 'betting focused' and 31.7% were 'gaming focused'. However, the proportion of 'betting focused' players in the whole customer base was high and these figures imply a much greater probability of a high loss among clients whose balance of activity was skewed towards gaming.

From analysing all gambling activity, the same story about concentration of revenue emerged as when we studied the two sub-sectors separately. The 'top-10%' of gamblers defined by volume delivered 79.0% of operator revenue. We preferred to focus on the top-10% because the qualification for entering the top 10% (£4,568 staked) roughly corresponds to an expected one year loss where (from international evidence) risk of problem gambling begins to increase. That about four-fifths of the operators' revenue appears to derive from a group with elevated risk highlights the dilemmas faced by the industry and in formulating public policy.

From the data for 'all gambling', operators in the study drew a somewhat greater revenue share from the most deprived areas than from the least deprived areas but this difference was evident only at the two extremes of the deprivation range. Across most of the deprivation range, revenue was about the same whether the areas were closer to the very high or to the very low deprivation ends of the spectrum. The contrast between the two ends was associated with higher spend on gaming products in the most deprived areas.

3.4 Safer gambling: self-management tools and operator interventions

Operators licenced to supply online gambling services in Great Britain are obliged to provide customers with tools which might enable them to better control their gambling. These allow account-holders to request pop-up reminders of how long their gambling session has lasted, to set deposit limit on their account, or to bar themselves from gambling at the website on either a short-term or long-term basis. The account data recorded details whenever the customer used one of these facilities, for example setting-up a deposit limit or varying its size. It was not possible to obtain a definitive measure of how many customers used self-control measures because we could not

observe, for example, instances where a deposit limit had been set up before the start of the data period and not varied during the data period. In this case, there would be no activity recorded in the data even though limits previously set still applied to the player. Nevertheless, it was possible to make several inferences from the data, inferences which were broadly consistent with prior research findings that self-management tools are most likely to be used by those experiencing harm from their gambling. It was also found in the follow-on survey that those recalling harm from gambling had a high probability (high in both absolute and relative terms) of having adopted self-control strategies to limit their gambling.

'Reality checks' remind the customer how long he or she has been gambling, the reminder appearing on-screen at whatever frequency the customer chooses. Just under 1% of account records included a reality check 'transaction' during the year, with more joining than cancelling the service. Even though we will not have detected cases where a reality check was already in place at the start of the data year and not varied during the year, it is clear that usage of reality checks is rare. They are most likely to be used by customers who take part in gaming activities, where reminders are more relevant given that gaming play tends to be continuous for a period of time whereas bets are often placed as individual discrete actions with little time spent on the website. Dual customers were more than twice as likely as gaming-only customers to use reality checks. Accounts with high annual losses were very much more likely to include use of reality checks compared with average accounts. For example, 9.1% of accounts with a one year loss of more than £2,000 included reality check transactions compared with 0.9% across the whole account base. Therefore though overall usage appears to be very low, its correlation with dual customer status (breadth of gambling) and with high spending indicates that the facility was employed by a significant minority of those who may need triggers to help them control their gambling.

Deposit limits were set up or varied by 21.5% of account-holders during the account year, confirming deposit limits as the self-management tool with the highest take-up. We found no strong patterns in take-up regarding age, gender, area deprivation or participation in betting versus gaming. High spenders were only marginally more likely to be users compared with other players. Any satisfaction with a relatively high take-up must therefore be tempered by the finding that those whose pattern of behaviour correlates with risk of harm are barely more likely to use the facility than anyone else. The explanation for the (non-) findings may be that a high number of users set their deposit limit at a very much higher level than was likely ever to constrain their activity. This merits further investigation but it is possible that some customers think that they are expected to set a deposit limit but then set it at an irrelevantly high level.

'Time-outs' allow customers to bar themselves temporarily from gambling on the website. 2.5% of account-holders used the facility at least once during the study year. Many of these, nearly one-third, used it at least twenty times. It is clear that, for some, time-outs are used habitually when they feel a need to limit their opportunity to gamble. Dual customers were most likely to use time-outs and there was also a strong correlation with spending level. For example, more than 23% of customers who ended the year with an accumulated loss of more than £2,000 used time-out. The evidence is therefore that the facility has good take-up among, and is used actively by, those who may be at elevated risk of harm.

Self-exclusion is a more formal step to take and involves customers barring themselves from gambling with the operator either permanently or for a fixed period of at least six months. In Great Britain, players can choose to extend their self-exclusion to all licenced online operators through the GAMSTOP scheme. Whether or not a self-exclusion included GAMSTOP was inconsistently recorded in the account data set and so we were not able to report on how frequently the GAMSTOP option was invoked.

2.3% of accounts in the data set registered a self-exclusion. About one-quarter of self-excluders set an exclusion period of up to twelve months and almost exactly half chose five years or more. Their average age was 34. Dual customers were more likely to self-exclude than others and the probability for betting-only customers was very low. High spenders were over-represented in the group of self-excluders. More than 10% of self-excluders lost more than £2,000 over the year even though their gambling year had been truncated by the act of self-exclusion.

We analysed self-excluders' behaviour in the two months prior to their date of self-exclusion. Whilst a significant number had won money over the preceding month, 9.5% self-excluded following monthly losses in excess of £1,000; usually representing an escalation on the previous month.

Prior research shows that self-excluders are not always removing themselves because they are experiencing problems from their gambling. They may just wish to sever all ties with an operator with which they are disillusioned (self-exclusion also prevents operators from contacting the former customer for marketing purposes). But we could still detect that self-exclusion was more common among apparently higher-risk players. Self-exclusion therefore appeared to be serving its purpose. To a very modest extent, the findings here help validate the practice of using self-exclusion as an (imperfect) proxy for problem gambling when training models to predict problem gambling on historic account data.

Licensed operators are also obligated to track player's behaviour and to initiate interaction where their systems detect that the customer may be experiencing harm. 3.9% of account-holders received an intervention in some way, usually by e-mail and a small number multiple times. 0.7% received a telephone contact, where 'interaction' seems more likely to occur. Interventions appear to have been well-targeted to the extent that dual customers and heavy spenders were very much more likely to be contacted than average customers. Further, raw data suggested that interventions were often followed by moderation of the customer's activity though raw data cannot easily establish the extent to which the effect was causal rather than a reversion towards more normal behaviour which would have occurred anyway. It is also impossible to know how many seemingly effective interventions masked cases where the player had just switched activity to another operator to avoid further interventions.

Although there was evidence that those at risk of experiencing harm were more likely to be recipients of a contact, and evidence which is not inconsistent with interventions having had beneficial effects, it is still questionable whether operators were satisfactorily fulfilling licence requirements to interact with customers who may be experiencing harm. According to the *Health Survey for England* which covered gambling around the time to which the data pertain, up to 10% of past-year online gamblers were either 'problem gamblers' or gamblers for whom there was a 'moderate risk' that they were experiencing gambling harm. The proportion of customers receiving any intervention, let alone direct interaction through a telephone call, appears to be low relative to these prevalence estimates. It is true that some at-risk gamblers may have been the subject of intervention prior to the account year and true also that some customers whose gambling was problematic may have escaped detection by their activity being spread across multiple operators. But these factors are unlikely to explain the size of the discrepancy between the numbers contacted and the number of online players who "may be experiencing harm" according to prevalence data. For example, although account-holders who lost more than £2,000 over the year were much more likely than average to receive a telephone call related to the licensee's social responsibility obligations, still only 0.84% of such account-holders were called. Future systems to detect problem gambling would be enhanced by a 'Single Customer View' of players' activities across all operators. But it appears also that the present restricted views are inadequate even for addressing cases of possible harm signalled by

behaviour observed at one operator. It may be that thresholds for intervention are set too low by the systems operators use to detect which customers may be experiencing harm and this possibility opens the industry up to suspicion that operators are insufficiently curious about their high spending customers because it is they who have most commercial value.

3.5 Recommendations

From the account data, the following recommendations for preventing or responding to gambling harms are provided:

We recommend that future safer gambling campaigns should give greater weight to the risks of playing casino and slots games online

According to the *Health Survey for England*, participation in online slots, casino and bingo games is less widespread than participation in online betting but the prevalence of problem gambling among its players is more than twice as high. The account data analysed in the present study did not allow problem gambling to be observed directly but there were several findings which were suggestive of greater risk of harm among gaming customers than among betting customers. For example, the proportion of players who lost in the thousands of pounds over the study year was sharply higher in gaming (and even higher again among dual customers). Further, compared with bettors, very high spending gaming customers were much more likely to reside in the most deprived areas, raising concerns about affordability. Recent high-profile safer gambling campaigns such as BetRegret have focused on risks associated with online betting, with football fans as the most targeted audience. We recommend that future safer gambling campaigns should instead give due weight to the risks of playing casino and slots games online. Compared with betting, such games appear to be more strongly associated with acknowledged correlates of gambling harm.

