

Chapter 4: The Characteristics of EGMs and Their Role in Gambling and Problem Gambling

4.1 Overview

Of all forms of gambling available in Australia, EGMs generate by far the largest proportion of industry income. EGMs are the most popular continuous form of gambling, with between 30% and 40% of the adult population gambling at least once per year, and around 3–5% gambling on a weekly basis. EGMs are also played by a wide range of people of different genders, ages and social backgrounds, so that it is more difficult to find clear demographic differences in EGM participation rates than when considering more traditional forms of gambling such as racing, casino-style games, and sports-betting. The general popularity of EGMs is, however, overshadowed by a consistent finding that this form of gambling is most likely to be associated with gambling-related problems.

This chapter summarises the body of research that has drawn associations between EGM gambling and problem gambling, as well as the factors that contribute to the popularity of gaming machines within Australia. Further sections in the chapter review the theoretical explanations advanced to explain excessive gambling on EGMs, and the nature of gaming machine features that influence gambling behaviour, and to what extent.

4.2 EGMs and Problem Gambling

Although it is acknowledged that many forms of gambling can potentially lead to gambling-related problems, a critical issue of public policy is the extent to which EGMs (as opposed to other gambling forms) contribute to these problems. This question is important for several reasons. First, from a public health and regulatory perspective, it is important to know where policies and regulatory provisions should be directed. Second, when considering what contributions the industry should make to assist problem gamblers, e.g. via the provision of treatment services, it is useful to know what forms of gambling and sectors of the industry are principally implicated in giving rise to problem gambling.

The AGR reviews several sources of information relevant to the establishment of links between specific forms of gambling and higher problem gambling rates.

1. *Participation Rates within Samples of Problem Gamblers:* Many prevalence studies present the percentage of problem gamblers gambling on different activities. Most of these studies show that 80–90%+ problem gamblers play poker machines (Delfabbro & LeCouteur, 2007). However, these figures do not allow one to determine whether poker machines are the specific cause of the person's gambling problems. Problem gamblers often report that they gamble on a wide range of activities, so it is unclear whether poker machines are the specific problem, or whether the combination of expenditure on different activities contributes to over-expenditure.

2. *Problem Gambling Prevalence as a Function of Participation Rates:* Other analyses have examined what proportion of regular gamblers on different activities are problem gamblers. The Productivity Commission (1999) found, for example, that 24% of weekly casino table gamblers, 23% of weekly EGM players, and 15% of racing gamblers were problem gamblers. Roy Morgan Research (2005) found that 39% of weekly EGM players at hotels and clubs in Tasmania were problem gamblers on the CPGI. In the ACT prevalence study (McMillen et al., 2001), 26% of weekly EGM players, 22% of weekly racing gamblers and 19% of casino table game players were problem players (SOGS 5+). These figures are insightful in that they show how quite different figures can be obtained if one examines the prevalence of problem gambling relative to the base-rate or prevalence of the activity itself. Since EGM gambling is more prevalent (30–40% gamble on EGMs vs. < 10% for casino games or 20% for racing), one will get more problem EGM players simply because there are more EGMs in general, i.e. $P(\text{EGM player}/\text{PG})$ is high because $P(\text{EGM player}) > P(\text{racing or casino gambler})$. However, if one calculates the $P(\text{PG}/\text{Casino or racing gambler})$ the figure may be closer to $P(\text{PG}/\text{EGM player})$. That is, racing and casino gambling may be just as likely to cause gambling problems as EGMs, but it is just that there are fewer people gambling on these other forms of gambling.

3. *EGMs Identified as the Cause:* Relatively few studies have asked problem gamblers to identify the type of gambling that was the principal cause of their problems. One of the few exceptions to this was the survey of clients in treatment conducted by the Productivity Commission (1999). In 6 of the 8 jurisdictions of

Australia, EGMs were identified as the cause of problems amongst 65–81% of clients. However, a potential threat to the validity of this analysis is that the agencies concerned might have had a principal focus on the treatment of EGM gambling. In addition, it is well established that women are more likely to have problems with EGMs and to seek help for their problems. Accordingly, there is a possibility that these figures based on agency data might over-state the role of EGMs in problem gambling.

