

Online Gambling in British Columbia: a Descriptive Report on Gambling Participation on the PlayNow.com Platform

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Citation: Lesch T & Clark L. Online Gambling in British Columbia: a Descriptive Report on Gambling Participation on the PlayNow.com Platform. Report to the BC Government, Gaming Policy and Enforcement Branch (GPEB), 2017.

EXECUTIVE SUMMARY

Background

Online gambling is a recent and expanding addition to the international gambling landscape. Online gambling services allow users to gamble in privacy, at any time of the day or night, and with high accessibility. There are longstanding concerns that online gambling may pose a risk to public health, and a 2016 Canadian survey reported that online gambling was the form of gambling most likely to be rated as harmful (1). At the same time, online gambling provides an unprecedented opportunity for gambling research and responsible gambling interventions, given that online gambling providers hold large datasets of naturalistic gambling behaviour that is linked over time to a single user account. Current research on online gambling is at an early stage, and relies almost exclusively upon European data.

BC was the first Canadian province to introduce online gambling in 2004. The BCLC's PlayNow.com platform became the first provincially-operated, regulated gambling website in North America. In BC, there were an estimated 265,000 registered users on the PlayNow.com platform in 2015 (2). At present, BCLC does not monitor online activity of individual users on PlayNow.com, which is a prerequisite for identifying and intervening in users experiencing gambling harms. As a provincially-run website, PlayNow.com is the only legal platform in its jurisdiction, and offers a wide range of games including lottery products, sports betting and an eCasino. The present report is based on PlayNow.com data from June 2015 provided by the BCLC in a de-identified format to the Centre for Gambling Research at UBC. The core objective of this report is to describe the levels and distributions of gambling engagement on PlayNow.com, across the five gambling modalities offered on the platform. These analyses help to characterize online gambling behaviour in BC residents. Our descriptive analyses consider both the typical user in each game category, as well as the distribution of engagement, with a focus on the 5% of users with the highest betting activity. These analyses are informed by the Pareto Rule in economics, whereby 80% of the revenue for a product tends to be derived from the 20% most engaged consumers. High Pareto values (i.e. >80%) may be regarded as a preliminary indicator of a game category for which revenues may be linked to harmful involvement.

Approach

Our report describes online gambling participation on the PlayNow.com platform by BC residents in June 2015. We were able to obtain data for five game categories: lottery, eCasino, sports betting, social games (including Keno), and bingo. We focus on 3 variables reflecting gambling *intensity* (total number of bets,

average wager per bet, and total monthly spend) and 3 variables reflecting gambling *engagement* (total number of gambling sessions, total number of gambling days, and total number of games played).

Findings

Our dataset for a single month of play comprises 41,401 individual customers placing over 48 million (48,855,890) individual bets. Looking at game preferences broken down by users, lottery products were the most popular game (79% of users), followed by the eCasino (30%), sports (9%), social games (8%) and bingo (4%). Looking at game popularity broken down by individual bets, the eCasino accounts for over 97% of bets placed; lottery products, social games and bingo each account for approximately 1% of bets, and sports betting only 0.1%. Thus, in the eCasino, 30% of the users on the platform generate 97% of the individual bets.

There were some systematic trends in when betting occurred on the platform. By day of week, traffic on PlayNow.com was greatest on Tuesdays (\$15.8m) and lowest on Sundays (\$11.7m). By time of day, betting rose steadily from late afternoon 4pm (~\$6m) to a peak at 10pm (~\$9m), and then gradually declined through the night to reach a low at 5am (~\$1m). Betting levels remained fairly stable through the morning and early afternoon from 9am until 3pm (~\$4m per hour).

On lottery products, the typical user placed 8.2 bets of \$2.96 each, for a total spend of \$35.52. The top 5% most engaged lottery users placed 31.8 bets of \$4.95, for a total spend of \$230. This top 5% accounted for 18.5% of the total spend, and the top 20% accounted for 53% of the total spend.

By contrast, player engagement in the four other categories showed a much higher degree of skew. In the eCasino, where 80% of bets were placed on online slot machines, the typical player placed 763 bets of \$1.00 each, for an average net loss of \$75.86. The typical user within the top 5% most engaged eCasino users placed 12,601 bets of \$4.96 each, for a net loss of \$2,704. The top 5% accounted for 53% of the eCasino total spend and the top 20% accounted for 84%.

This skew was also evident in the Pareto values for sports (89%), social games (80%) and bingo (87%), although the highest levels of engagement were manifested in different variables between games. For example, the top 5% most engaged sports bettors placed a relatively small number of bets (37.6) of large size (\$48.88), resulting in an average net loss of \$703.

These findings are summarized in the infographic in the Appendix.

Recommendations

One of the research priorities identified by the 2015 'Plan for Public Health and Gambling in British Columbia' report was to characterize the levels of online gambling involvement in BC residents. These analyses on PlayNow.com are useful in comparing the relative appeal and levels of engagement across different games on the platform. The present data do not constitute prevalence estimates, because we have no data on the levels of gambling on unlicensed websites in BC. Future surveys should seek to establish the prevalence of online gambling on unlicensed sites and the number of users who gamble online across multiple platforms.

Four of the five categories on PlayNow.com, including the eCasino, adhered to (or exceeded) the Pareto Rule, with the most highly engaged 20% of users generating at least 80% of the total spend. This effect was attenuated for lottery products, with the top 20% accounting for just 53% of total spend. In future research,

it is important to establish to what extent these most engaged users represent users experiencing gambling harms; for example by hosting clinical questionnaires on the website, or linking data to self-exclusion from the website.

The observed differences between the game categories on PlayNow.com carry implications for ongoing research and policy. In terms of risk detection, algorithms for identifying risky online play may require substantial tailoring by game types. For example, heavy engagement in the eCasino was reflected in a larger number of bets but modest average bet size, whereas for sports betting, heavy engagement was reflected in a large bet size but a modest total number of bets. Algorithms that have been validated on a platform offering a certain array of gambling products may not transfer well to platforms and jurisdictions that offer other game types.

The large number of customers using PlayNow.com to purchase lottery tickets creates a marketing opportunity for advertisements and promotions directed at this sector, to encourage them to visit other areas of the platform. Regulatory bodies may wish to consider the appropriateness of such practices.

Our ongoing program at the Centre for Gambling Research is using the PlayNow.com dataset to move beyond daily aggregate variables to fine-grained analysis of bet-by-bet behaviour, focusing on different indices of loss chasing. Our demonstrated ability to access, and work with, these 'big data' exemplifies the scientific benefits of the dialogue between the Centre for Gambling Research at UBC, the BCLC, and the government regulator, GPEB.

Online gambling in British Columbia: a Descriptive Report on Gambling Participation on the PlayNow.com Platform

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Background

Online gambling provides an unprecedented opportunity for both gambling research and intervention. Online gambling providers hold extremely large datasets ('big data') of naturalistic gambling behaviour. Online gambling customers (henceforth 'users') are gambling on games of their choice, using their own funds. The objective record of transactions and gambling outcomes avoids significant issues with gamblers' self-reports (1). As all credit card deposits are linked to a single user account, behaviour from a single user can be monitored across time (termed 'player tracking' or 'behavioural tracking'). In turn, the account settings and web-based delivery provide a ready means of delivering feedback and interventions to users.

