Electronic gaming machine characteristics: It's the little things that count

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Abstract

A range of gamblers, from low-frequency social gamblers through to problem gamblers in treatment, participated in focus groups discussing the characteristics of Electronic Gaming Machines (EGMs) that they found attractive. Analyses of the resulting transcripts resulted in two groups of EGM characteristics being identified as important, one group associated with winning and one with betting. Overall, free spin features were identified in all groups as the most attractive characteristic of EGMS. Beyond that it was smaller win-related characteristics, and low-denomination machines with multiple playable lines that were associated with increased duration and intensity of gambling behaviour. The important characteristics were consistent across different levels of gamblers, with the key behavioural difference being a self-reported 'expertise', and 'strategic' approach to gambling amongst higher-frequency gamblers and problem gamblers in treatment. The key characteristics all occur frequently and result in more wins and extended gambling sessions. The patterns identified resonated with established behavioural principles, and with models describing the development of problem gambling and addictions more generally.

Keywords: gambling, problem gambling, electronic gaming machines, game characteristics, qualitative

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The core characteristic underlying Electronic Gaming Machines (EGMs) is a variation on a simple schedule of reinforcement, a variable- or random-ratio schedule (Skinner, 1953; Ferster & Skinner, 1957). In their simplest form, variable-ratio schedules specify that a reinforcer (in the case of EGMs, a win or related characteristic) is delivered after an average number of responses (plays). These schedules reliably create a very high and consistent rate of responding. This pattern of behaviour is very robust, and most importantly resistant to extinction (i.e., the behaviour persists for very long periods in the absence of any payout) or other independent variables/interventions.

However, the schedules underlying EGMs are more complex than those used in basic research (e.g., Griffiths, 1993). EGMs have programmed variations to the payout magnitude, with large jackpots, much more frequent very-small wins, and characteristics such as free-spins. Multiple playable lines add yet another dimension that can affect EGM outcomes and gambler behaviour (e.g., Harrigan, Dixon, & Brown, 2015; Jensen, Dixon, Harrigan, Sheepy, Fugelsang, & Jarick, 2013; Templeton, Dixon, Harrigan, & Fugelsang, 2015). These more sophisticated variants of simple schedules add additional levels of complexity to the behaviour of both EGMs and gamblers, likely meaning very high rates of gambler behaviour that is very resistant to intervention. In the gambling context, this means gamblers are likely to spend more time and money in any given gambling session than they initially intended.

Direct extrapolation from behavioural research suggests that characteristics such as the variable nature of the reward schedule, the immediacy of the rewards, the variable nature of the reward magnitude, the extraneous rewards available, and the rapid or continuous nature of EGM play are all important product-specific factors in the development of excessive gambling, loss of control, and ultimately problem gambling. Although there is a vast amount

of laboratory research into the effects of a range of reinforcement schedules on behaviour (see Davison & McCarthy, 1988 for a review), translational and 'real-world' studies of this nature remain relatively rare, and where they have been conducted they are viewed with caution given concerns over external validity.

Whilst real-world studies remain somewhat rare, there have been some reported. For example, Dickerson, Hinchy, England, Fabre, and Cunningham (1992) undertook an investigation of 12 high-frequency poker machine players gambling with their own money in venues in the Australian Capital Territory. Response rates and outcomes on 20 cent machines with pull handles were recorded by observers. The results suggested that gambler behaviour was sensitive to machine events. Consistent with response patterns produced by variable-ratio schedules, players increased their play rates (reduced their time between wagers) in periods between small wins, and slowed immediately after large wins. However, the naturalistic nature of this study was confounded by observers asking questions of the gamblers after large wins.

Delfabbro and Winefield (1999) used a similar methodology to observe a sample of regular and occasional gamblers in a more modern setting. Regular gamblers were defined as those who gambled at least weekly on poker machines, and occasional gamblers were those that gambled less often. Data (on-screen events and button presses) were recorded using a small video camera located next to machines. Dickerson et al.'s (1992) results were replicated with play-rates decreasing after large wins with players tending to stop for a short period and admire their winnings, rather than any ongoing reduction of play-rates. It was also evident that almost every minute of play contained at least one small reward (e.g., two to five credits). These regular small rewards facilitated a high and consistent rate of responding. Delfabbro and Winefield reported that regular gamblers had a more patterned betting behaviour, they increased their bets after winning, and decreased them during periods of

losing. In contrast no clear pattern was evident in non-regular gamblers. Thus, regular gamblers seemed to be more responsive to the contingencies arranged by the machine.

Delfabbro, Falzon, and Ingram (2005) used simulated EGMs in a laboratory study to systematically vary lighting, play speed, sound, betting options and reinforcement schedules. Player preferences were measured using the relative amount of time spent, number of plays and return to player on each machine, along with self report. The results showed that players tended to prefer machines that were faster, provided more betting lines, and more sounds. Analyses indicated that a greater number of lines, faster play speed and lower illumination increased either the number of plays or time spent on each machine. Delfabbro et al. (2005) concluded their results supported a preference by gamblers for a relatively steady stream of small immediate rewards and a fast play speed.

