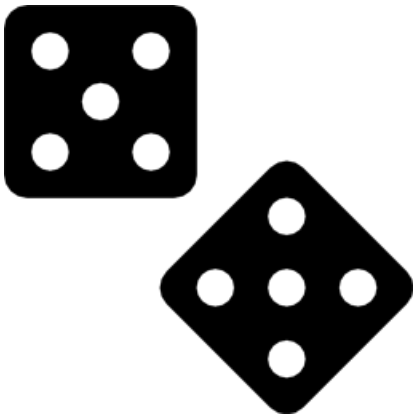
NatCen
Social Research that works for society

Changes in machine gambling behaviour

Headline findings from a follow-up study of participants to the Health Survey for England 2012, Scottish Health Survey 2012 and the British Gambling Prevalence Survey 2010



Authors: Heather Wardle & Dan Philo
Date: 26.11.2014
Prepared for: The Responsible Gambling Trust

Acknowledgements

We would like to thank all those colleagues who contributed to this study. In particular we would like to thank:

- Our Data Managers Joan Corbett and Cathy Coshall, whose hard work and advice were vital in preparing and creating the combined datasets for analysis.
- Statisticians, Christos Byron, Sarah Tipping and Carl Cullinane who devised the sampling strategy and produced the weights to calibrate the data.
- Eleanor Ireland, Sally Bridges, Carla Seabury and Hashim Ahmed, who programmed and tested the questionnaire and oversaw fieldwork.
- All of NatCen's telephone interviewers who collected the data.

Finally, we thank all the participants who took part in each survey and made this report possible.

Heather Wardle, Dan Philo

Contents

1 Introduction

Purpose

The purpose of this report is to provide a brief statistical bulletin of how machine gambling behaviour has changed among participants to either the Health Survey for England (HSE) 2012, the Scottish Health Survey (SHeS) 2012 or the British Gambling Prevalence Survey (BGPS) 2010.

Background

Machine gambling in Great Britain has become the focus of increasing media and political scrutiny, particularly machines in bookmakers (formerly known as fixed odd betting terminals or B2 terminals).[1] These machines allow people to stake up to £100 per bet; the highest staking level of current gambling machines available on the high street in Great Britain. This has led some commentators to raise concerns about their impact.

In early 2014, the Responsible Gambling Trust announced a programme of research to investigate machine gambling in Great Britain. This current study was funded as part of that programme to provide contextual information about how many people change machine gambling behaviour over time and to look at their profile. To date, information about machine gambling has only been collected through cross sectional surveys such as the British Gambling Prevalence Survey series, or the health surveys for England and Scotland in 2012. This provides information about who gambles on machines at a single point in time but does not provide information about how the same individuals change their machine gambling over time.

Understanding fluctuations in machine use is important as it helps us to understand which types of people are starting to play machines and why, and who is stopping machine play and why. Looking at the profile of these people gives insight into whether particular types of individuals are attracted to gambling machines; whether people are switching and swapping their machine use between different venues and how machine engagement is being integrated into changes in gambling behaviour more broadly.

[1] In Great Britain, machines are grouped into different categories based on the size of stake and prize offered. (http://www.gamblingcommission.gov.uk/gambling_sectors/gaming_machines/about_gaming_machines_fruit_m/gaming_machine_categories.aspx). The categories range from category A to D. Machines in bookmaker's can offer B2 games, which allow a maximum stake of £100 and maximum prize of £500 per game. However, lower stake games (categories B3 and C) can also be played on these machines. In this report, these machines are called 'machine's in a bookmaker's' for clarity as these terminals are largely unique to this venue. Machines found in other venues, like amusement arcades, pubs, clubs, casinos and bingo halls are referred to as fruit or slot machines in this report.

To obtain this type of information, the same individual needs to be interviewed on multiple occasions. For this study, a sample of people who were interviewed in the BGPS 2010, HSE 2012 or SHeS 2012 (called baseline studies hereafter) and who agreed to take part in future research were selected to be interviewed again about their gambling behaviour. This allowed changes between first interview and second interview (this study) to be documented. This is the first time this type of study has been conducted in Great Britain focusing on machine gambling behaviour specifically. Between the BGPS (2010) and the HSE (2012), levels of gambling involvement and problem gambling remained relatively stable and there was no overarching change to the legislative environment for gambling in this period. Therefore combining these studies as a sample frame was appropriate. However, machines in bookmakers have received a large amount of negatively publicity in the last 12 months which could have generated a negative public perception of this form of gambling. Changes in attitudes to machines, may for some, influence their machine play. These points are explored further in a qualitative study which will be published in early 2015.