What is known about online gambling internationally?

Over the past 20 years, the emergence of online gambling has substantially modified the gambling landscape around the world. Online gambling has an estimated global market value of €6.1 billion, and around 10% of the overall global gambling market (4). Online gambling services allow users to gamble in privacy, at any time of the day or night, and their access via mobile devices enables unrivalled convenience over land-based gambling options. For these reasons, there has been longstanding concern that online gambling may pose an elevated risk to public health (4, 5). A recent Canadian survey of public attitudes towards gambling indicated that online gambling was the form of gambling most likely to be rated as harmful (1).

In line with these concerns, scientific studies have found a *correlation* between online gambling involvement and symptoms of problem gambling (6–8). However, it is not clear whether this relationship is causal. Online gamblers typically do not gamble exclusively online. Recent studies indicate that the correlation is driven by involvement across multiple forms of gambling: those who play multiple forms of gambling (of which one form may be online) are reliably at high risk of problem gambling, but the specific involvement in online gambling *per se* may not be reliably predictive of problem gambling after controlling for engagement in multiple forms (9–11).

What do we know about online gambling in BC?

BC was the first Canadian province to introduce online gambling in 2004. The BCLC's PlayNow.com platform offers a variety of games, including lottery products (since 2004), casino games, and sports betting (since 2012), and became the first provincially-operated, regulated gambling website in North America. In 2013, Manitoba partnered with BCLC to launch PlayNow.com as the only regulated online gambling website in Manitoba. In BC, there were an estimated 265,000 registered users on the PlayNow.com platform in 2015 (2). In the 2014 BC prevalence survey (12), 72.5% of British Columbians reported past-year involvement in any form of gambling, but only 1% of these gamblers reported playing online. Consistent with international data, in the BC prevalence survey, online gambling was one of several forms of gambling that was over-represented among problem gamblers. At present, BCLC does not monitor online activity of individual users on PlayNow.com, which is a prerequisite for identifying and intervening in users experiencing gambling harms. As a provincially-operated website and the only legal platform in BC, it has been noted that the

imperative to protect vulnerable users may be greater relative to a private operator (Strategic Science, 2015).

The Centre for Gambling Research at UBC

The Centre for Gambling Research at UBC was launched in 2014 with \$2million in funding from the British Columbia Lottery Corporation and the Province of BC government. The Centre has a dual mandate of reducing the harms associated with problem gambling, and improving evidence-based gambling policy. Directed by Dr Luke Clark, an expert in the psychology and neuroscience of gambling games and gambling addiction, the first phase of research at the Centre has focused on describing the interplay between the psychological ingredients of gambling games (with a focus on modern Electronic Gaming Machines, EGMs) and personal risk factors for addictions.

Objectives

Contribution to academic literature

Scientific research on online gambling behaviour is limited and at an early stage. A 2015 BC report (13) identified 23 publications in which online gambling data was utilized to identify users experiencing gambling harms, with a view to developing algorithms that could predict online users who are at risk. The implementation of such algorithms is the first step in enabling interventions to mitigate gambling harms. However, the current evidence base relies upon European data (all 23 publications in the 2015 report). Eighteen of those publications come from a single dataset from the European operator, *bwin*, in conjunction with the Harvard Medical School, based on a cohort of users who opened *bwin* accounts in February 2005 (14–17). In comparison to this existing evidence base, the PlayNow.com dataset is unusual in 2 respects. First, limited data exist regarding online gambling in North American users. Second, in terms of gambling format, the dominant form of gambling on *bwin* was sports betting, and the platform also offered casino games. By contrast, PlayNow.com offers a wide variety of game categories, comprising lottery products, the eCasino (including online slot machines and table games), bingo and social games, and sports betting. It is likely that variables predictive of at-risk gambling may differ across game types (18). Of particular interest, as a province-run website, PlayNow.com offers lottery products. No previous studies of online gambling behaviour have characterized lottery involvement. In land-based gambling, including the 2014 BC prevalence survey, lottery products are typically the most prevalent form of gambling, and this form also generally has a negligible association with problem gambling (19, 20). The availability of lottery products on PlayNow.com may therefore shift behaviour and the distribution of gambling involvement.

The prior research on online gambling behaviour has focused on daily aggregate measures of data (e.g. total bets per day). These studies have identified a number of variables reflecting gambling intensity (e.g. average bet size) and the level of engagement (e.g. number of games played on platform), which predict independent markers of disordered gambling (e.g. subsequent self-exclusion from the website). At present, it is unclear how best to harness this knowledge in developing computational algorithms for the detection of at-risk players. Development of such an algorithm may require substantial tailoring to the characteristics of the local platform (e.g. gambling products offered).

Contribution to BC-specific knowledge and decision-making

The core objective of this report is to describe the levels and distributions of gambling engagement on PlayNow.com, across the five gambling modalities offered on the platform. These analyses

characterize for the first time online gambling behaviour in BC residents. The Centre for Gambling Research at UBC is able to conduct these analyses independently, without the conflict of interest that would arise from BCLC outputs.

Our descriptive analyses consider both the typical user in each game category, as well as the distribution of engagement, with a focus on the 5% of users with the highest betting activity. Prior work on online gambling has indicated pronounced skew in engagement, with a small minority of highly engaged users (e.g. 16, 21). Such observations raise a concern that problem gamblers may contribute a disproportionate share of online revenues. In land-based gambling, it is estimated that 15 to 60% of revenue derives from problem gamblers (22), but this figure varies by game type and is notably far lower for lottery products (e.g. 2% in Orford et al, 20). Our analyses are informed by the Pareto Rule from economics, where for many goods, 80% of the revenue is derived from 20% of most engaged consumers. There is evidence from the *bwin* dataset that the Pareto Rule applies to online sports betting (21), and by linking online data to a problem gambling screening survey, Tom et al were able to show that problem gambling was markedly over-represented in the “vital few” (i.e. the 20%) compared to the “trivial many” (the other 80%). In the absence of external markers of disordered gambling in the PlayNow.com dataset, we treat high Pareto values (i.e. >80%) as a preliminary indicator of a game category for which revenues may be linked to harmful levels of involvement.

Relevance to the Centre for Gambling Research’s mandate

In considering the differences in gambling engagement across gambling forms, including online slot machines, and the associations with excessive gambling (as indicated by the Pareto values), these analyses complement the ongoing laboratory-based work at the *Centre for Gambling Research*. Moreover, these descriptive analyses provide a foundation for more detailed investigations of online gambling behaviour, based on bet by bet observations. These include analyses of specific features on online slot machines, and identifying behavioural markers of loss-chasing as a sign of disordered gambling. In this manner, the PlayNow.com analyses are a powerful addition to the Centre’s research strategy.

Approach

Our report describes online gambling participation on the PlayNow.com platform in BC in one month of play (June 2015), comprising over 41,000 individual customers, placing over 48 million individual bets. We approached the BCLC Social Responsibility team to request the data. The dataset was provided under a confidentiality agreement, in a de-identified format by the BCLC Data Analytics team. The dataset was transferred to a secure server (Westgrid) hosted in Canada. The protocol was approved by the Behavioural Research Ethics Board at the University of British Columbia. The dataset contains data for five game categories on the PlayNow.com site: lottery products, the eCasino, sports betting, bingo, and social games (including Keno).