We recommend that future research should include addressing the question of the extent to which converting online gamblers from betting-only to dual status has a causal effect on risk of gambling harm

Past research has established that breadth of gambling activity is a particularly strong predictor of problem gambling and so customers who take part in both betting and gaming merit particular attention. Amongst the operators participating in the study, only 25% of accounts were used for both activities but these accounts generated 55% of operator revenue. The dual customers were heavily over-represented amongst the highest spending accounts, for example they held more than 55% of accounts with a loss over the year in excess of £2,000. They were much more likely than other customers to choose to self-exclude and much more likely to receive the highest level of operator safer gambling intervention. The evidence from the account data is therefore that dual customers are particularly lucrative for operators and also particularly at risk of gambling harm. The commercial value of dual customers provides an incentive for operators to recruit bettors in the hope of converting them to dual customers through aggressive cross-selling. In some cases, this may amount merely to transfer of activities between operators. On the other hand, aggressive marketing may expand the proportion of players who engage in both activities and therefore expose more individuals to a pattern of activity which is at least associated with harm. We recommend that future research should include addressing the question of the extent to which converting online gamblers from betting-only to dual status has a causal effect on risk of gambling harm and that, until more becomes known, operators should monitor particularly closely customers who have shifted from betting-only to dual status. Similar consideration might be given also to the relationship beteween playing

bingo and playing slots given that the proportion of high-spending customers is much higher for those who play both rather than only bingo.

We recommend that operators lower their thresholds for initiating interaction with customers

In line with good practice since embodied in the Social Responsibility Code[120] applicable to suppliers of online gambling services in Great Britain, all operators participating in the project had procedures in place first for tracking play to identify players who "may be experiencing harm" from gambling and for then engaging in interaction with such customers. Such interaction proved typically to be one-sided (an e-mail with a safer gambling theme) but some customers received stronger intervention in the form of one or more telephone calls. Such interventions appear to have been well-targeted. For example, dual customers and the heaviest spenders were particularly likely to have been contacted, according to the account records. Further, raw data indicated that interventions were often followed by moderation of the customer's gambling behaviour. On the other hand, we were concerned at the low proportion of customers with whom there had been interaction. During the study year, 3.9% of account-holders received a social responsibility contact, an e-mail in the large majority of cases. Just 0.13% of account-holders received a telephone call. According to the *Health Survey for England*, with field work roughly contemporaneous with our data period, 4.2% of past-year online gamblers were classified as 'problem gamblers' and were therefore very likely to have been experiencing harm. 5.8% of past-year online gamblers were 'PGSI moderate risk', where there is a moderate chance that the player is experiencing harm. One might therefore think of the group of customers who "may be experiencing harm" as comprising something of the order of 10% of all account-holders. Over the one-year period studied, the proportion of account-holders contacted was much lower than this, which suggests failure to identify most cases where the customer may have been experiencing harm. We recommend that operators lower their thresholds for initiating interaction with customers. Setting systems to be more sensitive (i.e.to encompass a greater proportion of true cases of harm) would be likely to be at the cost of lower specificity, i.e. a greater number of false positives such that more customers would be contacted where no harm is present. Operators might need encouragement to make changes which may lead to non-problem gamblers being inconvenienced by a contact but in fact there is little empirical support for fearing that this would lose customers. Ivanova et al. (2019)[121] reported that few 'recreational gamblers' felt irritation at exposure to responsible gambling images presented to them online; and being seen to give attention to safer gambling issues may even enhance the reputation of the company among its players (Gainsbury, Parke & Suhonen, 2013).[122] In a survey of 197 customers who had received a telephone intervention from a Swedish operator, only 13% endorsed having been annoyed or angry about the intervention and 88% regarded the call as showing that the company cared about the gambler.[123]

[120] https://www.gamblingcommission.gov.uk/licensees-and-businesses/lccp/condition/3-4-1-customer-interaction (accessed 31.12.21)

[121] Ivanova, E., Magnusson, K. and Carlbring, P. (2019) Deposit Limit Prompt in Online Gambling for Reducing Gambling Intensity: A Randomized Controlled Trial, *Frontiers in Psycholog*, 10, 639.

[122] Gainsbury, S., Parke J. & Suhonen, N. (2013). Consumer attitudes towards Internet gambling: Perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites, *Computers in Human Behavior, 29(1)*, 235-245: https://doi.org/10.1016/j.chb.2012.08.010

[123] Håkansson A., Franklin K., Dahlström M. & Lyckberg A. (2022). Responsible gambling through a motivational telephone intervention to high-risk gamblers – An evaluation of user satisfaction and subjectiveiIntervention effects, preprint: https://doi.org/10.21203/rs.3.rs-1349386/v1

We recommend that operators should show more curiosity about their most lucrative customers

Many of those who spent substantially higher amounts than average customers while online gambling in 2018-2019 will not have been people experiencing problems. As with other leisure pursuits, some respondents will have greater enthusiasm than others and a strong preference for the particular activity may be reflected in high commitment in terms of money or time, with harm to no one. On the other hand, the amount spent on gambling is known to be correlated with problem gambling status. Moreover, high spending may itself create much of the harm associated with problem gambling because so much harm arises from, or is mediated through, financial stress. The follow-on survey reported in this study confirms a relationship between account spending level in 2018-2019 and the probability of recalling problems managing financially and the probability of having ever self-perceived a gambling problem. Given that high spending is such a strong risk factor for gambling harm, we were surprised that the majority of 'high spenders' were not recorded as having received a social responsibility contact during the year. Just 3% of accounts recorded a net loss of more than £2,000 during the study year. Of these only about one-third received any sort of intervention (such as a safer gambling message sent by e-mail) and less than 1% were escalated to the point of a telephone call. We acknowledge that some of those not contacted may have received an intervention prior to the data period and satisfactory evidence gathered that the customer was not at risk of harm. Nevertheless, given that good practice, now embedded in the Social Responsibility Code, requires interaction with customers who "may be experiencing harm", it is surprising that such a low proportion of high spending accounts triggered an intervention. We recommend that operators should show more curiosity about their most lucrative customers and adopt internal procedures to guard against suspicion that commercial considerations are allowed to compromise compliance with the Social Responsibility Code.[124] For example, they might consider reviewing all customers whose rate of spending exceeds a threshold, such as one equivalent to £2,000 when annualised, and, if the decision is not to initiate an interaction, require that the staff member then make a record of the reason for the decision.

[124] In general comments on the sector as a whole, the Gambling Commission noted casework over several years which identified multiple instances of failure to comply with social responsibility obligations and explicitly attributed failings to operators "simply putting commercial objectives ahead of regulatory ones". Gambling Commission (2021). *Raising Standards for consumers - Compliance and Enforcement report 2020 to 2021*: https://www.gamblingcommission.gov.uk/report/raising-standards-for-consumers-compliance-and-enforcement-report-2020-to/enforcement-and-compliance-report-foreword (accessed 22.2.22)

Appendix A: Account data specification

Objectives of the research

This is an exploratory research project with the purpose to improve understanding of the characteristics and patterns of online play and how these may relate to the potential for harm. This is part of a broader programme of research designed to provide insights into patterns of online gambling. The broad objectives with examples of our main research questions linked to the specific data requested are outlined below:

Objectives	**Examples of research questions that will be explored**	**Type of data/analysis**
What are the basic patterns of play within online gambling?	Type of activity/products, frequency and intensity of activity, responsible gambling activity, sociodemographic characteristics	Total number of times gambled, total stakes and total gross return on different activities/products (data requested in 2.4 and 2.5) Frequency/patterns of responsible gambling tools (data requested in 2.7) Sociodemographic characteristics (age, gender, nation, IMD) of people gambling online (data requested in 2.9)
How do these patterns of play vary for different types of people?	What is the relationship between patterns of play and sociodemographic characteristics (e.g. sex, age, index of multiple deprivation)	Interaction between frequency/intensity of gambles/bets (i.e. times, stakes, returns; data requested in 2.4; 2.5) and sociodemographic characteristics (data requested in 2.4; 2.5; 2.9)
How do patterns of play vary among different products and characteristics	What is the relationship between pattern of play and type of activity/product, frequency? Do patterns of play on similar products vary by other characteristics or factors (e.g. depending on whether credit cards are being used or the time of day the gambling is taking place?)	Interaction between frequency/intensity of gambles/bets (i.e. times, stakes, returns), type of activity/product (data requested in 2.4, 2.5) and account balance data (data requested in 2.4.5)
How do people use responsible gambling tools?	What is the relationship between use of responsible gambling tools and patterns of play? Do gamblers play differently when	Interaction between frequency/patterns of responsible gambling tools (data requested in 2.7) and frequency/intensity of gambles/bets (data requested in 2.4, 2.5)

	using gambling management tools?	
	What is the relationship between use of responsible gambling tools and sociodemographic characteristics?	Interaction between frequency/patterns of responsible gambling tools (data requested in 2.7) and sociodemographic characteristics (data requested in 2.9)
	What is the relationship between patterns of play and patterns of transactions?	Interaction between account balance data (data requested in 2.6) and total number of times gambled, total stakes and total gross return on different activities/products (data requested in 2.4 and 2.5)

Data

Activities

The following activities are in scope and several aggregated variables related to each activity will be required for different data deliveries:

1. Bingo (exclude slots even if branded as bingo games)
2. Live casino games (i.e. casino games where player plays remotely against a dealer or other players), excluding poker and slots (which have their own categories)
3. Virtual casino (i.e. casino games where the whole game is simulated), excluding poker and slots (which have their own categories)
4. Slots
5. Poker (single hand/play and tournament poker will be treated as two separate activities)
6. Dogs betting
7. Horse betting
8. Sports betting:
    a. Football
    b. Tennis
    c. Golf
    d. Cricket
    e. Boxing
    f. eSports
    g. Other sports
9. Virtual betting
10. Other betting

Other betting includes betting on lottery outcomes, betting on outcomes in politics and entertainment, and novelty betting (novelty bets a catch all for everything else, from snow on Christmas day to whether I will live to be 70).