This study focused on two groups of people. First, all those who had either played slot machines or machines in a bookmaker's in the baseline studies were selected for follow-up. This was so we could identify how many of this group were still gambling on machines after their original interview.[2] Second, a propensity score matched sample of people who had not gambled on machines in the baseline study was selected. Propensity score matching is a technique usually used in evaluations to match a control sample to a treatment sample. In this study, propensity score matching was used to identify a group of people who had characteristics similar to machine gamblers but who had not gambled on these machines themselves. This was an efficient way to sample a large number of people who may have potentially started to gamble on machines to explore who they are and why their gambling behaviour has changed. More details about the methodology used are given in the technical appendix.

This report provides headline findings of how many participants have changed their engagement in machine gambling. A qualitative study is currently being conducted exploring, in depth, reasons for changing machine gambling behaviour with those who have either stopped or started playing machines in a bookmaker's. Results from this qualitative study will be published in early 2015.

Report conventions

- The data used in this report have been weighted. The weighting strategy is described in the Appendix of this report. Both weighted and unweighted base sizes are shown at the foot of each table. The weighted numbers reflect the relative size of each group of the population, not the number of interviews achieved, which is shown by the unweighted base.
- Unless otherwise stated, the tables are based on the responding sample for each individual question (i.e., item non-response is excluded). Therefore bases may differ slightly between tables.
- The group to whom each table refers is shown in the top left hand corner of each table.
- A percentage may be presented in the text for a single category that aggregates two or more percentages shown in the table. The percentage for that single category may, due to rounding, differ by one percentage point from the sum of the percentages in the table.
- The term 'significant' refers to statistical significance (at the 95% level) and is not intended to imply substantive importance. Only results that are significant at the 95% level are presented in the report commentary, unless specifically noted.
- See 'Table conventions' in Section 3 for details on the conventions used in the tables.

2 Headline results

This study followed-up two groups of people to examine how their machine and broader gambling behaviour had changed. These groups were:

1) All those who had gambled on a machine in the past year in the baseline surveys

2) A comparison sample of those who had not gambled on machines in the past year in the baseline surveys but who had similar characteristics to those who had gambled on machines (see technical appendix for more details).

Headline results are reported for each group. For the comparison group, we look at the prevalence of starting to use machines, how this varies by socio-economic and demographic characteristics and why people started to play machines. For the people who have previously gambled on machines, we look at how their engagement in machine gambling has changed, how this varies by socio-economic and demographic characteristics and changes in their broader gambling behaviour. Overall, 40% of eligible participants took part in this study (38% for machine gamblers, and 41% for the non-machine gambler comparison group). Response rate are discussed further in the Appendix.

Changes in machine gambling among baseline non-machine gamblers

Baseline non-machine gamblers: Overall patterns of change

- Overall, 13% of those who had not played machines at baseline had now played machines in the past 12 months (15% for men; 11% for women).
- Of those who had not played machines at baseline, 4% had now gambled on machines in a bookmaker's and 11% had played slot machines at least once in the past 12 months.
- Estimates were similar for men and women; 85% of men and 89% of women had not changed their machine play behaviour since the baseline study, [3] (See Table 1).

Baseline non-machine gamblers: Changes in gambling on machines in a bookmaker's

Table 2 shows the prevalence of starting to play machines in a bookmaker's (among non-machine players at baseline) by a range of socio-economic and demographic characteristics.

- Rates of starting to gamble on machines in a bookmaker's were highest among those aged 18-34, where 9% of people who had not previously used these machines now did so, and lowest among those aged 55 and over (1%).

- Starting to play machines in a bookmaker's was higher among those with lower incomes (7% for those in the lowest income quintiles) and lower among those with highest incomes (1%).
- Estimates were lower among those with other or no educational qualifications (1%) at baseline interview and highest among those with A-levels or GCSEs (6%).
- Finally, rates were higher (8%) among those who did not live with a spouse or partner than those who did (2%) and, at the margins of statistical significance, were higher among those who lived in households with three or more adults (8%).[4] This suggests that the immediate social network of who the participant lives with may be important in changing behaviour.
- Estimates did not vary significantly for any of the other characteristics presented in Table 2.

Baseline non-machine gamblers: Broader changes in gambling behaviour

Changing participation in other forms of gambling was also considered among those who had not gambled on machines at baseline: Table 3 shows how broader gambling behaviour changed among those starting to play on machines in a bookmaker's. Two metrics are presented:

- The change in the number of gambling activities undertaken in the past year between baseline and the current study.
- The change in Problem Gambling Severity Index score (PGSI) between this study and baseline.

Looking at change in the number of gambling activities first, the same number of gambling activities was asked about in both studies (19 activities). This allows a change score to be computed. To do this, the number of activities undertaken currently was subtracted from the number of activities undertaken at baseline. A positive number means that someone is gambling on more activities now than previously; a negative number means that someone is gambling on fewer activities now than previously.