We focus on 3 variables reflecting gambling intensity: i) total number of bets, ii) average wager per bet, iii) total monthly expenditure. In the case of the eCasino and sports betting, the expenditure variable was calculated as the summed wager minus winnings, henceforth ‘net losses’ (Nb. positive values indicate higher losses). For the other game sections (lottery, bingo, social games), we do not hold data for winnings and thus the expenditure variable was calculated as the summed wager, unadjusted for winnings, henceforth termed ‘total spend’. We focus on net losses where available because this variable is more pertinent to the gambler’s experience and platform revenue. We also extract 3 variables reflecting gambling engagement: iv) total number of gambling sessions over the

month, v) total number of days on which website visited, vi) total number of games played within a game category.

Our descriptive analyses focus on 4 questions:

1. How do participation rates in BC residents using PlayNow.com vary across the five game categories?
2. In a snapshot of one month of online play, can we see systematic patterns in the use of the platform over time, when stratified by day of the week and hour of day?
3. What is the distribution in engagement across different game categories on the platform? Specifically, what does the gambling behaviour look like in the 5% most engaged users in each category, and how skewed are these distributions? What proportion of the activity on each game category is linked to the top 20% most engaged users?
4. Can we see differences in gambling intensity or game preferences as a function of engagement across multiple forms of gambling? How many users visit the platform to play a specific game category, as compared to 'multi-category' users?

To characterize behaviour in the top 5% of users, we ran two complementary analyses. First, we ranked users within each category by their total number of bets placed, and extracted gambling intensity measures for the top 5% and the Pareto value for the top 20%. The second analysis calculated equivalent values based on ranking users by their total spend (net loss where available) within the category. Pareto values for this second analysis were all based on total monthly spend unadjusted for winnings, in order that these values are comparable across the different game categories.

Results

In total, 41,401 individual users in BC gambled on the platform in June 2015, generating over 48 million (48,855,890) individual bets. These figures were skewed by a small subset of users who placed a large number of bets in the month. The mean number of bets per customer was 1180 (sd 6078), while the equivalent median value was only 16.2. The mean is inflated by a minority of highly engaged users. For this reason, we report median values¹ as the better indicator of the 'typical user'. We then show the level of skew for each distribution by contrasting the top 5% of most engaged users against the typical (median) user.

Based on median scores, the typical user on the website visited the platform for 6 sessions in the month (mean = 9.7, sd = 14.3) over 5 separate days (mean = 7.0, sd = 5.9). The typical user played 4 different products (mean = 7.5, sd = 15.3), typically from a single game category on the platform (mean = 1.3, sd = 0.64).

If we look at game category preferences broken down by users (Figure 1A), it is clear that the lottery section is substantially the most popular section on the website with 33,008 (79.7%) users purchasing lottery products, compared to 12,422 (30.0%) using the eCasino, 3,674 (8.9%) betting on sports, 3,342 (8.1%) playing social games, and 1,771 (4.3%) bingo. As some users gamble across more than one of these categories, these percentage values sum to more than 100%, and the

¹ For the 3 gambling intensity variables, which vary substantially across users, we report a 'smoothed median': this is the average (mean) of the 5 datapoints above and below the median value. The use of this smoothed median avoids reporting exact values (e.g. net losses) reflecting the behaviour of a single user. The 3 gambling engagement variables take only a small range of integer values such that smoothing was not possible, and thus we report simple medians.

segment sizes in Figure 1A are adjusted proportionately (lottery 60.9%, eCasino 22.9%, sports 6.8%, social 6.2%, bingo 3.3%).

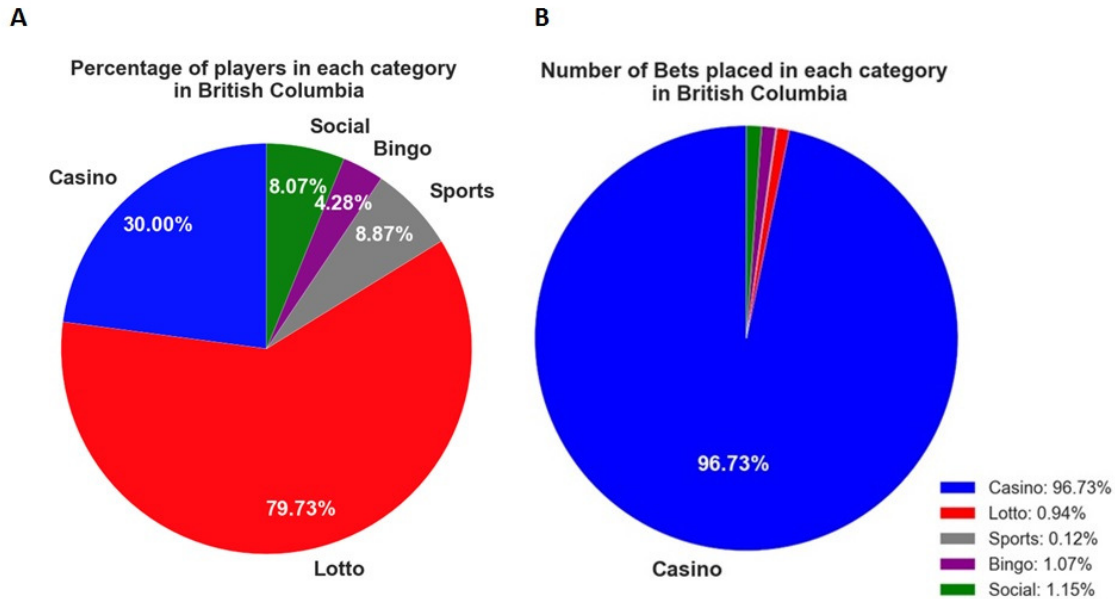


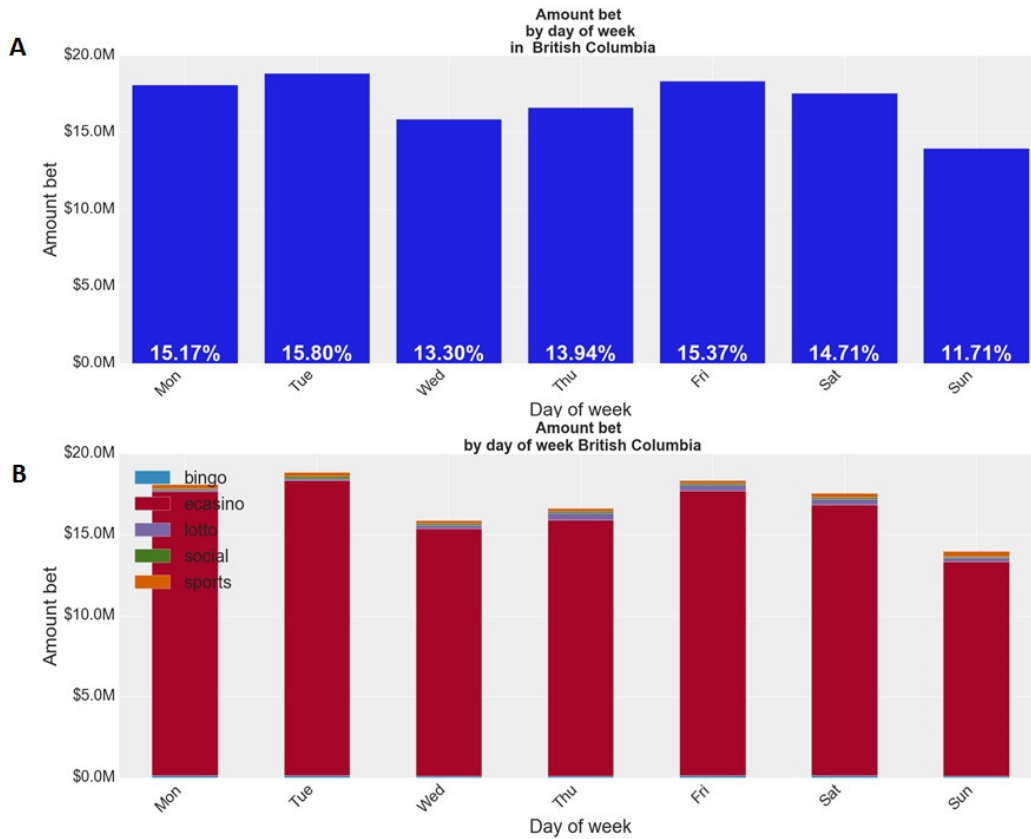
Figure 1: Gambling behaviour across the five sections on the PlayNow.com platform for BC residents, based on numbers of users (A) and number of individual bets (B)