Data definitions

One **gamble** is defined as follows for each activity:

Activity	Gamble
Bingo	Participates in one game
Live Casino	Gambles on the outcome of one play of the game (e.g. one spin of the roulette wheel – even though the stake may be split among multiple outcomes, this is to be counted as only one gamble); (any live casino game except slots and poker, which have their own categories)
Virtual Casino	Gambles on the outcome of one play of the game (any virtual casino game except slots and poker, which have their own categories)
Slots	One game cycle
Poker (cash or ring game)	One stake (total monetary value staked for a 'cash game' or 'ring game' which includes initial stake and any subsequent stake and/or further 'raises' or 'calls')
Poker tournament	One stake (total monetary value staked for entry to a tournament or rebuys)
Dogs	One bet (this includes combination bets such as doubles and also includes forecasts/tricasts; Exchange betting is excluded)
Horse	One bet (this includes combination bets such as doubles and also includes forecasts/tricasts; Exchange betting is excluded)
Sports	One bet (includes pre-live and in-play also includes combination bets such as accumulators; Exchange betting is excluded)
ESports	One bet (this includes combination bets such as accumulators; Exchange betting is excluded)
Football	One bet (this includes combination bets such as accumulators; Exchange betting is excluded)
Tennis	One bet (this includes combination bets such as accumulators; Exchange betting is excluded)
Golf	One bet (this includes combination bets such as accumulators; Exchange betting is excluded)
Cricket	One bet (this includes combination bets such as accumulators; Exchange betting is excluded)
Boxing	One bet (this includes combination bets such as accumulators; Exchange betting is excluded)
Other sport	One bet (this includes combination bets such as accumulators; Exchange betting is excluded)
Virtual betting	One bet
OtherBet	One bet

In-play betting is defined as being within the start and end time of one individual match or of one individual day of a match (for example in cricket) which is spread over more than one day rather than bets which cover a whole tournament.

Data structure

We are requesting data on six different levels of aggregation, to be delivered in different data files that we can link using the anonymised player identifier (PlayerID). The different levels of aggregation are:

- Session data
- Betting transaction data
- Account balance data
- Responsible gambling data
- Account access paradata
- Player data

The Player data would have one record per player, all other files can contain more than one record per player.

Session level and betting transaction level data

The definition of a session will vary according to the activity. Following discussions with operators at the workshop we decided that the best approach is to separate the granularity of the data into non-betting (session level data) and betting draws (transaction level data) activities.

Time-chunks/session level data

Rather than attempting to define a session as part of the provision of the data to NatCen, we need the data in time-chunks for activities that do not involve bets (e.g. bingo, casino, slots, poker). Our preference is to split days into 15-minute chunks beginning at 00:00 and to provide aggregated data for any time-chunks that are populated with activities. This should make it easier for operators to aggregate the data and still gives us the flexibility to define sessions and the length of time that people gamble.

Transaction level data

For all betting activities (pre-live and in-play), we would like to have transaction (bet-by-bet or ticket/entry) level data. As discussed during the workshop, this approach will provide more flexibility for the research team to decide how best to analyse the data and it will also be easier for operators to provide the data.

Session data

We require eligible player data from 1 July 2018 to 30 June 2019 aggregated up to 15-minute time chunks. We only want time-chunks that have a gambling activity on them. We require the following variables:

Variable	Description
PlayerID	Anonymised ID
GambleDate	Date of time chunk in date format “dd/mm/yyyy”
GambleStartTime	Start time of time chunk in time format “hh:mm”
Bingo_Gambles	Total number of times gambled on Bingo

Bingo_Stake	Total stake gambled on Bingo
Bingo_Return	Total gross return from stakes on Bingo
Bingo_Stake_Bonus	Amount of gambled stake that is a bonus, provided by the operator
Live_Casino_Gambles	Total number of times gambled on Live Casino Games (exclude slots and poker, which have their own categories)
Live_Casino_roulette	Whether stake gambled on live roulette 0 No; 1 Yes
Live_Casino_blackjack	Whether stake gambled on live blackjack 0 No; 1 Yes
Live_Casino_baccarat	Whether stake gambled on live baccarat 0 No; 1 Yes
Live_Casino_other	Whether stake gambled on other live casino games 0 No; 1 Yes
Live_Casino_Stake	Total stake gambled on Live Casino Games
Live_Casino_Return	Total gross return from stakes on Live Casino Games
LiveCasinoStakeBonus	Amount of gambled stake that is a bonus, provided by the operator
Virtual_Casino_Gambles	Total number of times gambled on Virtual Casino Games (exclude slots and poker, which have their own categories)
Virtual_Casino_Roulette	Whether stake gambled on virtual roulette 0 No; 1 Yes
Virtual_Casino_Blackjack	Whether stake gambled on virtual blackjack 0 No; 1 Yes
Virtual_Casino_Baccarat	Whether stake gambled on virtual baccarat 0 No; 1 Yes
Virtual_Casino_other	Whether stake gambled on other virtual casino games 0 No; 1 Yes
Virtual_Casino_Stake	Total stake gambled on Virtual Casino Games
Virtual_Casino_Return	Total gross return from stakes on Virtual Casino Games
Virtual_Casino_Stake_Bonus	Amount of gambled stake that is a bonus, provided by the operator
Slots_Gambles	Total number of times gambled on Slots
Slots_Stake	Total stake gambled on Slots
Slots_Return	Total gross return from stakes on Slots
Slots_Stake_Bonus	Amount of gambled stake that is a bonus, provided by the operator
Poker_Gambles	Total number of times gambled on single hand/play Poker

Poker_Stake	Total monetary (not chips) value stake gambled on single hand/play Poker
Poker_Return	Total gross return from stakes on single hand/play Poker
Poker_Resolved_Day	Date last single hand/play poker stake resolved in date format “dd/mm/yyyy”
Poker_Resolved_Time	Time last single hand/play poker stake resolved in time format “hh:mm”
Tournament_Poker_Gambles	Total number of times gambled on Tournament Poker
Tournament_Poker_Stake	Total monetary (not chips) value stake gambled on Tournament Poker (including entry fees, purchase of chips, rebuys)
Tournament_Poker_Return	Total gross return from stakes on Tournament Poker
Tournament_Poker_Resolved_Day	Date last Tournament Poker stake resolved in date format “dd/mm/yyyy”
Tournament_Poker_Resolved_Time	Time last Tournament Poker stake resolved in time format “hh:mm”
Instant_Gambles	Total number of times gambled on Instant Wins
Instant_Stake	Total stake gambled on Instant Wins
Instant_Max	Maximum gross win per bet from stakes in Instant Wins
Instant_Return	Total gross return from stakes on Instant Wins

For returns we need gross returns, i.e. the amount that is credited to the account after winning (including the original stake). Transactions related to void bets (i.e. cancelled bets where the money is returned to the bettor) are not required in the data set. It is possible for stakes to be placed in one time chunk and the outcome to take place in another. In that case we need the outcome included in the time chunk of the original stake.