Loba, Steward, Klein and Blackburn (2002) found that reducing speed and sound resulted in reduced enjoyment, excitation and tension reduction for pathological gamblers. Pathological gamblers found it more difficult to stop playing than non-pathological gamblers, but only in conditions with fast speed and sound. Moreover, the addition of a simple counting device made it easier for pathological gamblers to stop playing relative to non-pathological gamblers. Delfabbro et al. (2005) suggested the balance between smaller bets and multiple play lines provided relatively frequent small wins, and in doing so it extended play time on a machine. Aesthetic and auditory characteristics of the machines were of secondary importance in Delfabbro et al.'s (2005) study but still had noticeable effects on gamblers. Loba et al.'s results suggest that these effects might change somewhat on the basis of problem gambling status.

Other studies have reported consistent findings, for example Chóliz (2010) manipulated the immediacy of reward in an EGM simulation with ten pathological gamblers who played two versions of an EGM, one with an immediate payout (after two seconds) after

a win, and the other with a delayed payout (10 seconds). Participants had to complete 30 games on each machine before they were allowed to stop playing. Chóliz found that participants played an average of 56 games on the immediate version of the EGM, compared to an average of 38.5 games on the delayed version. This is consistent with basic behavioural research – essentially delays to payouts reduce their effectiveness in maintaining behaviour (e.g., Chung & Herrnstein, 1967; Williams & Fantino, 1978).   In terms of EGM design, a small delay such as that used by Chóliz would not necessarily impact on enjoyment (although this too remains an empirical question), but would be likely to reduce session length and presumably, harm.

It is clear that payout schedules are an important characteristic of EGMs effects on gambler behaviour. These schedules exert reliable and well understood effects on behaviour (Ferster & Skinner, 1957) and in EGMs they are used to arrange an array of win and win-related characteristics (e.g., monetary wins, small credit wins, free-spins and other bonus features). The results of Delfabbro et al.'s (2005) study are consistently supported by qualitative research with gamblers. For example, when specifically examining the relationship between game technology and problem gambling, Livingstone and Woolley (2008) found a majority of problem gamblers reported gambling small amounts on multiple or the maximum number of lines. Livingstone and Woolley (2008) also analysed EGM expenditure data from South Australia, and conducted a series of focus groups and individual interviews with 64 problem gamblers who had contacted South Australian gambling services. Livingstone and Woolley found the extremely common free spin feature of EGM games was very attractive to problem gamblers.   They concluded that the free spin feature appeared to be the most important secondary reinforcement technique, resulting in relatively high average bet sizes, particularly in combination with multi-line betting arrangements which allow EGM gamblers to cover more possible winning combinations.

Livingstone and Woolley (2008) discussed how free spins and other related features seemed to operate as inducements to increase betting and coverage. They noted a range of variations in playing style or 'strategy' including anticipating free spin features and taking up opportunities to gamble reels as well as lines facilitating higher average bets. These characteristics were suggested to be the fundamental elements underlying increases in time spent on EGMs. Livingstone and Woolley suggested these features substantially increased the risk of excessive gambling, and could play an important role in gamblers' transitioning from non-problem or low-risk to moderate and high risk gambling. At a minimum it seems that these factors promote a tendency for EGM gamblers to see raising, increasing and expanding their bets as normal. However, Livingstone and Woolley inferred this from state level expenditure data, and interviews with problem gamblers who had sought help for their gambling. No social, or lower frequency gamblers were interviewed.

It is not clear whether less frequent gamblers find similar EGM characteristics attractive, and whether the perceived relationships between EGM characteristics and time or money spent gambling are the same across a broader range of gamblers. Thus, the present research used a focus group approach with a range of gamblers including social gamblers who gamble relatively infrequent, gamblers who gamble more frequently, to problem gamblers who had sought help for their gambling problems. The approach used was a variation of the Nomimal Group Technique (NGT; Delbecq, Van de Ven, & Gustafson, 1975). Focus group participants were asked about the characteristics of EGMs that they found attractive and unattractive, and how they perceived these characteristics related to their level of gambling.

Method

Forty gamblers were recruited and took part in six focus groups. Low and higher frequency gamblers were recruited directly from the community. Notices were placed in a range of

community venues including libraries, shopping malls, community notice boards, gambling venues, universities, and brief stories were included in community newspapers. These gamblers contacted the research team, and were allocated into groups (low, high, and mixed frequency) on the basis of a brief telephone interview in which they were asked about their gambling frequency. Gamblers who reported gambling more than once a week were categorised as 'high-frequency gamblers', and those reporting gambling less than once a week were categorised as 'low-frequency gamblers'. The mixed frequency group contained both 'high' and 'low' frequency gamblers and was arranged to fit with participant availability. In addition to these community-recruited groups a dedicated Māori community recruited group was facilitated by a Māori researcher. Additional participants were recruited for this group with the support of a leading Māori public health service provider.