If we plot the same data broken down by bet rather than by user, a very different pattern emerges (Figure 1B): the eCasino category accounts for 96.7% of individual bets in the month, whereas the lottery section accounts for just 0.9% of the overall bets (social 1.2%, bingo 1.1%, sports 0.1%). In many respects, this contrast is unsurprising: lottery tickets are one-off purchases whereas eCasino games allow repeated betting against an initial deposit. Nevertheless, the size of the disparity is dramatic, and the disparity further highlights the need to analyze different gambling variables broken down by game type.

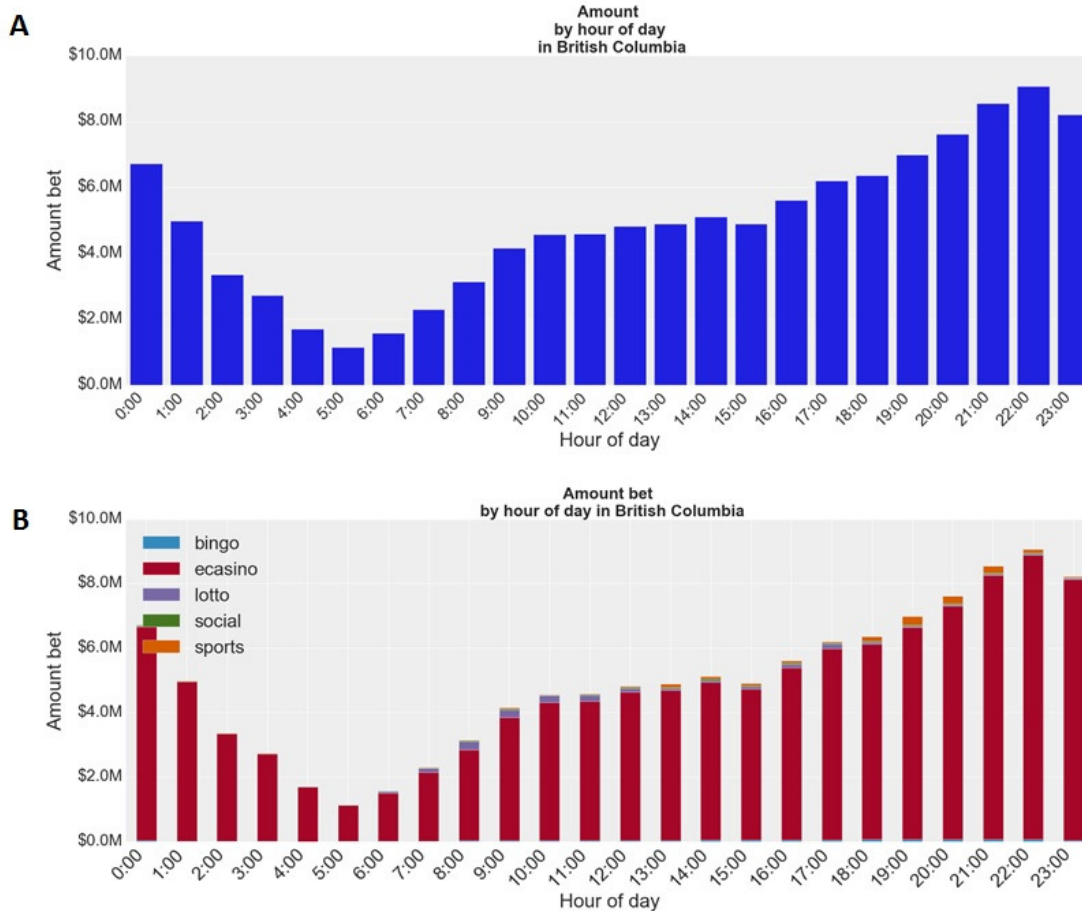
Gambling behaviour by day and time of day

We ran two analyses of betting behaviour across time. The first of these looked at fluctuations by day of week. As our dataset runs from Monday 1 June to Tuesday 30 June 2015, we are averaging 4 days of data for Wednesdays to Sundays, and 5 days of data for Mondays and Tuesdays. The total spend on the platform² varies from a low of \$11.7m on Sundays to a peak of \$15.8m on Tuesdays; Mondays (\$15.2m) and Fridays (\$15.4m) are close behind. These day fluctuations show a similar breakdown by game section; Figure 2B again highlights the predominance of the eCasino games in the overall spend.

² Total Spend is the cumulative wager unadjusted for winnings; this should not be interpreted as player losses, nor should it be interpreted as BCLC revenue. This variable reflects gross turn-over on the platform.



The second analysis looked at fluctuations by time of day. Across 30 days in June 2015, betting on the website rose steadily through the evening from 4pm (~\$6m) to a peak at 10pm (~\$9m). From 10pm, betting gradually dropped through the night, reaching a low at 5am (~\$1m). Betting levels remained fairly stable through the morning and early afternoon from 9am until 3pm (~\$4m per hour). When we further decompose these fluctuations by game section, it is evident that the traffic on the platform between 11pm and 7am was almost entirely within the eCasino, with some Lottery traffic evident within the morning (8am to 12pm) and some sports betting evident within the evening (6pm to 10pm).