Betting transaction data

We require all bets from eligible players' data from 1 July 2018 to 30 June 2019. We require the following variables:

Variable	**Description**
PlayerID	Anonymised ID
BetPlacedDate	Date bet is placed in date format “dd/mm/yyyy”
BetPlacedTime	Time bet is placed in time format “hh:mm”
BetResolvedDate	Date bet is resolved in date format “dd/mm/yyyy” (leave blank if bet is currently unresolved)
BetResolvedTime	Time bet is resolved in time format “hh:mm”
BetInPlay	Whether bet was in play (0,1)
BetStake	Total stake bet
BetStakeBonus	Amount of bet stake that is a bonus, provided by the operator

BetReturn	Total gross return
BetMaxReturn	The maximum potential return to the bet, including stake, if the bet is won (calculated at the odds the bet would have been settled at); if this is not known because the customer chose 'SP' please enter 'SP'
BetMultiple	Whether bet was a multiple (include accumulators) (0,1)
BetHorse	Whether bet included a component bet on Horses (0,1)
BetDogs	Whether bet included a component bet on Dogs (0,1)
BetESports	Whether bet included a component bet on eSports (0,1)
BetFootball	Whether bet included a component bet on Football (0,1)
BetTennis	Whether bet included a component bet on Tennis (0,1)
BetGolf	Whether bet included a component bet on Golf (0,1)
BetCricket	Whether bet included a component bet on Cricket (0,1)
BetBoxing	Whether bet included a component bet on Boxing (0,1)
BetOtherSport	Whether bet included a component bet on other sports (0,1)
BetOtherSportTxt	Text of what other sport(s) were bet on
BetVirtual	Whether bet included a component on a virtual bet (0,1)
BetOther	Whether bet included another component not covered above (0,1)

Account balance data

We recognise that account deposits and withdrawals do not necessarily fit easily into sessions, therefore we would like data at a transaction level for the whole specified time period with the following variables:

Variable	Description
PlayerID	Anonymised ID
AccTransactionDate	Date of transaction in date format "dd/mm/yyyy"
AccTransactionTime	Time of transaction in time format "hh:mm"
StartBalance	Balance prior to transaction if available
LastRecordedBalance	If start balance is unknown, the player's most recent balance
DateTimeOfLastBalance	Date and Time in format (dd/mm/yy hh:mm) of the last known balance (if start balance is unknown)
Amount	Amount deposited/withdrawn (withdrawals as negative)
Status	Whether withdrawal was reversed or declined before transaction was completed. (1= reversed, 2 = declined, 0= no action_
SourceOfTransaction	Withdrawal = 0, Debit Card = 1, Credit Card = 2, Paypal or other = 3, Bonus = 4, Unknown = 5.

Responsible gambling data

We require event level data about use of any responsible gambling tools during the requested year.

Variable	Description

PlayerID	Anonymised ID
RGEventDate	Date of event in date format “dd/mm/yyyy”
RGEventTime	Time of event in time format “hh:mm”
RGEventTimeLimit	Reality check used (0,1)
RGEventTimeLimitType	Reality check type (set-up=1, changed: less frequent=2, changed: more frequent=3, changed: removed = 4)
RGEventMeasureSpend	Financial limit used (0,1)
RGEventMeasureSpendAmount	Monetary limit set by customer in £ (e.g. a £50 per week limit should be ‘50’ in this field, and ‘2’ in the field below (i.e. RGEventMeasureSpendDuration)
RGEventMeasureSpendDuration	Length of time applicable to the monetary limit; 1=Daily, 2=Weekly, 3=Monthly, 4=Annually, 5=Other
RGEventContact	Customer contacted for Social Responsibility reasons (text = 1, email = 2, call = 3, pop up = 4, chat box = 5, other = 6)
RGEventSelfExclusion	Customer attempted log-in following self-exclusion (0,1)
RGEventGamstop	Customer self-excluded with Gamstop (0,1)
RGEventSelfExclusionLimit	Time-out facility used (less than 6 months=1, 6 months – 1 year=2, 1 year-3years=3, 3 years-5 years=4, more than 5 years=5)

Account access paradata

We would like to determine the device type that players use when gambling, so would like the following data for any time that a player initiates a new login/session.

Variable	**Description**
PlayerID	Anonymised ID
AccessDate	Access date in date format “dd/mm/yy”
AccessTime	Access time in time format “hh:mm”
Screenwidth	Screen width of the device used to access in pixels (as a proxy for type of device)

Player data

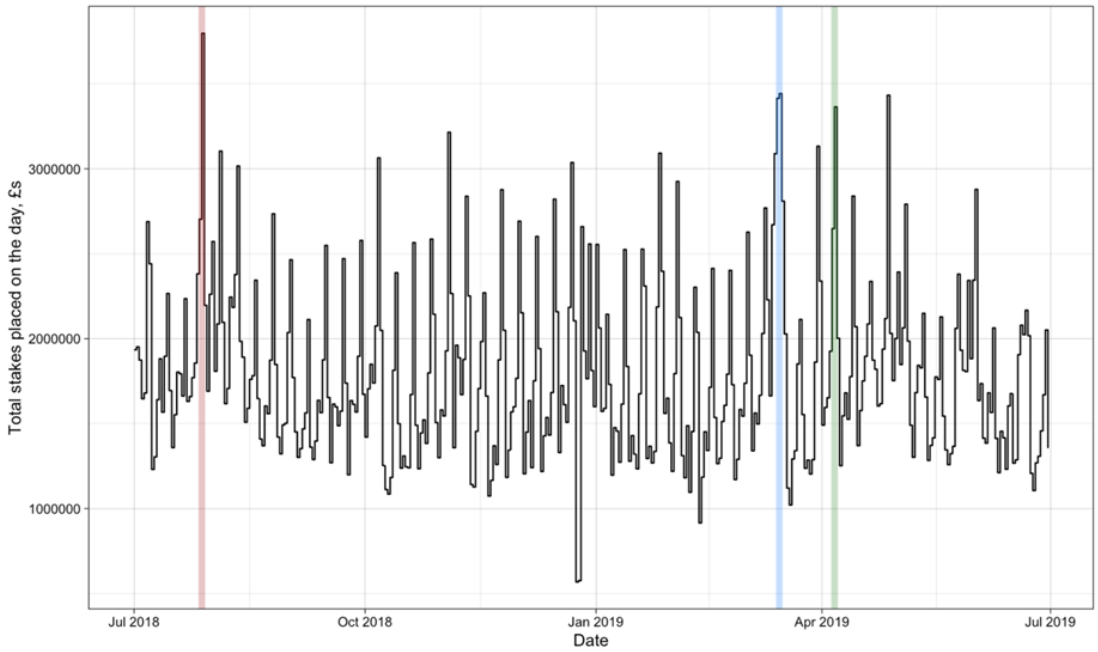
Variable	**Description**
PlayerID	Anonymised ID
Nation	1 England 2 Scotland 3 Wales
Age	Individual age if available at start of the requested time period of supplied data

AgeBand	Banded age 1=16-24; 2=25-34; 3=35-44; 4=45-54; 5=55-64; 6-65-74; 7=75+
Gender	1=Male; 2=Female; 3=Other; 4=Unknown
IMDDecile	NatCen to provide postcode lookup file for this data to be appended by operators
AccountDate	Date set account up in date format “dd/mm/yyyy”

In addition to demographic variables (e.g. sex, age) we will need an area variable in order to investigate the relationship between patterns of play and sociodemographic background. As a proxy for sociodemographic background and taking into account that we cannot obtain postcodes, we will need operators to provide us with the deciles of the Index of Multiple Deprivation (IMD) that correspond to each player’s postcode. NatCen will provide operators with a list of postcodes and their corresponding IMD deciles. Operators will use this lookup file to assign values to postcodes before sending the data to NatCen. This will not be disclosive, as we would be assigning players only into ten deprivation groups.

Appendix B: Patterns of betting across the year and across the day

Figure C:1 Total stakes placed on each day, £



The red, blue and green vertical bars highlight three days when the volume of horse race betting was particularly high: July 28, 2018 (a flat racing Super Saturday), March 15, 2019 (Cheltenham Gold Cup Day) and April 6, 2019 (Grand National Day). Note also high volumes on days adjacent to March 15, 2019 (the other days of the Cheltenham Festival).