Two focus groups were conducted problem gamblers receiving treatment for their problem gambling. They were purposively recruited in collaboration with a leading problem gambling service provider, and were all gamblers who had sought help for their gambling problems and recorded a Problem Gambling Severity Index (PGSI) score of 8 or more during their assessment and/or treatment. Counsellors provided information on the study to a selection (determined by their clinical judgement) of their clients who then voluntarily contacted the research team to discuss their possible participation.

No information was collected from any participants on their current problem gambling status as this would likely have impacted negatively on recruitment. After each focus group all participants were provided with information on the range of free and confidential problem gambling services available to them.

In total there were four community recruited groups, one 'low-' and one 'high-' frequency group, one 'mixed-'frequency group, one Māori community group (mixed gambling frequency), and two groups with problem gamblers undergoing treatment. The

gender, age and ethnicity of participants were all broadly representative of New Zealand EGM gamblers. Twenty-two participants were male and 18 female. Thirteen participants were aged between 30 and 39, 12 between 40 and 49, five each were between 50 and 59 and 60 or over, four between 20 and 29, and one undisclosed. Nineteen participants identified themselves as New Zealand European, 11 Māori, four Indian and two Pasifika (four undisclosed).

Procedure

A NGT was used, as it explicitly encourages participation from all group members, prevents the group from being dominated by one or more individuals, generates many ideas, and can result in a clear outcome reflective of group opinion (while minimising researcher bias). NGT has been described as "a structured procedure for gathering information from groups of people who have insight into a particular area of interest" (Gallagher, Hares, Spencer, Bradshaw, & Webb, 1993, p. 76).

Three broad questions pertaining to EGM characteristics were addressed in the focus groups (see Table 1 below). The groups were moderated by individuals knowledgeable in the subject area, and followed an established format (see Delbecq, Van de Ven, & Gustafson, 1975; van de Ven & Delbecq 1972). In practice, in following the standardised steps (individual idea generation, reporting, discussion and rating) each group effectively engaged in a semi-structured discussion session in response to the research questions. Thus, the process followed was a little more fluid than is generally prescribed. Consistent with the purpose of this research, the resulting data are of an exploratory nature, and provide a foundation for further testing and validation (Jones & Hunter 1995; van de Ven & Delbecq 1972). Recordings of the group discussions were transcribed verbatim prior to data analysis commencing.

INSERT TABLE 1 HERE

This research was approved by the Auckland University of Technology Ethics Committee (Approval number 11/54). To protect the identity of participants, only the gender and group of those quoted are reported.

Data Analysis

The analysis of data from the NGT focus groups and reporting of results was carried out using a descriptive qualitative approach (Sandelowski, 2000). The data were coded according to the game characteristics and linkages to behaviour identified in the focus groups. An inductive content analysis (Patton, 1990) was carried out on the focus group transcripts which enabled verification of information collected and ranked in the groups. Individual comments from participants were checked against their individual response sheets (participant written comments) and information on charts (facilitator recorded).

Three researchers (JL, KPdP, AP) independently undertook the initial phases of the analysis. This involved each researcher reading, re-reading, annotating and coding the transcripts. The main research questions were referred to continually throughout the thematic analyses. Although the initial analyses were undertaken independently, the similarity in the content was substantial. Thus, the researchers then met to compare, discuss, and agree upon the descriptive analysis within each game characteristic. Following this process the characteristics and their respective ratings/rankings were further examined across groups. Quotes from participants were extracted from the transcripts to illustrate both individual and group thinking. The aim was to provide a "descriptive summary of the informational contents of (the) data organized in a way that best fits the data (Sandelowski, 2000, p.339) for all participant groups in relation to the questions asked of them.

Results

When discussing specific characteristics of EGMs that were attractive, there was considerable consistency across the groups, both in terms of the characteristics cited, and their rankings.

Two superordinate themes emerged in the analyses, those EGM characteristics associated with *winning*, and those associated with *betting*. Table 2 outlines these features, ordered within each superordinate theme in the importance specified by the participants.

INSERT TABLE 2 HERE

Winning

Gamblers talked about winning money as an attractive characteristic of gambling on EGMs and indeed an important motivating factor in engaging in gambling behaviour. Sometimes this focus on winning was very clear, and in the context of personally winning.

"…it's all about winning."- male, high-frequency gambler, mixed-frequency group

Other gamblers referred to a social-learning like experience early in their gambling in which they saw or were told of others winning money.

"…it was attractive because I saw people winning hundreds and hundreds of dollars from it…" - female, high-frequency gambler, Māori group

As a general motivation for playing EGMs, gamblers talked about relatively large wins. However, when discussing their actual ongoing experiences at the machines, a range of smaller more frequent win-related characteristics were discussed.

Free spins.