3.1. Descriptive Analysis of Lottery Gambling

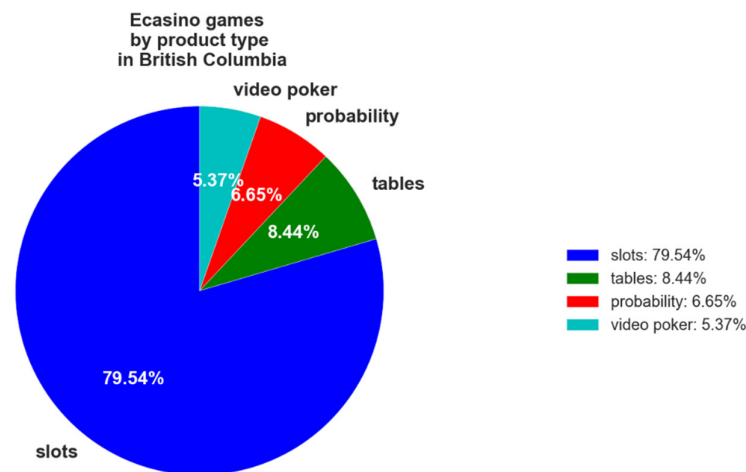
The 33,008 users who purchased lottery products made an average of 8.2 bets in the month (mean = 13.9, sd = 14.8), with an average bet of \$2.96 (mean = \$4.64, sd = 5.87), for a total spend (not adjusted for winnings) of \$35.52 (mean = \$55.72, sd = 82.1). This betting took place on 5 separate sessions (mean = 6.0, SD = 4.7) across 4 days (mean = 5.6, sd = 4.1) and used an average of 3 (mean = 3.0, SD = 1.5) different game products within the lottery section.

The top 5% of users in the Lottery section were defined in two ways. First, we identified the top 5% based on the total number of bets on lottery products (n=1,733). The typical user within the top 5% of bettors placed 45.5 bets, with an average bet of \$1.50, for an average total spend of \$126.68. This top 5% accounted for 17.7% of lottery bets, and the top 20% of bettors accounted for 54.0% of lottery bets (see Figure 4A). Second, we identified the top 5% based on the total spend on lottery products (n=1,666; the different sample size for the two 5% subgroups is due to multiple users registering the same value). The typical user within the top 5% of spenders placed 31.8 bets, with an average of \$4.95 per bet, for an average total spend of \$229.61. This top 5% accounted for 18.5% of the total spend on lottery products, and the top 20% accounted for 53.0% of the total spend. Notably, only 37% of these top 5% subgroups overlapped. As one would expect, the top 5% ranked by bet tended to place a larger number of low value bets, whereas the top 5% ranked by spend tended to place a smaller number of high value bets. Nevertheless, with both methods of identifying the most heavily engaged users, lottery play was reasonably homogenous: the most heavily engaged

lottery players were not vastly different from the typical player in the overall distribution, and the contributions of the top 20% most engaged players (54% and 53%) fall considerably below the Pareto value of 80%. This is also illustrated by the gradual increment in gambling intensity in the cumulative plot in Figure 4A.

3.2. Descriptive Analysis of Gambling in the eCasino

The eCasino section comprises four game types: online slot machines, video poker, probability games, and casino table games. In June 2015, the online slot machine subsection was the most popular, accounting for 79.5% of individual bets within the eCasino (table games: 8.4%, probability games: 6.7%, video poker 5.4%). Within each section, there can be a large number of individual games; for example there were 175 distinct slot machine games in the eCasino in June 2015.



The 12,422 users who played in the eCasino placed a median of 763 bets in the month (mean = 3,796, sd = 10,560), and wagered a median of \$1.00 per bet (mean = \$3.32, sd = 16.7), for a net loss (i.e. total spend adjusted for winnings) of \$75.86 (mean = \$378.61, sd = 1,806). Typical betting in the eCasino took place on 6 sessions (mean = 14.0, sd = 19.9) across 5 days (mean = 7.7, sd = 7.5), and used an average of 6 individual products (mean = 12.9, sd = 18.8).

In the analysis of the top 5% of bettors in the eCasino category (n=622), the typical user within the top 5% placed 25,546 bets in the month, with an average wager of \$0.79 per bet, for a net loss of \$1,255. This top 5% of users accounted for 33.6% of all bets in the eCasino, and the top 20% of bettors accounted for 76.4% of all bets in the eCasino (see Figure 4B). The second analysis identified the top 5% based on the net loss in the eCasino (n=619). The typical user within this top 5% placed 12,601 bets, with an average of \$4.96 per bet, for an average net loss of \$2,704. The top 5% accounted for 53.3% of the total spend in the eCasino, and the top 20% accounted for 84.4% of total spend. As was seen for lottery products, only 37% of these top 5% subgroups overlapped, with the top 5% ranked by bet placing a very large number of low value bets, and the top 5% ranked by net loss placing a smaller number of higher wager bets. But with either method of identifying the most heavily engaged users, eCasino play was heavily skewed, with high Pareto values such that the top 20% most engaged players accounted for 76% and 84% of betting activity. This skew is illustrated by the steepness of the cumulative plot for the eCasino in Figure 4B.

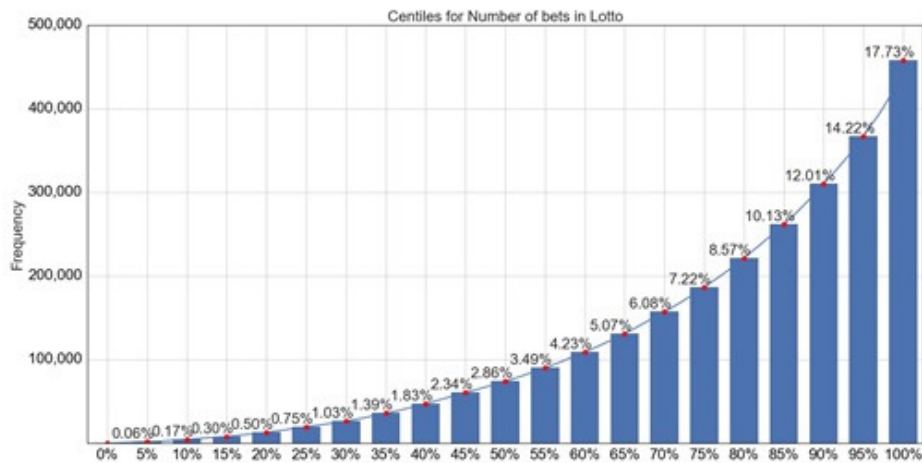
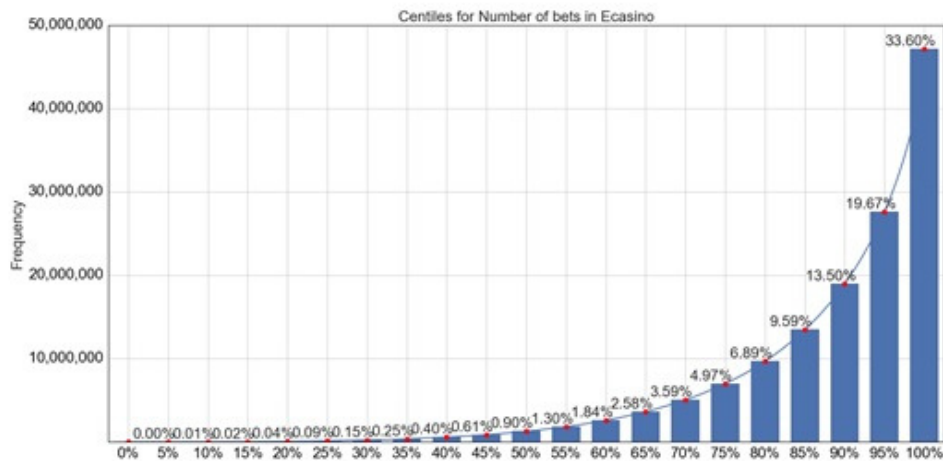
A**B**

Figure 4: Cumulative distributions for the total number of bets in the month, in 5% increments for A: the lottery section, B: the eCasino section of PlayNow.com in June 2015. We report these cumulative plots for 'total number of bets' because the variable is most comparable across game sections. By contrast, for expenditure, the Lottery, Bingo and Social Games data are not adjusted for winnings.