Figure C:2 Total sports betting stakes placed on each day, £

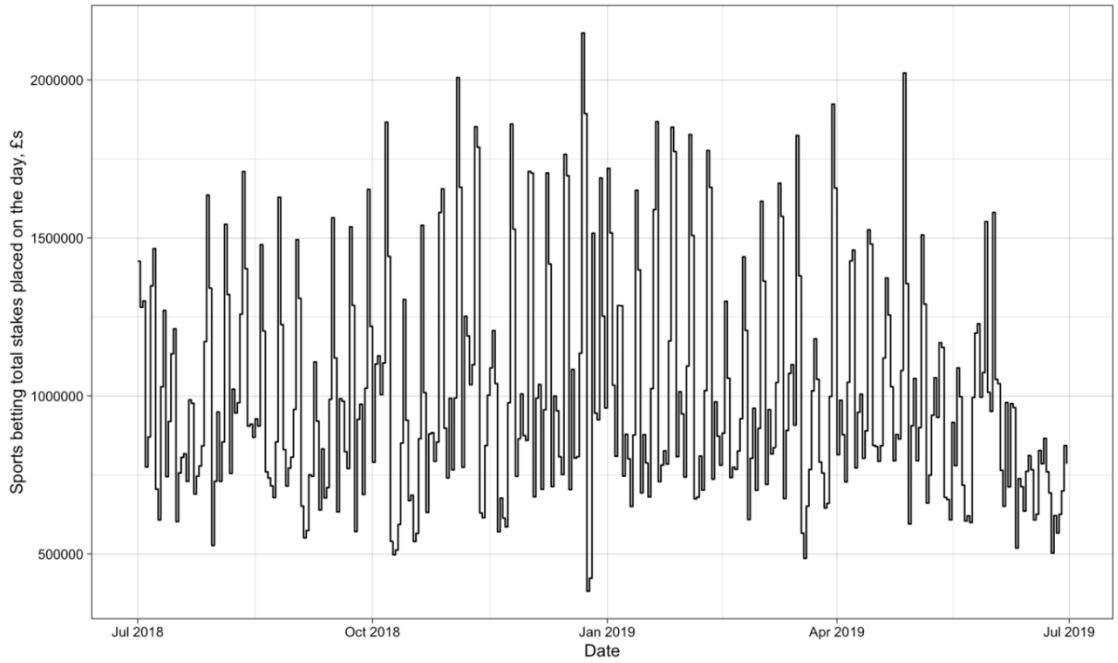
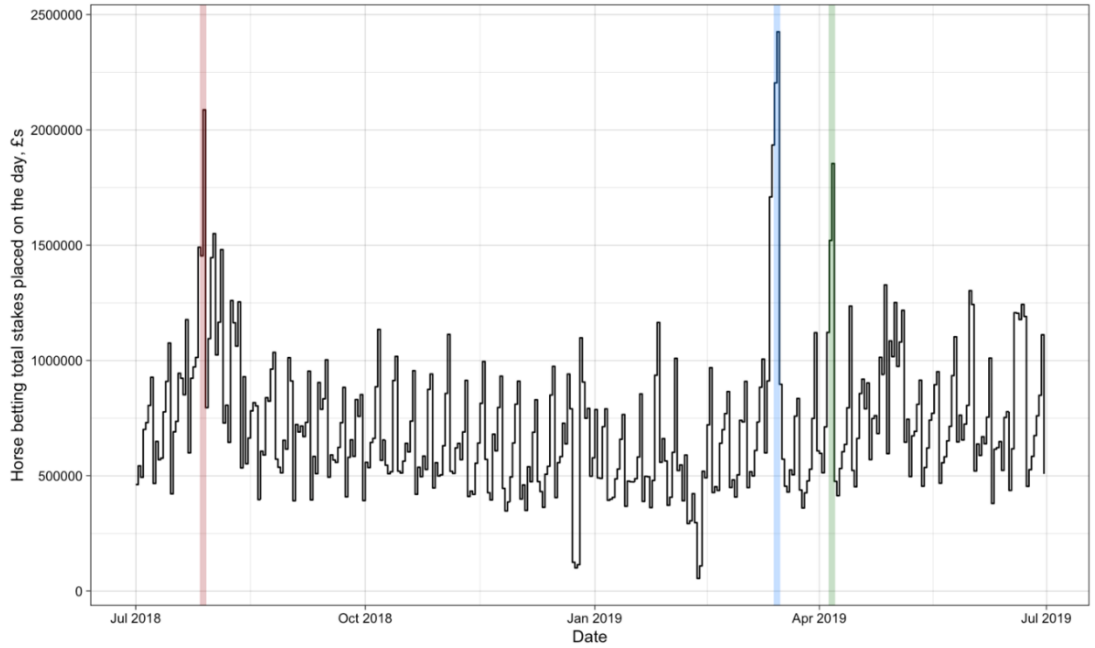


Figure C:3 Total horse betting stakes placed on each day, £s



The red, blue and green vertical bars highlight three days when the volume of horse race betting was particularly high: July 28, 2018 (a flat racing Super Saturday), March 15, 2019 (Cheltenham Gold Cup Day) and April 6, 2019 (Grand National Day). Note also high volumes on days adjacent to March 15, 2019 (the other days of the Cheltenham Festival).