- Table 3 shows that average number of gambling activities undertaken increased by 3.1 among those who had started to gamble on machines in a bookmaker's in the past year. Among those who had not started to use machines in a bookmaker's it decreased by -0.4 activities.
- This means that those who started to play machines in a bookmaker's typically increased their engagement in gambling by participating in broader range of activities than previously, not just machines in a bookmaker's.

Now looking at changes in the PGSI score, the PGSI is a set of nine items questioning a range of different problems that a gambler may experience. A total score of between 0 and 27 is possible, with higher scores representing greater problems. The same calculation method as above was used; current PSGI scores were subtracted from baseline PGSI scores. A positive value means that PGSI scores have increased (indicating an increase in gambling difficulties); a

negative value means that scores have decreased (indicating a decrease in gambling difficulties).

- Changes in PGSI score were +0.7 among those who started gambling on machines in a bookmaker's and +0.2 among those who had not. This was not statistically significant; thought this is likely to be because of small base sizes meaning we are unable to detect these differences of this size.

Baseline non-machine gamblers: Changes in gambling on slot machines

Table 4 shows the prevalence of starting to play slot machines in the past year, among those that did not gamble on machines at baseline, by a range of characteristics.

- Prevalence of starting to gamble on slot machines was higher among those who were younger (11% for those aged 18-34 and 14% for those aged 35-54) than those who were older (6% for those aged 55 and over).
- Estimates were also higher among those from White/White British ethnic groups (12%) and those who were in paid employment (13%). Estimates did not vary significantly for the other characteristics shown.
- Having gambled on slot machines in the past year was associated with the number of children in the households (significant at the 10% level), with rates being highest among those living in households with three or more children (14%).
- Change in gambling behaviour was also assessed by looking at changes in the number of activities undertaken and changes in PGSI score.
- Overall, those who started using slot machines had an average change in the number of activities undertaken of 1.4 compared with -0.4 for those who did not start using machines. This means that those who started gambling on slots typically increased their range of gambling activities undertaken by 1.4 activities, whereas those who did not, decreased their range of gambling activities undertaken by 0.4 activities.
- Changes in PGSI score did not vary between those who had started gambling on slot machines and those who had not, estimates were 0.3 and 0.2 respectively (see Table 5).

Baseline non-machine gamblers: Reasons for starting to gamble on machines

All participants who had started gambling on machines since the baseline interview were asked why this was, and offered a range of different justifications:

- The main reason given for starting to gamble on machines in a bookmaker's was that they are fun/exciting (40%), followed by the participant simply wanting to or feeling like playing them (33%) or doing so because of family or friends (32%). Around one in four (23%) started to use these machines because they wanted to get or make money. One in five started to gamble on these machines because they either had more money now or because they had more time available now. A lesser proportion said that they used these machines as a one off (9%). Some caution should be applied when reviewing these results as they are based on responses from just 37 people. Further qualitative

work is planned to explore reasons for starting gambling machines in a bookmaker's and will be published in early 2015.

- The primary reasons given for starting to use slot machines tended to focus on increased opportunities. The main reason given was that people were on holiday or a day trip (26%) or did so because of their friends and family (24%). Around one in four (24%) stated that it was because slot machines are fun/exciting and one in five said they had more opportunities to gamble on slot machines now (20%).

Baseline machine gamblers

Changes in machine gambling

All participants who had gambled on machines in the baseline study were asked whether they had gambled on slot machines or machines in a bookmaker's in this current study.

- Overall, 50% of baseline machine players had not gambled on machines in the past year; 31% had used slot machines only, 9% had gambled on machines in a bookmaker's only and 11% had gambled on both machine types.
- Table 8 shows changing patterns of machine use between baseline and the current study for each machine gambler type identified at baseline. These were:
  - Slot machine only gamblers
  - Machines in a bookmaker's only gamblers
  - Gambled on both slot machines and machines in a bookmaker's.

  These descriptions refer only to a participant's machine play, and they may have engaged in other forms of gambling activity.
- Those who had only gambled on slot machines at baseline displayed the most consistent pattern of machine engagement with 37% of this group reporting that they still gambled on slot machines only. 53% had stopped gambling on any machine, whilst 3% now only gambled on machines in a bookmaker's rather than slot machines. 6% continued to gamble on slot machines but had now also gambled on machines in a bookmaker's in the past 12 months.
- Those who had previously used machines in a bookmaker's only had the least consistent patterns of machine gambling over time. Of this group, 61% no longer gambled on any machine; 23% continued to only gamble on machines in bookmaker's and 14% had added playing slot machines (as well as continuing to play machines in a bookmaker's) to their machine gambling repertoire. 3% had stopped gambling on machines in a bookmaker's but had gambled on slot machines in the past year instead. This means that nearly two out of three (63%) people who had previously only gambled on machines in a bookmaker's had not done this in the current study.
- Those who had used both machines in a bookmaker's and slot machines had greater movement between machine categories. Only around one in three (31%) had not gambled on machines at all in the most recent interview, around one in four (25%) continued to gamble on both types of machines and around one in five (20%) had either stopped using machines in a bookmaker's or around one in four (24%) had stopped playing slot machines.