The EGM characteristic most commonly reported as attractive and the most important characteristic across all groups of gamblers irrespective of frequency of gambling or problem gambling status was the free spin feature. Gamblers talked about the free spin feature in a variety of ways, including the notion of getting something for nothing and a sign of better luck, or simply boosting one's spirits.

"One feels one's got a present or a prize you get the feeling of "Oh! I got

something!!" Even though, it's not money, you got something. It picks you

up after a losing streak *laughs*" – female, low-frequency group

"You're not moving till you get something, and the free spinning thing …

that was almost like it was telling you that you weren't wasting your money

when you were getting those free spins" – male, high-frequency gambler,

Māori group

Gamblers discussed how free spins replicated the bet made in winning them, and thus encouraged people to gamble more lines and/or more credits. Gamblers reported maximising bets in the expectation of free spins, or varying the credits bet in some predetermined way to try and ensure free spins were maximised.

"Well the idea is that you're on maximum credits... You know, you put in

your $20 and you have, have a couple of go's and then you're on maximum

credits and you win free spins and then you just sit back, put your feet up -

now if you drink, take a drink and watch the credits just roll on." – male,

problem gambler treatment group

The consensus was that the free spins encouraged more gambling, gambling for longer, and contributed to some loss of control even in low frequency gamblers. Gamblers in all groups were focused on at least winning free spins.

"If I hadn't have got the free spins one, I'd spend more money by putting

money into it, to try and get the free spins." – female, low-frequency group

The free spins kept the hope of a larger win alive, and it was clear that without the free spins, the EGMs might be a much less attractive proposition as a gambling alternative.

"So if they didn't have the 15 free games, whatever, then that turned me off

because I thought, where's my chance to get a bit of excitement in the game

or to get a bigger win?"- male, problem gambler treatment group.

Frequent small wins.

The second most highly ranked attractive characteristic of EGMs was the frequent small

wins. This was again the case irrespective of gambling frequency or problem gambling

status. The participants highlighted that, as with the aforementioned free spins, small credit

wins promoted enjoyment and fun, and extended the time spent on the EGMs. There were

some differences between infrequent social gamblers and problem gamblers in treatment, but

the differences were quite subtle. Both groups were interested in getting 'value for money',

but the social gamblers were more concerned with maximising the time they spent gambling.

"I don't bet or win big money. So I'm restricted by betting amount... I do it

for entertainment so the longer that I can make it last, the better it is..." –

female, low frequency group

In contrast, problem gamblers in treatment were more focused on management of the

money they were wagering.

"I'd rather have a whole lot of small wins and have it paying every second or

third spin than have something which pays every 50 spins and pays 50 times

your bet. And it's (for) a simple reason - it's bankroll management." – male,

problem gambler treatment group.

This also highlights the increasingly 'analytic' approach that problem gamblers in

treatment perceived themselves as taking. It is indicative of an increased self-perceived

expertise and enhanced skill level among the high frequency and problem/ex-problem

gamblers.

As with the free spins, it was clear from the discussions that the main effect of the small wins was to encourage or motivate gamblers to gamble for longer. It was clear that these smaller wins kept the possibility of winning salient in the minds of gamblers, even low frequency gamblers who might never have had a large win.

> "Well when they pay out a bit you think they are going to pay out again, so you keep going" – male, low-frequency group

Jackpots.

> "You still go there for that jackpot at the end of the day 'cause really that's why we're gambling, you know" – female, high-frequency group

Whilst jackpots were commonly cited as a reason for gambling, they were not commonly cited as among the most attractive characteristics of games. In fact, they were only a frequently discussed characteristic for the high frequency and current/ex-problem gambler groups. This is perhaps because the higher frequency gamblers are the only ones likely to have had or witnessed very large wins of this type, or perhaps need wins of this magnitude. For most gamblers the reality was that very small wins extended sessions and encouraged the hope of a larger win at some stage. However, for higher frequency and problem gamblers the motivation to achieve larger wins was stronger. Many of these gamblers had had wins of this sort before, and believed that their pattern of play had some impact on their winning although the views expressed were quite disparate.

> "I like the fuller machines, because of the jackpot, if there's (sic) heaps of people around, then it's going to go off faster... Yeah, yeah, because everyone is feeding the machines money, so it will go up and up. And I always pick one like where the jackpot's high, like it's around the amount when it's going to go." – female, low-frequency group

"Oh I think it's attractive when like the room's empty but the jackpots kinda

high, but no one's there and you just feel like the chances are going to be better"

– male, 20s, high-frequency group

In contrast to other characteristics, with respect to the jackpots, the participants talked about more social aspects of gambling, in that linked jackpots draw more of a crowd, and EGM play became in a sense less solitary, more socially interactive and competitive.   This was all linked to increased intensity of play during these periods.

The perceptions of the effects of jackpots on ongoing gambling behaviour were somewhat different to the other characteristics. An advertised jackpot that was arranged to pay out before it reached a certain value encouraged increased attention and increased gambling. However, the jackpot paying out, to the gambler in question, or someone else resulted in mixed comments from participants. For some low frequency gamblers in the present sample, a jackpot paying out seemed to aid control, and the decision to stop gambling in the current session.