Figure C:4 Total number of bets placed on each day

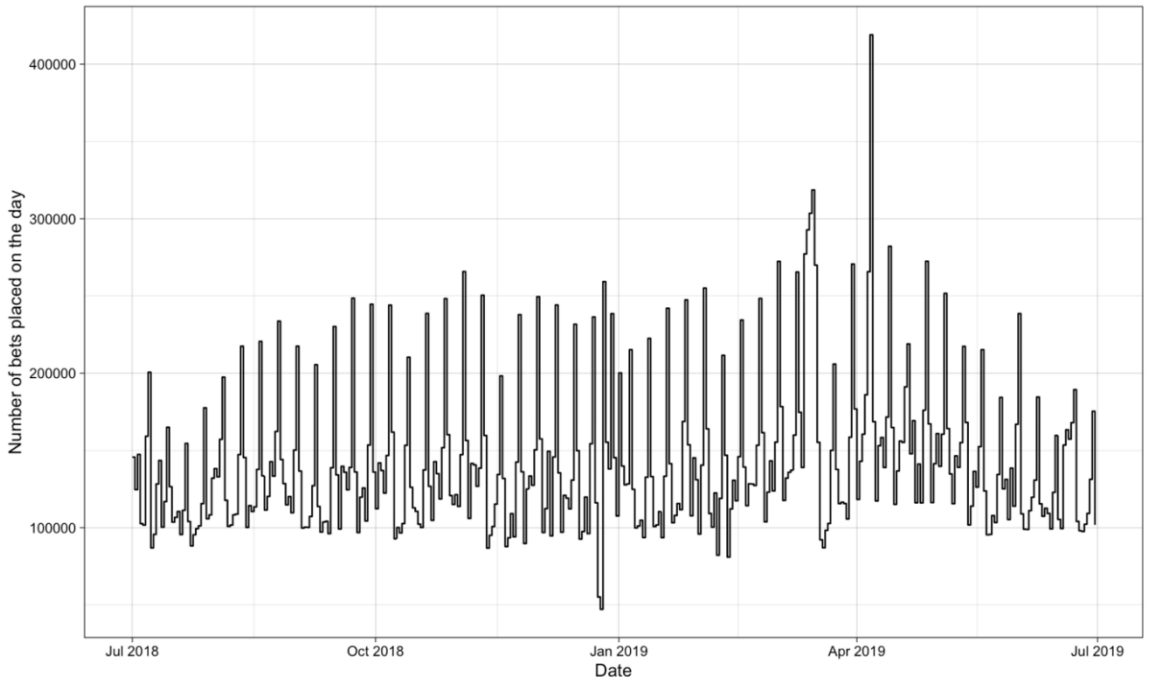


Figure C:5 Total customer spend on each day, £s

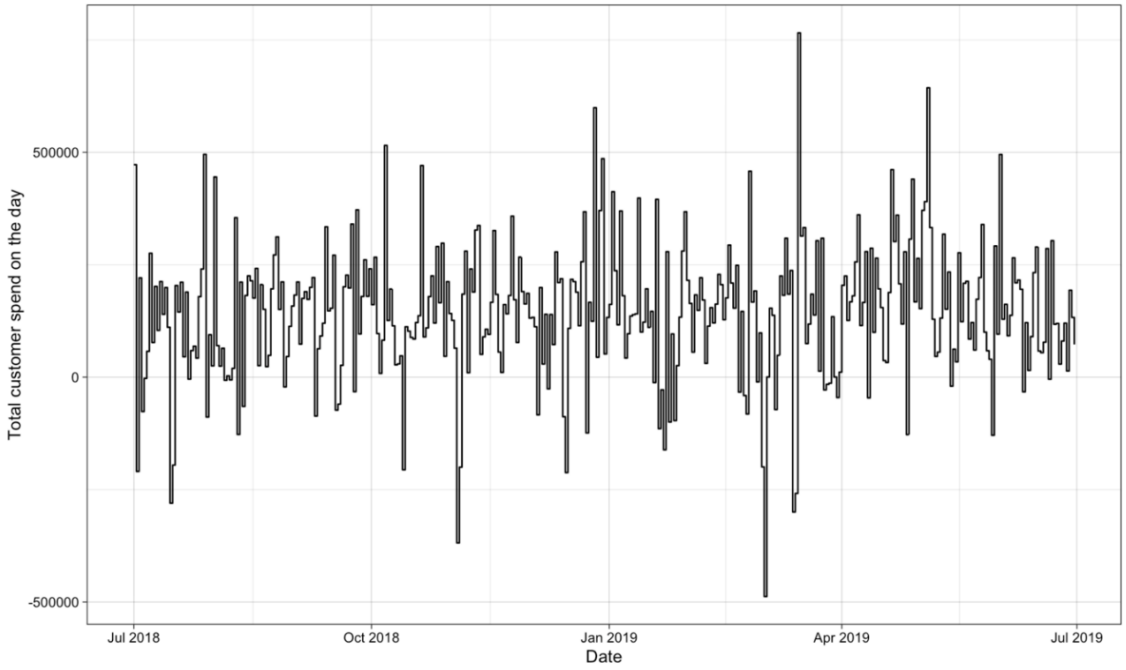


Figure C:6 Average total staked by day-of-week

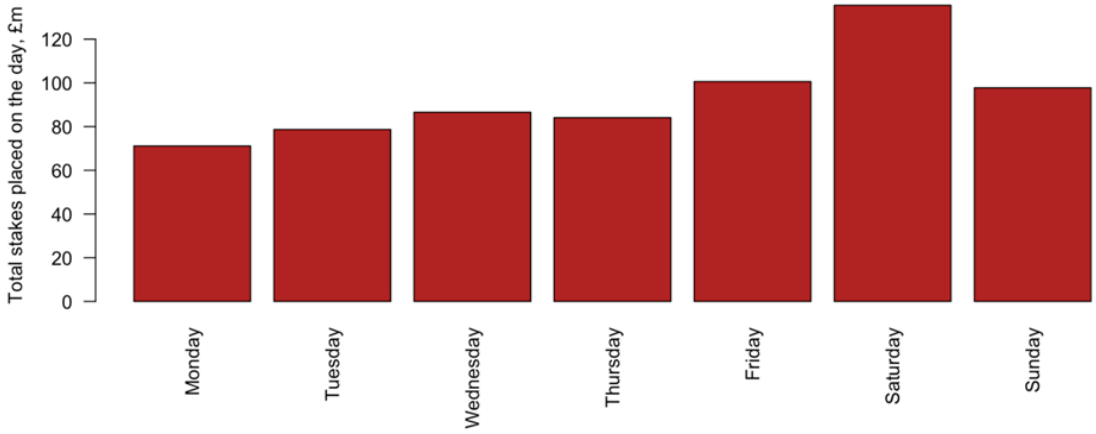


Figure C:7 Average total expenditure (betting losses) by day-of-week, £m

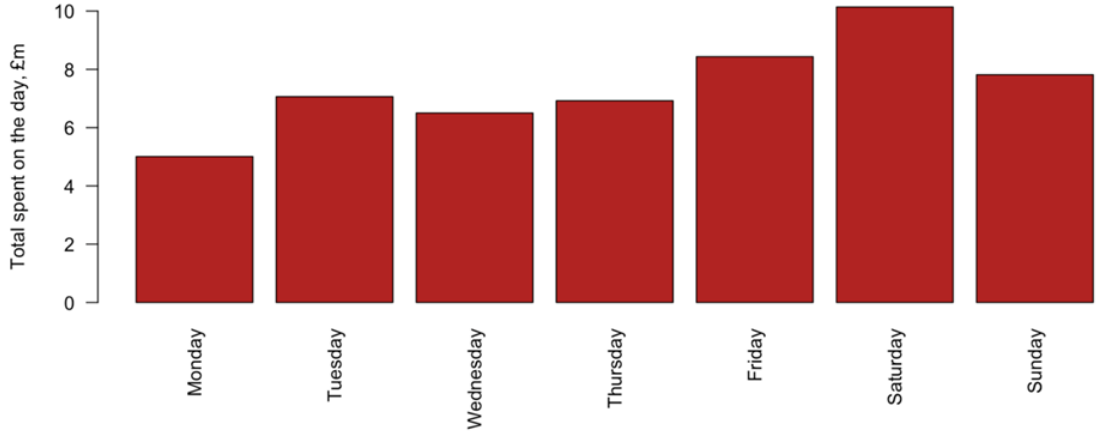


Figure C:8 Average number of bets by day-of-week, millions

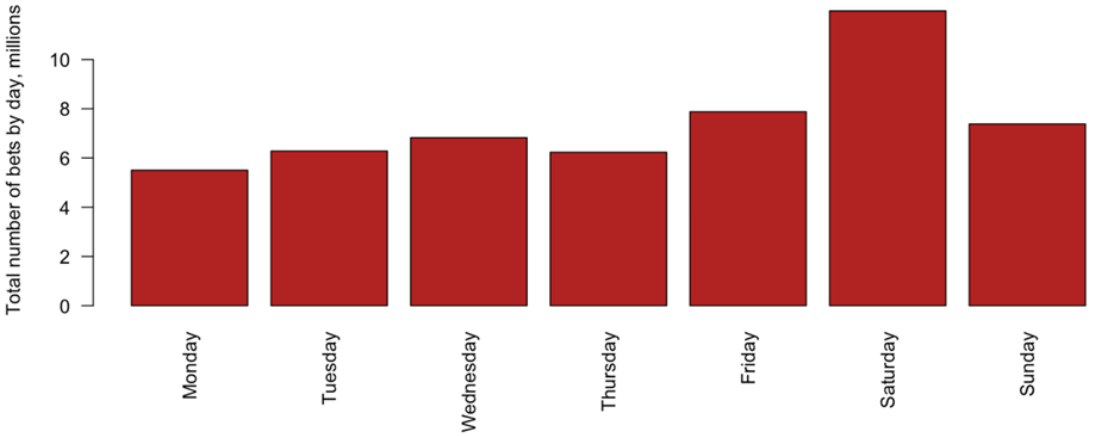
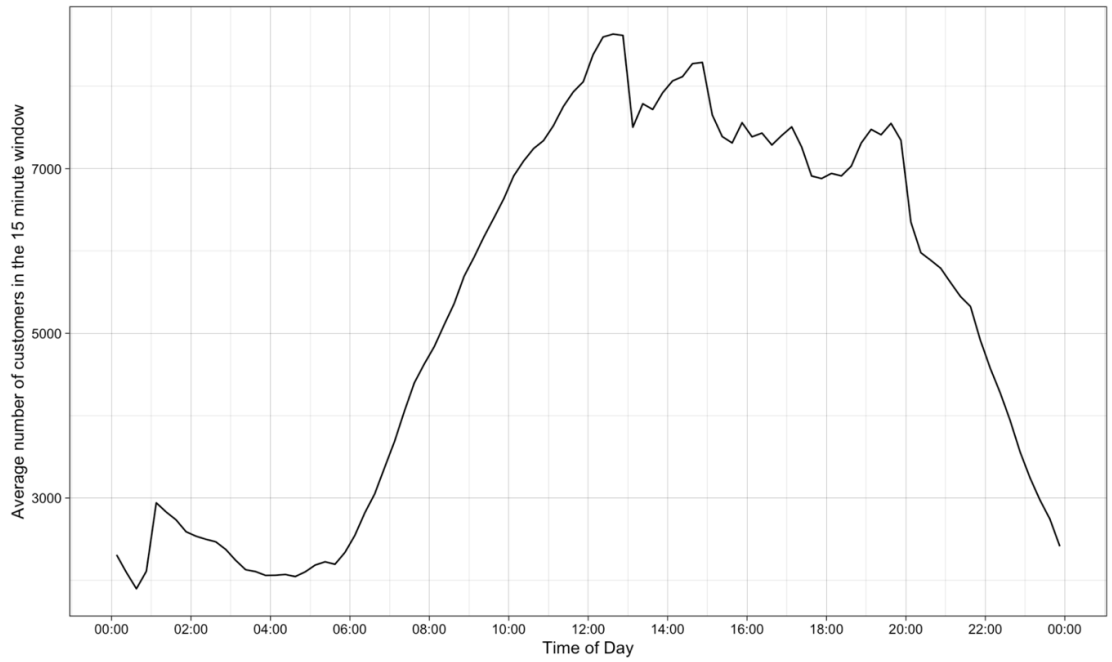
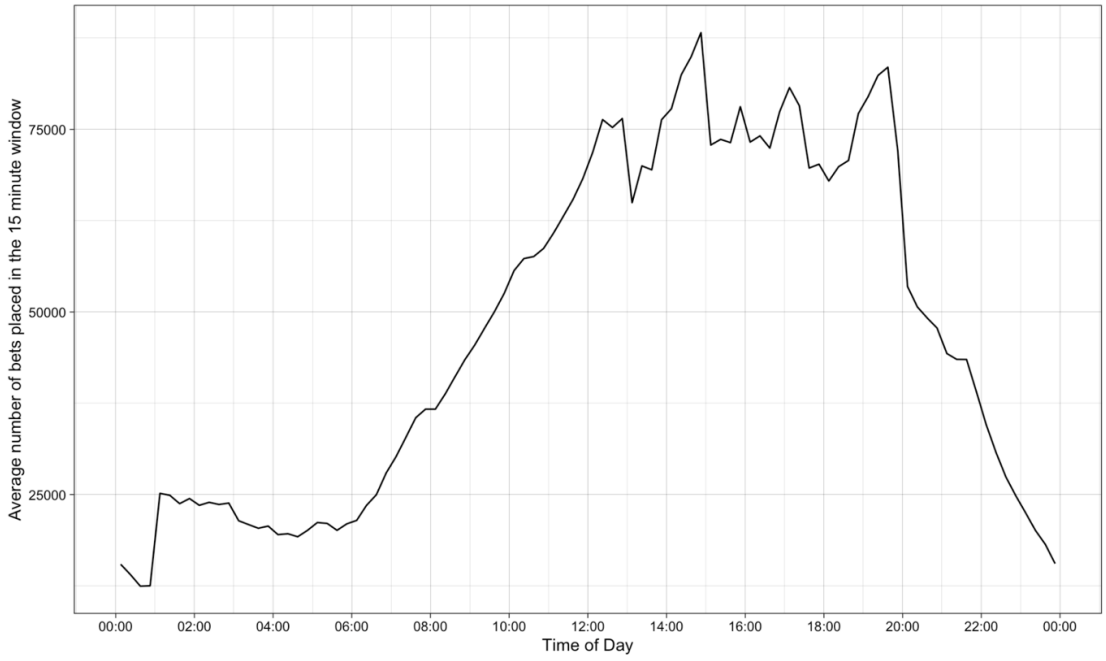


Figure C:9 Average number of customers in 15-minute windows across the day.