- This shows a great deal of movement in machine gambling, with many participants being no longer involved with machine gambling, some changing the type of machine they use and some continuing to gamble consistently on machines.

Baseline machine gamblers: Changes in machine gambling by socio-demographic factors

Changes in machine gambling behaviour, among baseline machine players, were analysed by a range of socio-economic and demographic characteristics. Because of small base sizes, it was not possible to examine the prevalence or profile of those who stopped using machines in a bookmaker's or slot machines separately. Therefore the following categories were created:

- Those who stopped gambling on machines
- Those whose machine gambling was consistent between baseline and this study
- Those whose machine gambling type changed between baseline and this study.

- Overall women were more likely to have stopped gambling on machines (57% for women; 45% for men).
- Conversely men were more likely to have changed their type of machine gambling than women; estimates were 23% for men and 8% for women.
- The only difference evident by age was that younger people were more likely to change their machine gambling type than older people; estimates were 24% for those aged 18-34, 14% for those aged 35-54 and 11% for those aged 55 and over.
- No other significant differences were found by various socio-economic or demographic characteristics.

Baseline machine gamblers: Changes in machine gambling by broader gambling behaviour change

Using the same methodology identified previously, changes in number of gambling activities engaged in and changes in PGSI score between baseline and this study were also measured:

- Overall, machine gamblers took part in 1.3 fewer activities in the current study than previously. Unsurprisingly, those who had stopped using machines reported taking part in even fewer activities than this, 2.1 on average, compared with 0.4 and 0.5 for those who either maintained or changed their machine behaviour.
- Changes in PGSI scores were also examined. Those who changed the type of machine they gambled on demonstrated an increase in their PGSI score by +1.6 compared with -0.2 or -0.1 for other groups. However, base sizes were small meaning that we were unable to detect differences of this size.[2]

[2] The p-value was p=0.11.

Tables

Table conventions

1. The group on which the figures in the table are based is stated at the upper left corner of the table.

2. The data in most tables have been weighted (see the Appendix for more detail). Both unweighted and weighted sample sizes are shown at the foot of each table.

3. The following conventions have been used in tables:
   - \- no observations (zero value).
   - 0 non-zero values of less than 0.5% and thus rounded to zero.
   - [ ] used to warn of small sample bases, if the unweighted base is less than 50. If a group's unweighted base is less than 30, data are normally not shown for that group.

4. Because of rounding, row or column percentages may not add exactly to 100%.

5. 'Missing values' occur for several reasons, including refusal or inability to answer a particular question; refusal to co-operate in an entire section of the survey; and cases where the question is not applicable to the participant. In general, missing values have been omitted from all tables and analyses.

Table 1

Prevalence of gambling on machines among baseline non-machine players, by sex

Aged 18 and over

Machine gambling status	Sex		Total
	Men	Women	
	%	%	%
Played slot machines only in past year	10	9	9
Played machines in a bookmaker's in the past year	3	2	3
Played both slots and machines in bookmakers in the past year	2	1	2
Did not play machines in the past year	85	89	86
All who started playing machines since baseline	*15*	*11*	*13*
Bases (weighted)	*690*	*509*	*1199*
Bases (unweighted)	*656*	*543*	*1199*

Table 2

Prevalence of gambling on machines in a bookmaker's among baseline non-machine players

Aged 18 and over

Socio-economic/demographic characteristics		Started playing machines in a bookmaker's	*Bases (weighted)*	*Bases (unweighted)*
Age group				
18-34	%	9	*363*	*229*
35-54	%	3	*442*	*475*
55-64	%	1	*272*	*372*
Ethnicity				
White	%	4	*1006*	*1035*
Non-white	%	7	*81*	*52*
Income quintile				
Lowest	%	7	*253*	*229*
2nd	%	7	*159*	*197*
3rd	%	3	*204*	*197*
4th	%	5	*201*	*197*
Highest	%	1	*177*	*179*
Employment status				
In paid employment	%	5	*724*	*691*
Not in paid employment	%	3	*357*	*392*
Whether had limiting longstanding illness*				
Yes	%	7	*143*	*197*
No	%	4	*944*	*890*
Highest level of educational qualifications*				
Professional or higher	%	4	*380*	*405*
A-levels/GCSEs	%	6	*542*	*470*
Other/none	%	1	*165*	*211*
Whether lives with spouse or partner				
Yes	%	2	*693*	*745*
No	%	8	*387*	*335*
Number of children in household				
0	%	5	*746*	*749*
1	%	3	*154*	*140*
2 or more	%	4	*188*	*198*
Number of adults in household				
1	%	6	*170*	*198*
2	%	3	*608*	*653*
3 or more	%	8	*309*	*235*