"If they [jackpots] pay out, I'm out" –male, low-frequency group

However, for most, winning a jackpot or seeing someone else win a jackpot encouraged more gambling, sometimes in the current session, but more clearly in future sessions for all gamblers.

"I've won $2,500 at the casino once and I walked out with about $1,500

because I kept putting money in" –female, low-frequency group

"Definitely, when you have that first Jackpot hit of $800 like at the ten pin

bowling for the first time, you keep on coming back and then before you know

it you're spending more than you are getting" –female, high-frequency group

Lights, sounds and graphics.

"I like to be in the area where the features are going off and everybody's in such a good mood it's not even funny, and they're saying "come and sit over here!" –female, high-frequency group.

Gamblers cited a range of game-specific lights, sounds and graphics as being important to their enjoyment. They were drawn both to characteristics they had not seen before, or favourite machines identifiable through key characteristics. The modern, relatively sophisticated range of graphics and sounds were very attractive compared to older EGMs. The sounds were generally linked to winning (or disguising losses as wins), and acted to build excitement among gamblers and onlookers and encourage use of machines both among the frequent and infrequent gamblers.

"You could see the gold dollars floating all over the… you know, especially when you won, like a burst of dollars all over the screen... So yup, that was really enticing." –male, former problem gambler, Māori group

The most exciting characteristics were clearly related to winning and free spins, and gamblers across all groups spoke of the excitement they generated, even with small wins.

"Some machines, the symbol for the free spins when they come up give a gong or a bell - you know, so it's BONG, BONG, BONG! And it just lifts your adrenaline as you're watching them drop down." –male, problem gambler treatment group

It is clear from numerous comments that the range of auditory and visual characteristics built into modern EGMs generally add to the excitement for gamblers, and add to the reward of a win or free spin beyond the initial feeling of winning, or receiving a bonus.

"…sometimes the music is like a positive reinforcement (others "mmmmm,

yep") you know when you win something, if it's big or small and that, the music

sort of reinforces the win" –female, high-frequency group

However, unlike the free spins and small wins, there were some gamblers who were less

positive about the sounds in particular. These views tended to be expressed in the high

frequency and current/ex problem gambler groups. The concerns were largely related to

disrupting the gambler's concentration, or attracting unwanted attention from others in the

venue.

"I don't like um the sound of the reels… like I just don't like, especially the

older ones, like they just sound…tacky... it's just real annoying coz you hear it

so many times" –male, high-frequency group

Betting

A second group of game characteristics commonly cited was linked to the behaviour of

betting, as distinct from winning. Betting and the excitement of uncertain outcomes were

often cited as influencing gamblers' behaviour.

"Every time you push that button, what's… you know, what are you going to

get, you know? If, if you don't, if you don't get your free spins, it's like oh, you

still don't know exactly how much is going to pay out. Sometimes it's going to

be your best friend, and next time it's going to be your enemy. And it's like,

gosh, I've put all this into it, and only received this" –female, current/ex problem

gambler group

Denomination of Machines.

Across all groups, the participants reported preferences for lower denomination EGMs. They

linked this to a perception of better value for money, and maximising the amount of time

spent gambling within their predetermined budget (where appropriate) and hence more

perceived control. The more frequent gamblers reported more variability in how they played (such as varying number of lines and bet amount in response to or the expectation of specific outcomes) and discussed more strategy in their approaches.

"I just like the pretty pictures and everything, and the music, and unfortunately it doesn't sing for me mostly, that's why I sort of umm, stay with the one cent machines 'cause you have more for your money" –male, high-frequency gambler, mixed-frequency group

"But I do it for entertainment, so the longer that I can make it last, the better it is"- female, low-frequency group

Across groups, participants seemed to realise that the perceived safety of low denomination machines led them to gamble more than they intended. They bet more lines, and more on each play than the denomination of the machine, and rationalised this in that they were still wagering relatively little per spin, whilst increasing their chances of winning. Thus, they seemed to understand the hidden nature of this increased expenditure, but this understanding was not sufficient for them to change their behaviour.

"The machine says one cent ... but to get a reasonable chance you've got to play five lines minimum... say you play a five cent machine, what's five cents? Nothing! But each turn is a quarter of a dollar and it mounts up" –male, high-frequency gambler, mixed-frequency group

In fact, the low denomination machines provided an opportunity to gamble longer with a very constrained budget.

"And then you have different machines with different start points like one cent, one dollar, so even if some day you're low on money you're like I won't go, but then you say okay fine, I'll play the one cent machines, because you are addicted" –male, high-frequency group

For high frequency and problem gamblers, the denomination of the machine was considered with readily available information on return to player percentages, to determine the 'best' machine to play.