3.3. Descriptive Analysis of Sports Betting on PlayNow.com

A total of 3,674 users placed sports bets in June 2015; we note that this month may specifically underestimate sports betting as it is out of season for several major sports leagues. Sports bettors on PlayNow.com placed a median of 2.4 bets in the month (mean = 15.3, sd = 51.0), with an average bet of \$6.33 (mean = \$21.5, sd = 104.0), and a net loss (i.e. total wager adjusted for winnings) of \$13.02 (mean = \$57.58, sd = 1,654). Typical sports betting took place over 3 sessions (mean = 11.5, sd = 21.7) across 2 days (mean = 5.4, sd = 7.0). All sports bets were recorded within a single game (i.e. we do not hold data broken down by sport).

In the analysis of the top 5% of bettors in the Sports category (n=185), the typical user within the top 5% placed 101.3 bets in the month, with an average bet of \$3.98, and a net loss of \$150.53. This top 5% of users accounted for 32.6% of all bets, and the top 20% of sports bettors accounting for 69.2%

of all bets in the sports section (see Figure 5A). The second analysis identified the top 5% based on the net loss in the Sports section (n=184). The typical user within this top 5% placed 37.6 bets, with an average of \$48.88 per bet, for an average net loss of \$703.43. The top 5% accounted for 66.6% of total spend, and the top 20% accounted for 88.7% of total spend. Only 32% of the top 5% subgroups overlapped. The analysis ranked by total spend indicates greater skew and a higher Pareto value (89%) compared to the analysis ranked by total bets (69%), although the steepness of the cumulative plot for total bets for sports betting in Figure 5A is similar to that for the eCasino shown in Figure 4B.

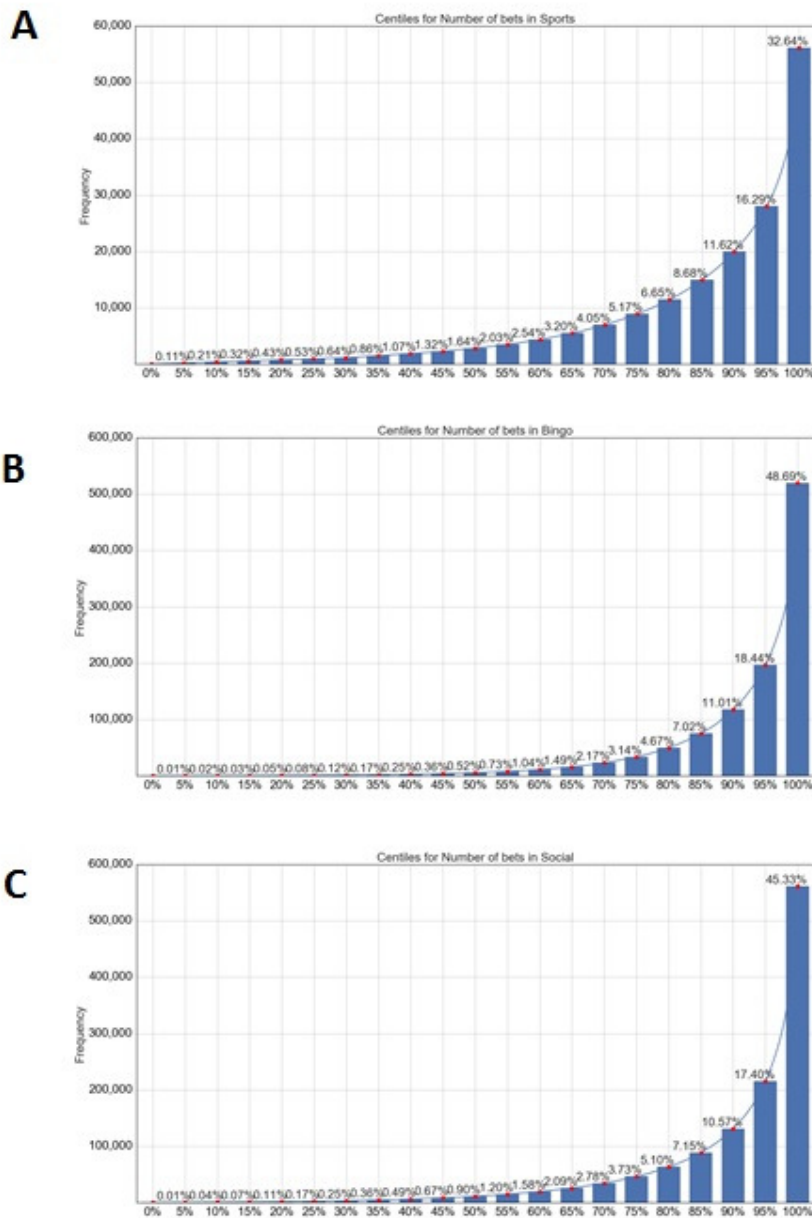


Figure 5: Cumulative distributions for the total number of bets in the month, in 5% increments for A: the sports betting section, B: Bingo, C: Social Games. We report these cumulative plots for 'total

number of bets' because the variable is most comparable across game sections. By contrast, for expenditure, the Lottery, Bingo and Social Games data are not adjusted for winnings.

3.4. Descriptive Analysis of Bingo on Playnow.com

A total of 1,771 users played Bingo games, placing a median of 20.6 bets in the month (mean = 293, sd = 1,284), and an average bet of \$0.96 (mean = \$1.69, sd = 2.37), and a total spend (not adjusted for winnings) of \$24.77 (mean = \$461, sd = 2,876). Typical bingo play took place on 3 sessions (mean = 9.9, sd = 17.2) spread over 2 days (mean = 5.2, sd = 6.7), and used an average of 8 bingo products on the platform (mean = 22.5, sd = 32.6).

In the analysis of the top 5% of bettors in the bingo category (n=89), the typical user within the top 5% placed 2,222 bets in the month, with an average wager of \$0.90, and a total spend of \$2,683. This top 5% of users accounted for 48.7% of bets in the bingo category, and the top 20% of bettors accounted for 85.1% of bets (see Figure 5B). In the top 5% based on the total spend on bingo (n=89), the typical user placed 1,846 bets, with an average bet of \$3.05, and a total spend of \$3,700. The top 5% based on total spend accounted for 56.4% of expenditure, and the top 20% accounted for 86.9% of expenditure. For the bingo category, there was a higher overlap (63%) between the two 5% analyses. Both methods indicate heavily skewed engagement and high Pareto values (85%, 87%), which is illustrated by the steepness of the cumulative plot for total bets on bingo in Figure 5B.

3.5. Descriptive Analysis of Social Games on Playnow.com

The 'social games' section on the PlayNow.com platform comprises Keno and its variants. A total of 3,342 users played social, placing an average of 19.7 bets in the month (mean = 168, sd = 580), an average bet of \$1.00 (mean = \$1.42, sd = 1.15), and a total spend (not adjusted for winnings) of \$24.39 (mean = \$206, sd = 717). Typical behaviour on the social games involved 3 sessions (mean = 9.0, sd = 16.6) over 2 days (mean = 4.7, sd = 5.8), using an average of 2 products in the social games section (mean = 1.6, sd = 0.6).