*Recorded at baseline

Table 3

Gambling behaviour change among baseline non-machine players, by whether started gambling on machines in a bookmaker's

Aged 18 and over

Gambling behaviour change	Whether started gambling on machines in a bookmaker's		Total
	Yes	No	
	%	%	%
Change in number of gambling activities undertaken			
Mean	[3.1]	-.4	-.1
Standard error of the mean	[.37]	.07	.08
Change in PGSI score			
Mean	[0.7]	0.2	0.2
Standard error of the mean	[.45]	.05	.06
Bases (weighted)	*50*	*1037*	*1199*
Bases (unweighted)	*37*	*1050*	*1199*

Table 4

Prevalence of gambling on slot machines among baseline non-machine players

Aged 18 and over

Socio-economic/demographic characteristics		Started playing slot machines	*Bases (weighted)*	*Bases (unweighted)*
Age group				
18-34	%	11	*371*	*240*
35-54	%	14	*500*	*529*
55-64	%	6	*287*	*391*
Ethnicity				
White	%	12	*1090*	*1118*
Non-white	%	4	*78*	*53*
Income quintile				
Lowest	%	14	*274*	*247*
2nd	%	12	*168*	*214*
3rd	%	11	*222*	*218*
4th	%	12	*215*	*218*
Highest	%	9	*192*	*193*
Employment status				
In paid employment	%	13	*788*	*759*
Not in paid employment	%	8	*374*	*408*
Whether had limiting longstanding illness*				
Yes	%	12	*152*	*206*
No	%	11	*1016*	*965*
Highest level of educational qualifications*				
Professional or higher	%	11	*411*	*442*
A-levels/GCSEs	%	12	*578*	*507*
Other/none	%	9	*179*	*221*
Whether lives with spouse or partner				
Yes	%	10	*750*	*809*
No	%	13	*411*	*355*
Number of children in household				
0	%	12	*802*	*804*
1	%	6	*157*	*150*
2 or more	%	14	*209*	*217*
Number of adults in household				
1	%	12	*182*	*209*
2	%	10	*658*	*706*
3 or more	%	13	*328*	*255*

Table 5

Gambling behaviour change among baseline non-machine players, by whether started gambling on slot machines

Aged 18 and over

Gambling behaviour change	Whether started gambling on slot machines		Total
	Yes	No	
	%	%	%
Change in number of gambling activities undertaken			
Mean	1.5	-0.4	-0.1
Standard error of the mean	0.22	0.07	0.07
Change in PGSI score			
Mean	0.3	0.2	0.3
Standard error of the mean	0.18	0.05	0.05
Bases (weighted)	*132*	*1037*	*1199*
Bases (unweighted)	*121*	*1050*	*1199*

Table 6

Reasons for starting to play machines in a bookmaker's

Aged 18 and over

Reasons for starting to gamble on machines in a bookmaker's	All
	%
Because it's fun/exciting	40
Wanted to play them	33
Because of friends and family	32
Wanted to make money	23
Have more money to spend now	20
Have more time now	20
No particular reason	17
Have more opportunities to play machines in bookmakers	16
It was a one off opportunity	9
Became old enough to play them	8
On holiday/business trip/day trip	2
Bases (weighted)	*50*
Bases (unweighted)	*37*

Table 7

Reasons for starting to gamble on slot machines

Aged 18 and over

Reasons for starting to gamble on slot machines	All
	%
Was on holiday/day trip/business trip	26
Because of friends and family	24
Because it's fun/exciting	24
Have more opportunities to play slot machines	20
No particular reason	12
Wanted to play them	11
One off opportunity	10
Wanted to make money	9
Have more time now	8
Have more money to spend now	6
Became old enough to play them	3
Machines looked attractive	2
Bases (weighted)	*132*
Bases (unweighted)	*121*

Table 8

Prevalence of machine gambling among baseline machine players

Aged 18 and over

Machine gambling status in current study	Machine gambling status at baseline			
	Slots only	Machines in bookmakers only	Both	Total
	%	%	%	%
Played slot machines only in past year	37	3	24	31
Played machines in a bookmaker's in the past year	3	23	20	9
Played both slots and machines in bookmakers in the past year	6	14	25	11
Did not play machines in the past year	53	61	31	49
All whose machine play has not changed since baseline	*37*	*23*	*25*	*50*
Bases (weighted)	*369*	*54*	*126*	*549*
Bases (unweighted)	*412*	*51*	*86*	*549*

Table 9

Machine behaviour change among baseline machine players, by sex

Aged 18 and over

Machine gambling status	Sex		Total
	Men %	Women %	%
Stopped playing machines	45	57	49
Did not change machine play	32	35	33
Changed types of machines played	23	8	18
Bases (weighted)	*355*	*194*	*549*
Bases (unweighted)	*319*	*230*	*549*