"…a bad percentage payout instantly turns me off because I play them mathematically, and with the player information displays you press the little 'I' button and find out instantly what it's paying back at. So if I saw a machine with 87%, I'd leave it alone if there was one with 92% next to it…" male, problem/ex problem gambling group

The playing of low denomination machines sometimes blended seamlessly into higher denomination machines. Participants reported sometimes making a change to a higher denomination machine without fully considering the implications, at the time at least.

"You're playing the one and two cents, and then you go to a 10 ... you can still be betting a dollar or two or three dollars a spin without really remembering oh it's a 10 cents machine – gosh what the heck am I doing? A hundred spins is 300 bucks" – male, current/ex problem gambler group

Number of Playable Lines.

The number of playable lines played relates back to several of the previous characteristics, predominantly via betting amount and denomination of machines. There was a clear preference across all groups to make minimum bets on multiple or maximum lines. The low frequency groups preferred a relatively consistent low betting approach. It was suggested that the low betting amount allowed them to play for longer with spending accumulating in a less noticeable apparently more controlled way.

However, higher frequency and problem/ex problem gamblers reported making higher bets on maximum lines and had more variability in the number of lines played. The number of lines played was frequently associated with strategies to maximise wins and free spins.

"I've been into pubs like where the jackpot's been pretty close to going off, so automatically I'd go in there and I just max it and I get it, and it just sort of cuts everybody off. But it works though, I mean for some reason it works " – male, problem/ex problem gambling group

High frequency and problem gamblers frequently discussed the attractiveness of playing more lines in the expectation of favourable outcomes, and playing strategically based on these perceived outcomes.

"...because there is (*sic*) more lines, like the winning seems to, like when I win on it, I'm like oh yup, so I want to keep winning on it, even though I haven't won more than I've spent…the amount of lines, like if it's like 50 lines then I'm like yeah I'll just, I'll just stay on this, I'll just carry on staying because I must win, just 'cause it's, it seems like it's more, it's gonna pay out like, sooner or later...I always play all of the lines" –male, high-frequency group

Discussion

The structural characteristics of EGMs play a key role in gamblers' decisions to gamble, and then the likelihood that they will gamble for longer, or at a higher intensity than intended (e.g., Griffiths, 1993). On one level, the key characteristic is undoubtedly the schedules of reinforcement (Skinner, 1953; Ferster & Skinner, 1957) that arrange the various win-related characteristics. However, the present results suggest that the nature of the win-related characteristics themselves is important. Their relative frequencies are clearly related to gamblers' perceptions of their importance, and their impact on gambling behaviour. The way in which they are constructed, portrayed to, and experienced by gamblers also seemed to influence the way gamblers perceive them.

Whilst a range of EGM characteristics were discussed as important, it was overwhelmingly the free spin features that participants viewed as the most important and

enjoyable characteristic of EGMs (see also Livingstone & Woolley, 2008). Gamblers often discussed the notion of value for money, and along with low denomination EGMs, free spins were central to this, as they were perceived as a bonus, and 'playing with someone else's money'. Winning them was discussed as a goal, in and of itself, and thus their presence facilitated longer gambling sessions on two levels, first gambling longer to win them, and then winning them extended time at the EGM. Second, the free spins explicitly encouraged gamblers to bet more by playing more lines. They reported greater coverage maximising their chances (Templeton, et al., 2015), and that the free spins replicated the way they were playing, so winning free spins when playing few lines was not valued, in fact winning free spins whilst playing a small number of lines left gamblers feeling cheated.

The notions of "value for money" and "maximising entertainment" (extending time at an EGM while limiting expenditure) were pervasive across groups. Low denomination machines were preferred on this basis, and because of their perceived safety relative to other EGMs. However, because of the free spins, and the general impression winning was very unlikely when playing a small number of lines, gamblers typically played multiple lines and maximised bets. Gamblers reported an interesting dichotomy in their thinking and behaviour here, they chose low denomination machines for safety and control reasons, but were aware that by gambling multiple lines they were gambling more per play than they initially intended. They rationalised this by reiterating to themselves that they were *only* playing low denomination machines. Thus, their intention to gamble for as long as possible, together with low denomination machines, multiple lines and free spins worked to ensure lengthened gambling sessions. These lengthened sessions meant more opportunities for winning (and losses disguised as wins), and further extending sessions and ultimately gambling harm (Harrigan & Dixon, 2010; Harrigan, et al., 2015).

Higher frequency gamblers and problem gamblers in treatment described what they viewed as a more analytic approach, with more variation in their strategy (Delfabbro & Winfield, 1999), generally playing more lines, and playing more lines when they believed they were more likely to win. These same gamblers also used machine information displays to choose machines that had provided higher return to player percentages. Harrigan and Dixon (2010) have shown that machines with higher return to player percentages are likely to be more harmful products. Similarly, Templeton et al. (2015) have shown that gambling on maximum lines increases rate of reinforcement. Thus, the increasing experience and change in approach to gambling on EGMs reported by higher-frequency and problem gamblers leads to potentially more harmful gambling decisions.