In the analysis of the top 5% of bettors on social games (n=168), the typical user within the top 5% placed 1,386 bets in the month, with an average bet of \$1.00, and a total spend of \$1,586. This top 5% of users accounted for 45.3% of bets placed on social games, and the top 20% accounted for 80.5% of bets (see Figure 5C). In the second analysis using the top 5% based on the total spend (n=169), the typical user placed 1,380 bets, with an average bet of \$1.00, and a total spend of \$1,646. This top 5% accounted for 44.1% of the total spend, and the top 20% of players accounted for 79.7% of the total spend. For social games, 86% of the top 5% users overlapped between the two analyses. Both analyses indicate high degree of skew and high Pareto values (81%, 80%), also evident by the steepness of the cumulative plot for total bets on social games in Figure 5C.

3.6 User engagement across multiple play categories

Many users visiting the PlayNow.com platform in June 2015 placed bets across more than one category on the website. The number of bets placed by users who only bet within a single category (18,551,898 bets) was similar to the number of bets placed by users who bet across two categories (18,368,951 bets). A further 8.9 million bets were placed by 3-category players, 2.6 million by 4-category players, and 209,637 bets by users who played across all 5 sections. Considering the game category preferences within these different groups, it is important to bear in mind that the eCasino accounts for 97% of bets overall. Within single category players, 97.5% of bets (n=18,087,765) were placed in the eCasino, and 1.9% (n=346,560) were on lottery products. In 2 category players, 97.7%

of bets are within the eCasino, and only 0.4% on lottery products. This percentage of lottery play drops further in the 3 and 4 category players (both 0.3%), and can be visualized more easily in Figure 6 by excluding the eCasino. From this figure, it is evident that approximately three quarters of lottery players – who account for 61% of the customers on the platform overall - use PlayNow.com for the exclusive purpose of buying lottery products. As the number of game categories increases, social games and bingo account for an increasingly greater share of the total bets, while the share accounted by sports betting remains fairly stable.

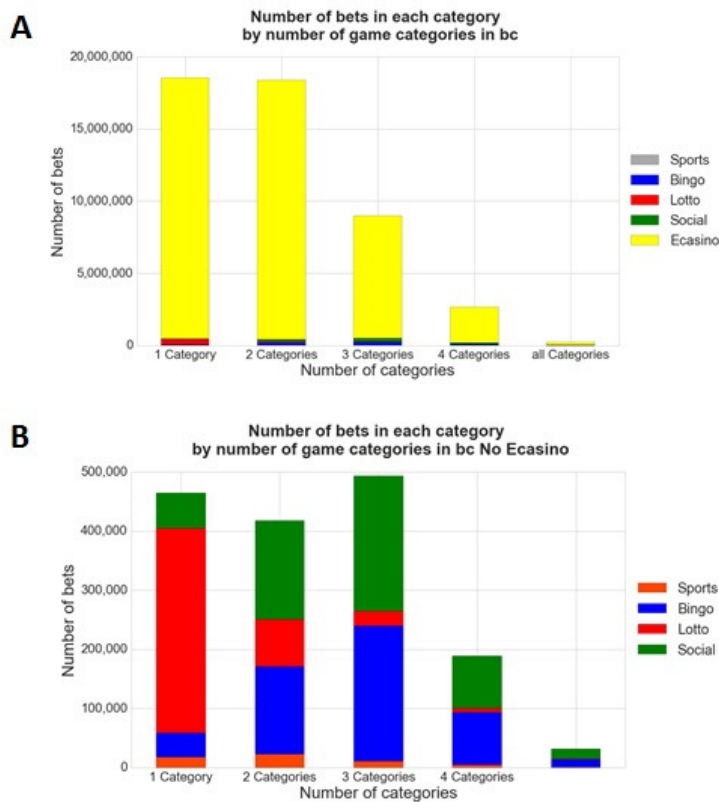


Figure 6: Total bets placed by users who played within a single or multiple categories on the PlayNow.com platform in June 2015. A: all five game categories, B: excluding the eCasino.

Discussion and Recommendations

These descriptive findings provide a cross-section of engagement on the PlayNow.com platform in a single month. We characterize the levels of engagement in five game categories offered on the platform: lottery products, the eCasino, sports betting, bingo and social games. Similar to a land-based casino, the eCasino offers a number of gambling products, including online slot machines, table games (e.g. blackjack, roulette) and video poker. Approximately 80% of the play in the eCasino was on online slot machines.

Which of these game categories was the most popular? The answer depends on how one organizes the data. Broken down by users on the website, lottery products were by far the most popular category: 79% of all visitors to PlayNow.com purchased lottery products in the month. Only 30% of users visited the eCasino, the second most popular category. However, when we analyze game

popularity broken down by bets, a different story emerges: the eCasino accounts for nearly 97% of individual bets, and lottery products account for less than 1%. Gambling behaviour on the platform varies systematically by day of the week (e.g. low levels on Sundays) and with time of day (e.g. high levels in the evenings peaking at 10pm).

Four of the five categories on the platform adhered to (or exceeded) the Pareto rule, with the most highly engaged 20% of users generating 84% of expenditure in the eCasino, 89% for sports betting, 87% for Bingo, and 80% for social games. This effect was attenuated for lottery products, with the top 20% accounting for just 53% of expenditure, which is markedly below the Pareto rule. Within the eCasino, sports betting, bingo and social games categories, the expenditure distributions were highly skewed, to the extent that the top 5% of users accounted for much of the Pareto effects: eCasino 53%, sports betting 67%, bingo 56%, social games 44%. Some differences were observed in Pareto values when users were ranked on total number of bets rather than total spend (eCasino: 76 vs 84%; Sports betting 69% vs 89%; for lottery, bingo and social games, the Pareto values were within 2% in the two analyses). As Pareto values are typically based on expenditure rather than the number of purchases, we emphasize the values derived from expenditure.

An important question that we cannot address in the current data is to what extent the top 5% or top 20% tails of these distributions represent 'problem gamblers', i.e. users who experiencing negative consequences from online gambling. In the case of the eCasino and sports betting, our data indicate pronounced overall net losses in the top 5% (averaging \$2,704 for eCasino and \$703 for sports). Symptoms of problem gambling largely arise from, and are correlated with, monthly gambling losses (20), although we have no direct evidence for the existence of such harms in the present data. For the other game categories (i.e. lottery, bingo, social games), the top 5% analyses were based on gross expenditure rather than net losses, as data on gambling winnings was unavailable for these categories. The association with objective gambling harms may be assessed in future research by hosting clinical questionnaires on the platform, or indirectly by other means including self-exclusion from the website (24, 25) or text analysis of correspondence with BCLC (26).