Table 10

Machine behaviour change among baseline machine players, by age group

Aged 16 and over

Machine gambling type	Sex			Total
	16-34 %	35-54 %	55+ %	%
Stopped playing machines	46	54	45	49
Did not change machine play	30	32	44	33
Changed types of machines played	24	14	11	18
Bases (weighted)	*233*	*222*	*89*	*549*
Bases (unweighted)	*137*	*244*	*157*	*549*

Table 11

Gambling behaviour change, by machine gambler type

Aged 16 and over

Machine gambling status	Machine gambler type			Total
	Stopped playing machine	Did not change machine play	Changed type of machines played	
Change in number of gambling activities undertaken				
Mean	-2.1	-.4	-.5	-1.3
Standard error of the mean	0.23	0.30	0.81	0.19
Change in PGSI score				
Mean	-.2	.1	1.6	.2
Standard error of the mean	*0.24*	*0.18*	*0.81*	*0.23*
Bases (weighted)	*269*	*182*	*98*	*549*
Bases (unweighted)	*274*	*195*	*80*	*549*

Appendix: Methods

Overview

In Great Britain, a number of cross sectional surveys have been conducted which collected information on gambling behaviour. This includes the British Gambling Prevalence Survey series (last conducted in 2010) and the health surveys for England and Scotland, 2012. Each survey asked participants if they would be willing to take part in future research, of which around 88-90% of participants agreed.

This enables these studies to be used as a sampling frame for other research projects. This is particularly useful when research is focusing on hard to reach population groups, like machine gamblers. Using previous studies as a sampling frame for other research is a method has been used on a number of high profile studies, such as the English Longitudinal Study of Ageing and the Evaluation of the impact of picture health warnings on cigarette packets. Information collected in the new research study can be linked to that collected within the baseline survey and changes in behaviour assessed.

The aim of this study was to understand how machine gambling varies over time and how many people may have changed their engagement in machine gambling. Conducting a new survey from scratch to identify machine gamblers and then follow them up over a longer period of time would have been prohibitively costly and data would not have been available within the required timeframe set by the client, the Responsible Gambling Trust. Therefore, a study following up people who had previous taken part in the BGPS, HSE or SHeS was proposed. This appendix gives an overview of the methods used, starting with a brief overview of each of the baseline surveys used to sample participants.

Baseline surveys

British Gambling Prevalence Survey (BGPS) 2010

The BGPS 2010 was the third and last survey conducted in the BGPS series aimed at collecting information about gambling behaviour among adults aged 16 and over living in private households in Great Britain. Data were previously collected in 1999 and 2007. In each survey year, a random probability, stratified and clustered sample of households was selected using the Postcode Address File. All adults aged 16 and over living at that household were eligible to take part in the survey. Data was collected using private self-completion methods. The questionnaire include modules about gambling participation in the past 12 months, gambling in the past week, questions aimed at measuring problem gambling (screening instruments based on 1) American Psychologists Association Diagnostics and Statistics Manual IV (DSM-IV) and

2) the Problem Gambling Severity Index (PGSI)[3]. In 2010, 7756 people took part in the study. Of this, 1045 had either played a slot machine or machines in a bookmaker's in the past year, of which 940 people agreed to be recontacted about future research (90% of all machine players identified).

HSE and SHeS 2012

Following a comprehensive review and public consultation in 2010 on the way in which gambling prevalence data was gathered and used, the decision was made to discontinue the British Gambling Prevalence Survey (BGPS). The recommendation was to instead include a module of questions on gambling participation and problem gambling in both the Health Survey for England (2012) (HSE 2012) and the Scottish Health Survey (2012) (SHeS 2012). The survey design of the HSE and SHeS is similar to that of the BGPS. Each survey is a random probability survey of adults aged 16 and over living in private households in England and Scotland respectively (in both surveys, children are also included but gambling questions were not asked of youth). Like the BGPS, a random, stratified and clustered sample of private addresses is drawn from the Postcode Address File and all adults aged 16 and over living at that household are eligible to be interviewed.

On both HSE and SHeS, questions about gambling were included in a paper self-completion questionnaire, replicating BGPS method and aimed at encouraging honest reporting of behaviours. Questions included where whether the participant had engaged in any one of 19 legal forms of gambling and the administration of the DSM-IV and PGSI problem gambling screens. Overall, 13094 adults took part in both studies. Of these, 824 participants had gambled on machines in the past year and 743 of this group had agreed to be recontacted about future research (88% of all machine players identified).

Sample design

The aim of this study was to assess the extent to which machine gamblers have changed their engagement in machine gambling and the extent to which non-machine gamblers have started to engage in machine gambling and why.

To do this, two different samples were selected. The first was a sample of all participants to the baseline surveys who reported they had gambled on machines at least once in the last year and who had agreed to be recontacted for future research. This is shown in Table A1.