Jackpots and the prospect of large wins were commonly cited by participants as reasons for gambling. However, once in a venue, the decisions on which EGMs to play, and how long to continue playing were made on the basis of the smaller, more frequently occurring events –specifically, whether the gambler had a history of good experiences with an EGM, and what occurred whilst they were gambling. Jackpots were the only characteristic gamblers associated with ceasing gambling, although that was only in the current session and jackpots seemed to increase the likelihood of gambling again at a future date. Graphics and sounds were important in that they added to the experience via their associations with the win- and bet-related characteristics (Delfabbro et al., 2005; Loba et al., 2002.) and acted to disguise losses as wins (Harrigan et al., 2015; Jensen, et al., 2013).

In the Pathways Model, Blaszczynski and Nower (2002) outlined how operant and classical conditioning principles can lead to habitual gambling and faulty cognitions related to gambling (see also, e.g., Ladouceur, 2004; Ladouceur, Gaboury, Dumont, & Rochette, 1988; Walker, 1992). The present results show how a range of EGM characteristics work to extend both the amount of time gamblers spend at an EGM, and the intensity of their betting.

Recent biological research (e.g., Volkow, Wang, Fowler & Telang, 2008; Volkow, Wang, Fowler, Tomasi, & Telang, 2011) has also discussed how prolonged and repeated exposure and stimulation of this nature can lead to addiction, where one reinforcer is enhanced in value at the expense of others. Learning, conditioned cues, and expected rewards combine to over-activate motivation and reward systems, whilst inhibiting cognitive control circuits (Volkow et al., 2008). It is now generally accepted that supraphysiological stimulation (as with addictive drugs such as cocaine) is *not* necessary to produce these physiological changes that seem to underlie addiction. Rather, repeated stimulation at normal physiological levels with other supporting environmental cues is sufficient. This highlights the need to clarify the characteristics of EGMs that result in such conditions being met, and thus greatly increase the likelihood of problem gambling.

Both the Pathways Model (Blaszczynski & Nower, 2002) and the Systems Model of Abuse/Addiction (e.g., Volkow et al., 2008; 2011) are informative on how gambling problems might arise, and the present research together with recent experimental studies (e.g., Harrigan & Dixon, 2009; Harrigan, et al., 2015; Jensen, et al., 2015; Templeton, et al., 2015) highlights some characteristics of EGMs that whilst being popular with gamblers facilitate harmful patterns of gambling. Frequent but small win-related events, particularly free spin features, resonate with the processes described in these models, and clearly lengthen sessions and increase exposure to wins of various magnitudes (Harrigan & Dixon, 2010). Faulty cognitions and behaviours are therefore repeatedly and frequently associated with reinforcement (see e.g., Bruner & Revusky, 1961; Catania & Cutts, 1963; Skinner, 1948) and gamblers might come to believe in their greater skill or ability to influence events.

The present research suggests that characteristics such as free spin features, and other frequent small win-related events coupled with low denomination EGMs with multiple playable lines should be the focus of further research and harm minimisation efforts. These

characteristics are valued highly by gamblers, and facilitate temporally extended gambling sessions even with a limited budget, and thus the repeated behavioural (e.g., Blaszczynski & Nower, 2002; Bruner & Revusky, 1961; Catania & Cutts, 1963; Delfabbro & Winefield, 1999; Delfabbro et al., 2005; Ferster & Skinner, 1957; Harrigan & Dixon, 2010; Skinner, 1948; Templeton et al., 2015) and physiological (e.g.,Volkow, et al., 2008; 2011) events to occur that likely underlie the development of problem gambling.

References

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction, 97,* 487-499.

Bruner, A., & Revusky, S. H. (1961). Collateral behavior in humans. *Journal of the Experimental Analysis of Behavior, 4*, 349-350.

Catania, A. C., & Cutts, D. (1963). Experimental control of superstitious responding in humans. *Journal of the Experimental Analysis of Behavior, 6*, 203-208.

Chóliz, M. (2010). Experimental analysis of the game in pathological gamblers: Effect of the immediacy of the reward in slot machines. Journal of Gambling *Studies, 26*, 249-256.

Chung, S.H., & Herrnstein, R. J. (1967). Choice and delay of reinforcement. *Journal of the Experimental Analysis of Behavior, 10,* 67-74.

Davison, M., & McCarthy, D. (1988). *The matching law: A research review.* Hillsdale: Erlbaum.

Delbecq, A.L., Van de Ven, A.H., & Gustafson, D.H. (1975). *Group techniques for program planning: A guide to Nominal Group and Delphi processes.* Glenview, Illinois: Scott, Foresman and Company.

Delfabbro, P., Falzon, K., & Imgram, T. (2005). The effects of parameter variations in Electronic Gaming Machine simulations: Results of a laboratory-based pilot investigation. *Gambling Research Journal of the National Association for Gambling Studies (Australia), 17(1),* 7-25.