The observed differences between the game categories on PlayNow.com carry a number of implications for ongoing research and policy. First, in terms of risk detection, algorithms for identifying risky online play may require substantial tailoring by game types. For example, the highest level of engagement in the eCasino was reflected in a large number of bets (12,601) and high net losses (\$2,704), but the average bet size was modest (\$1.00). Conversely, for sports betting, high engagement was reflected in a large average bet size (\$48.88) but a modest total number of bets (37.6). These differences have implications for the detection of loss chasing as a behavioural marker of problematic play, given that loss chasing can be expressed in different ways, such as the escalation in bet size through a session, or extended session length. Our data indicate that these expressions of loss chasing may systematically vary across gambling products. By extrapolation, risk-detection algorithms that have been validated on a platform offering a certain array of products may not transfer well to platforms or jurisdictions with distinct online games. Second, online lottery players represent the majority of users of PlayNow.com, and are most likely to be 'single category' users. These users generate a small percentage of the revenue on the platform. This creates a natural marketing opportunity for advertisements and promotions directed to lottery users, to encourage them to visit other areas of the platform. Regulatory bodies may wish to consider the appropriateness of such practices.

One of the research priorities identified by the BC Strategic Plan report was to characterize the levels of online gambling involvement in BC residents. These analyses on PlayNow.com are useful in comparing the relative appeal and engagement across different games, but critically, they do not

constitute prevalence estimates, as we have no data on the levels of gambling on unlicensed websites. Future surveys should seek to establish the prevalence of online gambling on unlicensed sites, as well as the number of users who gamble online across multiple platforms, and the convergence of online and land-based forms of gambling (27).

Next steps for the Centre for Gambling Research at UBC

Research on online gambling to date has focused almost exclusively on daily aggregate measures of gambling (e.g. total bets per day). These prior studies have identified variables reflecting gambling intensity and engagement that predict external markers of disordered gambling (e.g. account closure) (24, 25, 28). At present, it is not clear how best to harness this knowledge in developing algorithms for the detection of at-risk players. Our findings highlight how the development of such algorithms is likely to require careful tailoring to the local platform. Our ongoing analyses with the PlayNow.com dataset are moving beyond daily aggregate variables to a more fine-grained analysis of bet-by-bet behaviour. We are especially interested in loss chasing, the tendency to continue gambling or increase one's bet in an effort to recoup losses. Loss chasing is often regarded as a defining feature of problem gambling, and it is one of the few symptoms of problem gambling that may be detectable behaviourally from player tracking data. Our ongoing work is deriving different indices of chasing (e.g. the increase in bet size through a session, session length) and assessing the reliability across different game types and relationships with the established daily aggregate predictors of disordered play.

This report provides a snapshot of engagement on the PlayNow.com platform across a single month in summer 2015. Our demonstrated ability to access, and work with, these 'big data' exemplify the scientific benefits of the dialogue between the Centre for Gambling Research at UBC, the BCLC, and the government regulator, GPEB. Two key observations are the disparity in game popularity when broken down either by user (Lottery: 79.7% of users) or by bet (eCasino: 97.7% of bets), and of the degree of skew that is evident in the top 5% of gamblers in the eCasino (12,601 bets, \$2,704 net loss). As online slot machines represent 80% of play in the eCasino, these findings converge with ongoing laboratory-based projects at the Centre for Gambling Research at UBC, investigating the psychological ingredients of modern slot machines that may underlie their disproportionate harms. This includes experiments testing players' tendencies to become immersed in slot machine play for extended periods (29), and individual differences in players' tendencies to "anthropomorphize" slot machines (i.e. treat the machine as a human competitor). Future projects will seek to operationalize these effects in the PlayNow.com data as a very large, naturalistic dataset of gambling "in the field".

Disclosures and Funding

The Centre for Gambling Research at UBC is supported by funding from the British Columbia Lottery Corporation and the Province of BC government. This project was funded by a Research Grant from the BC Ministry of Finance (Gaming Policy & Enforcement Branch) awarded to Luke Clark and Tilman Lesch. We would like to thank the Social Responsibility and Data Analytics teams at BCLC for their assistance in providing the data.

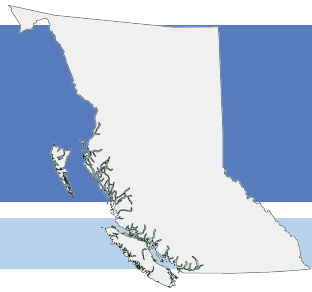
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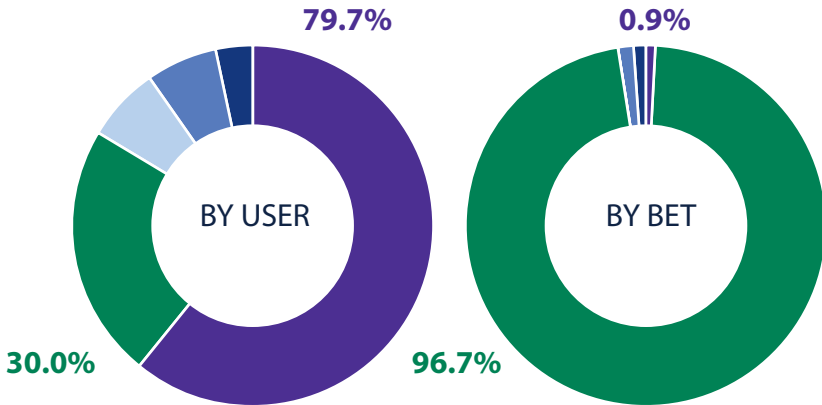
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ONE MONTH OF PLAY (June, 2015), 41,401 PLAYERS, OVER 48 MILLION BETS

1 WHAT TYPES OF GAMES DID PEOPLE PLAY?

● eCasino
 ● Lottery
 ● Sports
 ● Social
 ● Bingo



Just **30%** of users play **eCasino** games but **96.7%** of all bets made are in the **eCasino**

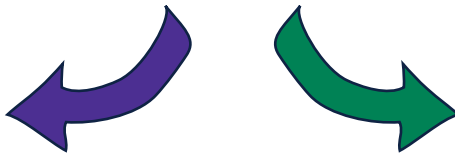
Slots were the most popular game within the **eCasino**, accounting for **79.5%** of all bets

2 HOW DID THE AVERAGE USER BEHAVE?

The average user made 16.2 bets over the month, playing 6 sessions over 5 days, and 4 different games. But average user behaviour varied considerably across game type

LOTTERY

8.2 bets
\$2.96 per bet
 Total spend: **\$35.52**
 5 sessions, 4 days, 3 products



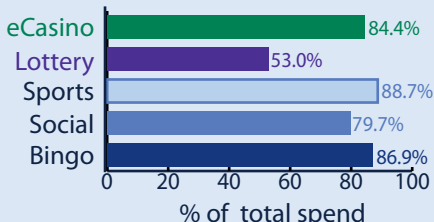
763 bets
\$1.00 per bet
 Net loss: **\$75.86**
 6 sessions, 5 days, 6 products

eCASINO

3 SO WHAT DID THE HEAVIEST USERS LOOK LIKE?

Engagement in all games was skewed, a small proportion of players accounted for a large proportion of the total spend

TOP 20% MOST ENGAGED PLAYERS



Pareto value (from economics):

20% most engaged players generate **80%** of total spend

20% most engaged **eCasino** users accounted for **84.4%** of total spend

20% most engaged **Lottery** users accounted for just **53.0%** of the total spend

TOP 5% MOST ENGAGED PLAYERS

LOTTERY

1,666 players
31.8 bets
\$4.95 per bet
 Total spend: **\$230**
 Account for **18.5%** total spend



619 players
12,601 bets
\$4.96 per bet
 Net loss: **\$2,704**
 Account for **53.3%** total spend

eCASINO