[3] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV). APA, USA, 1994; Ferris, J & Wynne H. (2001). *The Canadian Problem Gambling Index: Final Report*. Canada: The Canadian Centre on Substance Abuse.

Table A1

Machine players sample by baseline survey

Aged 18 and over

Survey	Number of past year machine players	Number who agreed recontact	Number with valid phone number
British Gambling Prevalence Survey 2010	1045	940	860
Health Survey for England 2012	516	479	387
Scottish Health Survey 2012	308	264	224
Total selected for follow-up study			**1471**

In total, 1471 machine gamblers who had agreed to be contacted about future research and provided a valid phone number were selected for this study. This represents 78% of all machine gamblers identified in the baseline surveys. Weighting to account for non-response and these selection biases has been applied to all analysis. More details about the weighting strategy used are given below.

A second group of participants was selected (n=2910). These were people who had not gambled on machines in the year prior to baseline interview. Because the prevalence of using slot machines or machines in a bookmaker's is low, we used propensity score matching to identify a sample of people with characteristics similar to machine gamblers. This enabled us to 'boost' the number of people most likely to start engaging with machine gambling and give larger numbers for analysis. It also allows us to make comparisons between those who use machines and those who are similar to machine gamblers, but did not themselves gamble on machines. By controlling for differences in their demographic profile or engagement in gambling, any differences between these two groups in motivations, attitudes or gambling behaviour can be more confidently associated with their machine gambling. The matching process is described below.

In order to ensure that the machine gambler and comparison samples were as similar as possible at baseline, matching methods were used to remove any observed differences between the samples. The matching approach used was 'propensity score matching', a method that allows for multiple variables to be matched concurrently. Essentially the difference between the two samples is modelled (using in this instance logistic regression modelling, and with all the baseline characteristics being predictors) and the modelled probability (or propensity) of being in the machine gambler group is recorded per person. Machine gamblers are then matched to the comparison group individuals in such a way that the two matched samples have equivalent propensity score profiles. In this project a matching ratio of 2:1 was used to boost numbers for analysis. This means for every sampled machine gambler, two non-machine gamblers with an equivalent propensity score profile were identified. This matching can be done in a number of ways, but the default is 'kernal matching' whereby each user is matched to a weighted distribution of comparison group individuals, the weighting per comparison group

individual being determined by the difference between their propensity score and the user's propensity score.[4]

A wide range of baseline variables were included in the logistic regression model to generate the propensity score that was used for matching the user group to the comparison group. This included variables relating to demographic characteristics, economic status and involvement in gambling. The baseline variables included in the logistic regression model included:[5]

Demographic, socio-economic and health and lifestyle variables

- Sex
- Age group
- Marital status
- Highest educational qualifications
- NS-SEC of household reference person
- Economic activity
- Ethnicity
- General Health
- Presence of a limiting longstanding illness
- Cigarette smoking status
- Alcohol consumption
- Number of adults present in the household
- Number of children present in the household

Gambling behaviour variables

- Number of gambling activities undertaken in the past year
- Response to the DSM item about chasing losses
- Response to the DSM item about preoccupation
- Played the National Lottery Draw in the past year
- Bought scratchcards in the past year
- Bought tickets for other lotteries in the past year
- Played football pools in the past year
- Bet or gambled privately in the past year
- Bet on sports events in the past year
- Played bingo in the past year
- Played table games in a casino in the past year
- Gambled online on casino, slot or bingo style games in the past year
- Bet on horses races in the past year
- Bet on dog races in the past year
- Bet on other events with a bookmaker in the past year
- Bet online in the past year.

[4] Comparison group members with a similar propensity score to machine players are given a large weight, and vice versa.

[5] These variables were identified for inclusion by looking at bivariate relationships with machine gambling behaviour. Some gambling activities, though significantly associated with machine gambling, were excluded from the logistic regression model because of small cell sizes. These were spreadbetting, playing poker in a pub or club and using betting exchanges.

Because of the matching procedure undertaken, all those in the comparison sample had gambled in the past year. This means that this study excludes those who had not previously gambled on any activity and means we may miss some people who have previously never gambled and start playing machines.

Questionnaire design

The questionnaire was designed to capture information on changes in gambling behaviour, including machine use. Funding was available for an interview of around 10 minutes on average. Therefore, we had to be pragmatic about the range and level of content included. The questionnaire, as agreed with the Responsible Gambling Trust, focused on the following areas:

- Past year engagement in one of 19 gambling activities
- Frequency of engagement in each gambling activity
- Why started and why stopped gambling on machines
- Methods of playing machines in a bookmaker's (i.e., use of debit cards, cash, timing of sessions etc)
- Problem gambling screen, measured by the PGSI (see below)
- Motivations for gambling on machines
- Attitudes to machine gambling
- Levels of control when playing machines
- Socio-economic and demographic information.

Please contact the authors for a full copy of the questionnaire.