Delfabbro, P. H. & Winefield, A. H. (1999). Poker-machine gambling: Analysis of within-session characteristics. *British Journal of Psychology*, *90*, 425-439.

Dickerson, M.G., Hinchy, J., Legg England, S., Fabre, J. & Cunningham, R. (1992). On the determinants of persistent gambling behaviours: High frequency poker machine players. *British Journal of Psychology, 83*, 237-248

Ferster, C.B., & Skinner, B.F. (1957). *Schedules of Reinforcement*. Appleton: New York.

Gallagher, M., Hares, T., Spencer, J., Bradshaw, C., & Webb, I. (1993). The Nominal Group

Technique: A research tool for general practice? *Family Practice, 10*(1), 76-81.

Griffiths, M. (1993). Fruit machine gambling: The importance of structural characteristics.

Journal of Gambling Studies, 9, 101-120.

Harrigan, K., & Dixon, M. (2010). Government sanctioned "tight" and "loose" slot

machines: How having multiple versions of the same slot machine game may impact

problem gambling. *Journal of Gambling Studies, 26,* 159-174.

Harrigan, K., Dixon, M., & Brown, D. (2015). Modern multi-line slot machine games: The

effect of lines wagered on winners, losers, bonuses, and losses disguised as wins.

Journal of Gambling Studies, 31, 423-439.

Jensen, C., Dixon, M. J., Harrigan, K. A., Sheepy, E., Fugelsang, J. A., & Jarick, M. (2013).

Misinterpreting 'winning' in multiline slot machine games. *International Gambling

Studies, 13(1)*, 112–126.

Jones, J., & Hunter, D. (1995). Qualitative Research: Consensus methods for medical and

health services research. *British Medical Journal, 311(7001),* 376-380.

Ladouceur, R. (2004). Perceptions among pathological and nonpathological gamblers.

Addictive Behaviors, 29(3), 555-565.

Ladouceur, R., Gaboury, A., Dumont, D., & Rochette, P. (1988). Gambling: The

relationship between the frequency of wins and irrational thinking. *The Journal of

Psychology, 117,* 47-52.

Livingstone, C., & Woolley, R. (2008). *The relevance and role of gaming machine games

and game features on the play of problem gamblers*. Melbourne, Australia: Australian

Institute of Primary Care.

Loba, P., Stewart, S.H., Klein, R., M., & Blackburn, J.R. (2002). Manipulations of the

features of standard video lottery terminal (VLT) games: effects in pathological and

non-pathological gamblers. *Journal of Gambling Studies, 17,* 297-320.

Patton, M. Q. (1990). Qualitative evaluation and research methods (2nd ed.). London,

UK:Sage.

Sandelowski, M. (2000). Focus on Research Methods: Whatever Happened to Qualitative

Description? *Research on Nursing and Health, 23,* 334-340.

Skinner, B. F. (1948). "Superstition" in the pigeon. *Journal of Experimental Psychology,*

38, 168-172.

Skinner, B.F. (1953). *Science and Human Behavior,* Free Press: New York.

Templeton, J.A., Dixon, M.J., Harrigan, K.A., & Fugelsang, J.A. (2015). Upping the

reinforcement rate by playing the maximum lines in multi-line slot machine play.

Journal of Gambling Studies, 31, 949-964.

Van de Ven, A.H., & Delbecq, A.L. (1972). The nominal group as a research instrument for

exploratory health studies. *American Journal of Public Health, 62(3)*, 337-342.

Volkow, N.D., Wang, G-J., & Baler, R.D. (2011). Reward, dopamine and the control of food

intake: Implications for obesity. *Trends in Cognitive Sciences, 15 (1),* 37-46.

Volkow, N.D., Wang, G-J., Fowler, J.S., & Telang, F. (2008). Overlapping neuronal circuits

in addiction and obesity: Evidence of a systems pathology. *Philosophical Transactions*

of the Royal Society B, 363, 3191-3200.

Volkow, N.D., Wang, G-J., Fowler, J.S., Tomasi, D., & Telang, F. (2011). Addiction:

Beyond dopamine reward circuitry. *Proceedings of the National Academy of Sciences,*

108 (37), 15037-15042.

Walker, M. (1992). M. *The Psychology of Gambling*. London: Pergamon Press.

Williams, B.A., & Fantino, E. (1978). Effects on choice of reinforcement delay and conditioned reinforcement. *Journal of the Experimental Analysis of Behavior, 29,* 77-86.

Table 1. The three broad questions that were explicitly addressed during the focus groups

Focus group questions
What are the features of the games that you play that encourage or discourage you from playing?
What are the features of the games you play that reduce your level of control over the amount of money or time you spend gambling?
What are the features of the games you play that increase your level of control over the amount of money or time you spend gambling?

Table 2. Structure resulting from thematic analysis. Features are listed in the order of importance suggested by participants.

Superordinate Theme	Winning	Betting
Features	Free Spins	Machine Denomination
	Small Wins	Number of Lines
	Jackpots	
	Lights and Sounds	