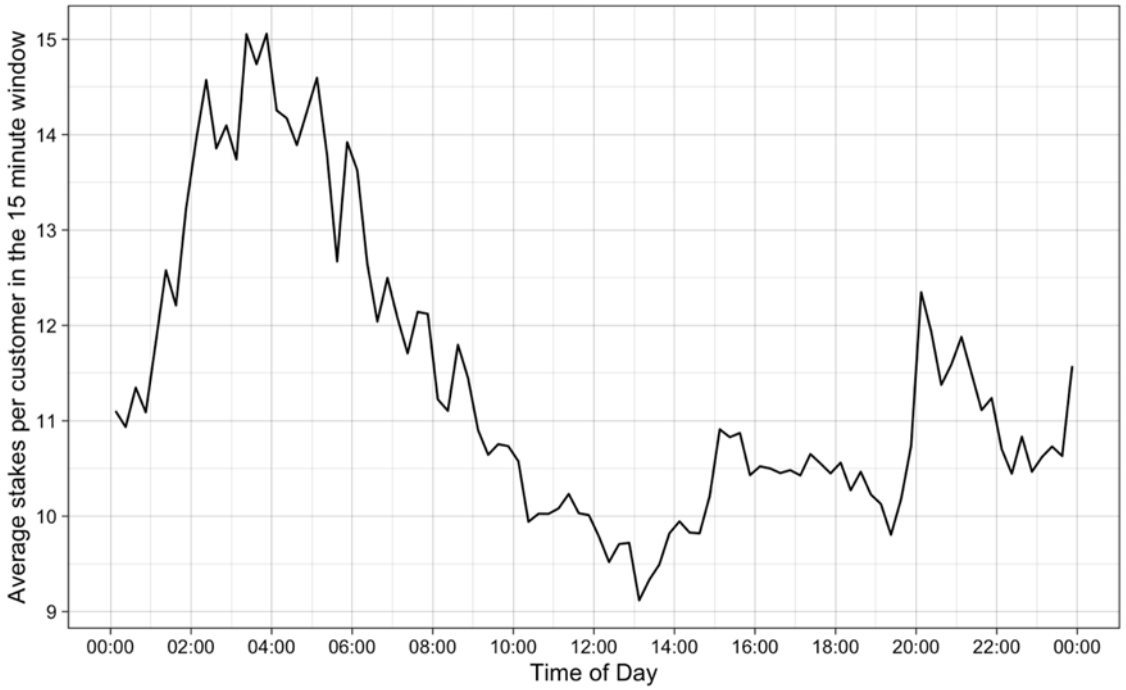
Each day was divided into 96 fifteen-minute windows and averages were calculated across all days.

Figure C:10 Average number of bets placed in 15-minute windows.



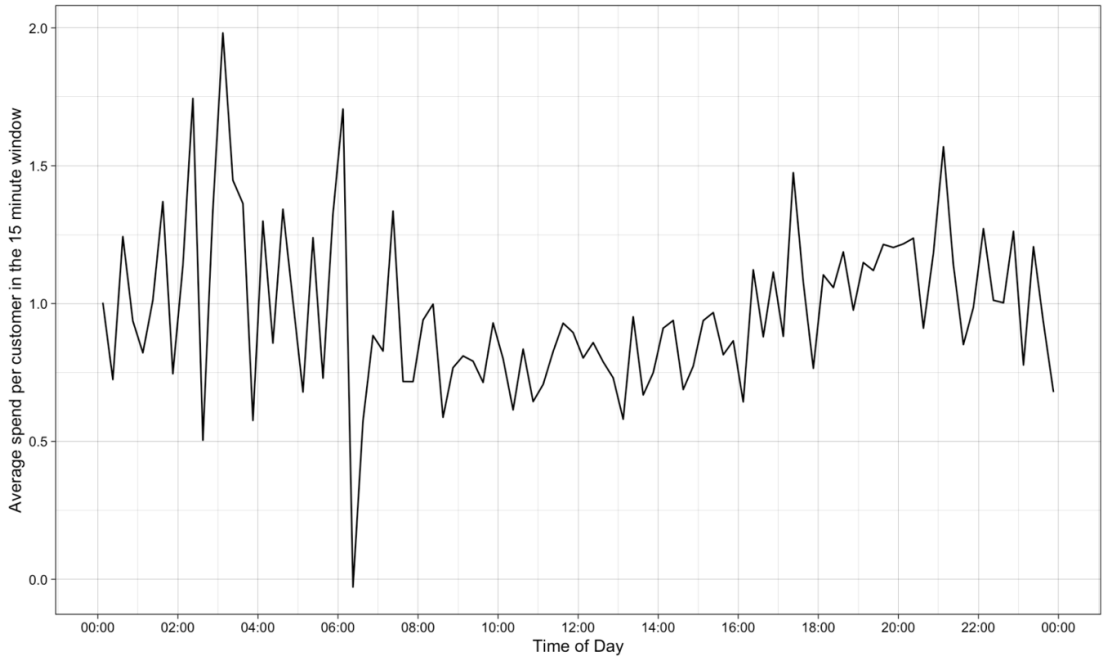
Each day was divided into 96 fifteen-minute windows and averages were calculated across all days.

Figure C:11 Average amount staked per customer within 15-minute windows



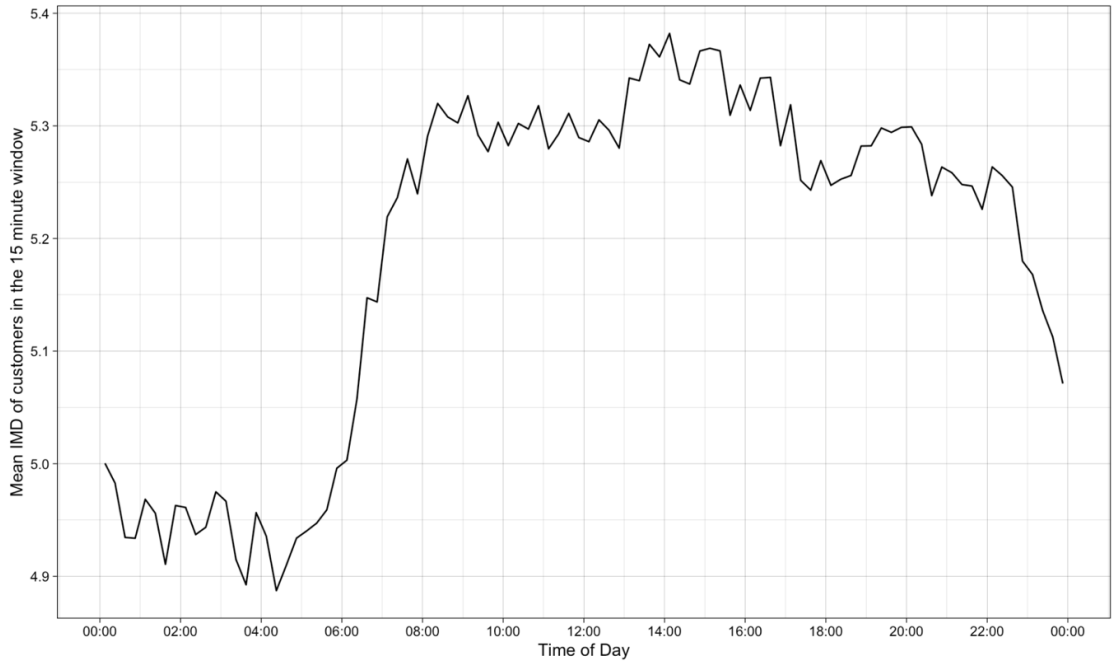
Each day was divided into 96 fifteen-minute windows and averages were calculated across all days.