Data collection

All data was collected using computer-assisted telephone interviewing. Replicating the interviewing methods of the baseline studies, where an interviewer visits each household to collect data, would have been prohibitively expensive. All selected individuals were first sent an advance letter to inform them about the study. This included a £10 pre-paid voucher redeemable for cash by visiting a Post Office. It also included contact details for the research team if the potential participant wanted to know more about the study.

One of NatCen's specialist telephone interviewing team then attempted to make contact with the potential participant, answer any questions they might have and attempt to collect the survey data. Multiple attempts were made to make contact with each potential participant. On

average, cases were called 8 times at different times of the day and on different days of the week.

Survey response

The response rates achieved for each sample type (machine gamblers and comparison sample) are show in Table A2 below, along with the overall response rate for the study.

Table A2

Survey response rates, by sample type

Aged 18 and over

	Machine gamblers n	Comparison sample n	**All** **n**
Total number of individuals selected	1471	2910	4381
Total number of individuals identified as ineligible*	10	16	26
Total eligible sample	1461	2894	4355
Total productive interviews	549	1199	1748
No contact	660	1078	1738
Refusal	217	556	773
Other unproductive (contact made	35	61	96
Final response rate	**37.6%**	**41.4%**	**40.1%**

*These were selected participants who had died or emigrated between studies.

Overall, the 40% of eligible participants took part in this study. This represents a conservative estimate of response as it includes 887 cases where there were technical difficulties in making contact (i.e., the phone was disconnected or was a fax/modem). The American Association of Public Opinion Research recommends that these cases be removed from the base when calculating response (they are not working phone numbers and therefore are ineligible). Following these guidelines would give a total eligible sample of 3468 and a response rate of 50.4%. Therefore, we estimate the final response rate for this project to be between 40% and 50%.

As Table A2 shows, response was slightly lower among machine players than the comparison sample.

Weighting

Calibration weighting

The combined sub-sample of the HSE 2012, SHeS 2012, and BGPS 2010 participants who answered at least one of the gambling participation questions (HSE: 8291, SHeS: 4815, BGPS: 7756) was calibrated so that the weighted distributions of age-by-gender and region (Government Office Region) matched the ONS 2012 mid-year population estimates for Great Britain. The weights were then scaled to have a mean of 1, by dividing the calibrated (grossed) weight by the overall mean. Table A3 shows the distribution of cases in England, Scotland and Wales after calibration weighting.

Table A3 Sample distribution after calibration weighting

	Population		grossed weights		scaled weights	
	N	%	n	%	n	%
England	43035926	86.2	43035926	86.2	16843	86.2
Scotland	4365699	8.7	4365699	8.7	1709	8.7
Wales	2498497	5.0	2498497	5.0	978	5.0
Total (GB)	49,900,122	100.0	49900122	100.0	19530	100.0

Adjustment for non-eligible cases

Of the 19,530 cases in the combined HSE/SHeS/BGPS dataset, 15,050 (77.1%) had given consent to be followed-up and provided a valid phone number. Therefore, an adjustment was necessary to make sure that those who were eligible for the follow-up survey were representative of the total population.

The probability of being eligible for the follow-up survey was estimated using a logistic regression model (weighted by the calibration weight) to predict a binary variable defined as:

1 = given consent to be followed-up and provided a valid phone number

0 = have not given consent to be followed-up or not provided a valid phone number

The predictors of this variable that were entered into the model included all the variables used to select the matched sample of non-machine players for the follow-up survey (i.e. demographic characteristics, health measures and gambling-related activities).

The eligibility adjustment was defined as the inverse of the model-predicted probability. To reduce variance inflation due to a small number of large weights, the top 0.5% of the eligibility adjustment was trimmed.

The eligibility weight for the 15,050 eligible cases was then calculated as the product of the eligibility adjustment and the calibration weight, and was scaled to have a mean of 1.0.

Non-response weighting

Of the 15,050 eligible cases, 1,471 machine players and 2,910 non-machine players were included in the follow-up survey. 37.6% of machine players and 41.4% of non-machine players agreed to be interviewed.

Therefore, an adjustment was necessary to make sure responding machine and non-machine players were representative of the total population (of machine and non-machine players respectively).

The probability of response, separately for machine and non-machine players, was estimated using a logistic regression model (weighted by the eligibility weight) to predict a binary variable defined as:

1 = respondent to the follow-up survey

0 = non-respondent to the follow-up survey

The independent variables entered into the models included the same variables used for the adjustment for non-eligible cases.

The non-response weight was defined as the inverse of the model-predicted probability for the machine and non-machine players' model respectively. To reduce variance inflation due to a small number of large weights, the top 1% of each non-response weight was trimmed.

The final weight for the 549 machine and 1,199 non-machine players respectively was then calculated as the product of the non-response weight and the eligibility weight, and was scaled to have a mean of 1.0 separately for the machine and non-machine players' sample.