Figure C:12 Average spend per customer active in the 15-minute window



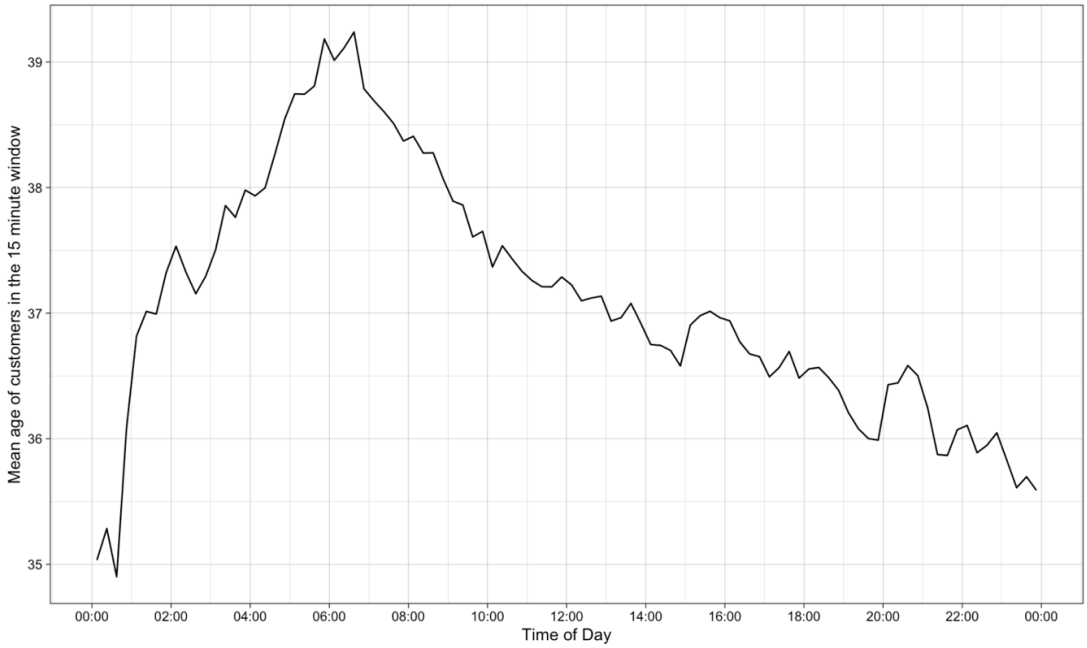
Each day was divided into 96 fifteen-minute windows and averages were calculated across all days.

Figure C:13 Mean IMD of customers active in the 15-minute window



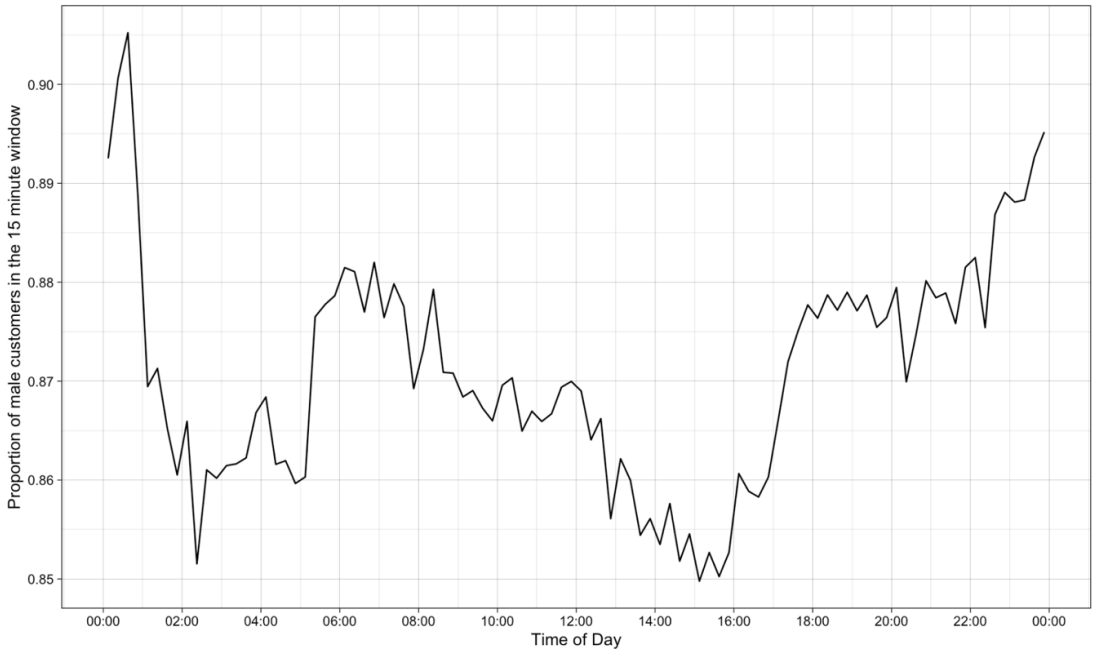
Each day was divided into 96 fifteen-minute windows and averages were calculated across all days.

Figure C:14 Mean age of customers active within the 15-minute window



Each day was divided into 96 fifteen-minute windows and averages were calculated across all days.

Figure C:15 Proportion of customers who are male (where gender is known) during each 15-minute window



Each day was divided into 96 fifteen-minute windows and averages were calculated across all days.

Appendix C: Activity before and after a telephone intervention

Figure D:1 Changes in betting stakes after a safer gambling call

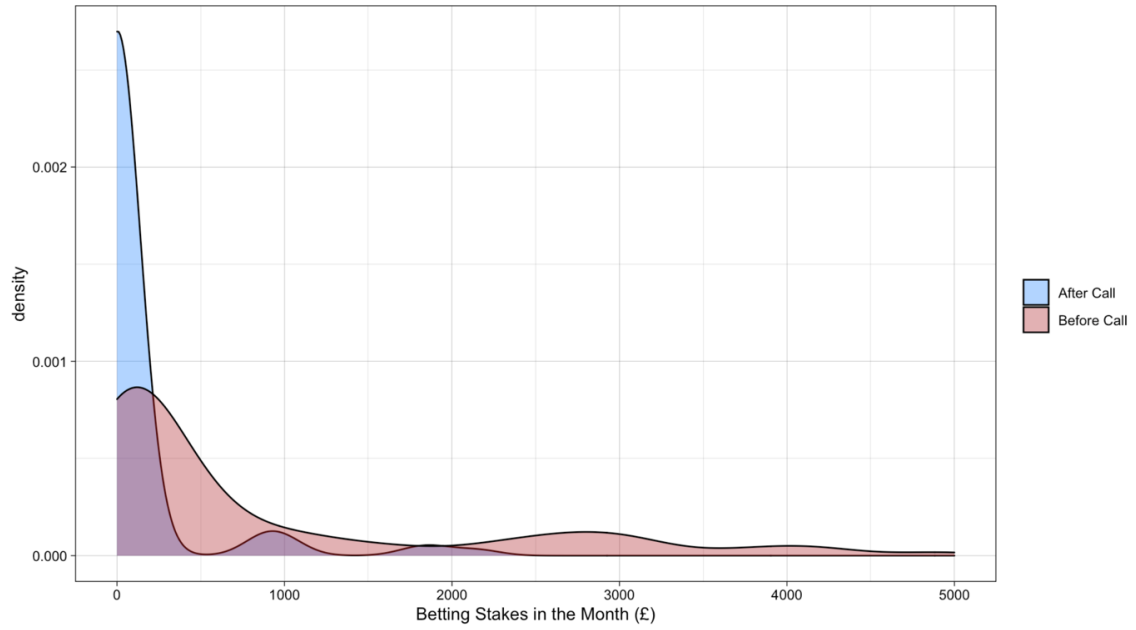


Figure D:2 Changes in gaming spend after a safer gambling call

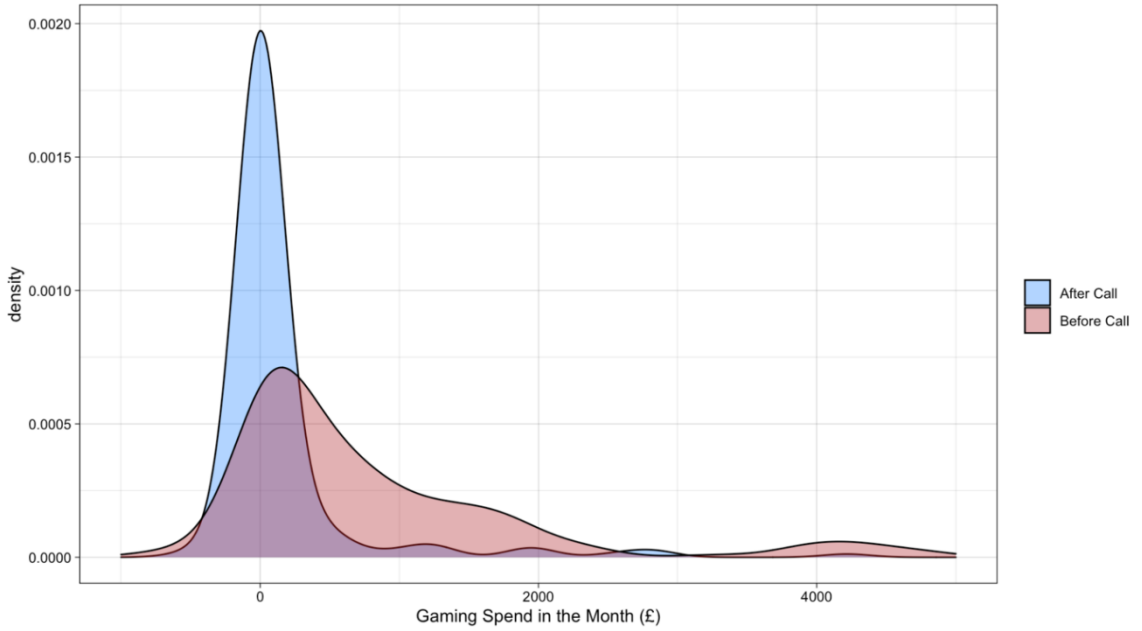


Figure D:3 Changes in gaming duration after a safer gambling call