In summary, the existing national literature provides an incomplete analysis of the links between problem gambling and specific forms of gambling because either the wrong questions have been asked, or researchers have failed to conduct a comprehensive set of analyses relevant to this topic. In future prevalence studies, it would be useful for problem gamblers who admit to having a problem to be asked what form of gambling was principally involved. Moreover, in order to understand the relative risk of problem gambling associated with individual forms, it would be useful to present prevalence as a function of the type of gambling involved (e.g. % of regular or weekly gamblers on each form who are problem gamblers).

4.3 EGM Gambling: Motivational Factors and Preferences

Since the early 1990s, a number of studies have been conducted to examine people's motivation for gambling on various forms of gambling, including EGMs. Motivations have been obtained using self-report surveys, but also by drawing inferences from observed gambling behaviour in venues. The results across multiple surveys generally show that EGM gamblers play for enjoyment, relaxation, and to socialise with friends. However, other self-report data, particularly relating to motivations for winning, is very difficult to interpret because the results vary significantly depending on how the questions are asked and analysed. Since many surveys do not specifically ask about why people gamble on particular activities, it is necessary to cross-tabulate motivational responses with participation questions in an attempt to infer motivations. Accordingly, if one asks "Do you gamble to win money?" and then cross-tabulates this response with EGM participation, the results will show reasonable correspondence between this motivation and EGM gambling. However, if one specifically asks people why they gamble on EGMs, very few will identify 'winning money' as a significant motivation (e.g. Hill, Deyell, Lockett, & Pederick, 1995). On

the other hand, if the question is reframed so as to ask people 'how important' winning money is when they gamble on EGMs, most people will consider it to be important (Delfabbro, 1998). Similarly, as McMillen et al. (2003) found in Victoria, if one asks people if they gamble on EGMs for the 'dream or thrill of winning', many EGM players will endorse the question because it refers to a hope of winning money rather than an expectation. In other words, although people want to win money when they play EGMs, they also recognise that winning is unlikely.

Self-report data have also been used to determine what features of gaming machines people find attractive. In one recent study by the Australian Institute for Primary Care (AIPC) (2006) in Victoria, detailed focus groups were conducted with 62 problem gamblers who had sought assistance from counselling agencies in Melbourne. When asked what features of machines they found attractive, many indicated that the graphics or sounds were important, but there was no systematic pattern in terms of what particular characteristics were preferred. Players were, however, more consistent in their view that they liked 1, 2 or 5 cent machines because they allowed greater playing time, and an opportunity to bet on a greater number of lines. Playing on a greater number of lines also provided greater opportunities to win bonus features. These findings, particularly the popularity of low denomination gaming machines, have been confirmed in several State prevalence surveys, e.g. in the SA Department of Human Services (2001), and Victorian prevalence study (McMillen et al., 2003). One, two or five cent machines were preferred by 75% of players in Victoria and 83% in South Australia. When these results were compared across problem and non-problem gamblers, few significant differences were observed (88% of problem gamblers played 1, 2 and 5 cent machines).

As discussed in the AGR, the first 'AIPC study is useful in that it provides detailed insights into the perceptions of a representative sample of problem gamblers, which allowed for an open exploration of different issues relevant to both venue design and technology' (p. 123). However, the validity of the conclusions needs to be treated with some caution because the data were obtained via general self-report interviews rather than by using a standardised measure. The sample also only included problem gamblers within treatment and was 74% female, so it may not be possible to generalise to other problem gamblers within the community. Moreover, the study

does not provide a comparison sample of regular gamblers to determine whether similar findings might have been obtained in other gamblers.

A second AIPC study analysed some questions included in a Victorian telephone survey of almost 100 regular EGM gamblers conducted by New Focus Research. Once again, respondents (of whom 70% were women) were asked a series of questions relating to EGM gambling. It was found that 82% preferred 1, 2 or 5 cent machines, 60% adopted a gambling strategy that involved gambling on maximum lines and minimum credits per line. This study involved gamblers recruited from the general community so the findings are more easily generalised to other EGM players in the Victorian community, but no comparisons of problem vs. non-problem players were provided to determine whether these preferences were unique to problem gambling or common to many gamblers in general.

A number of self-report studies have also examined variations in the amount bet per game. The Productivity Commission (1999) showed that problem gamblers were more likely to bet multiple credits per line (70% vs. 36%) and to gamble on more lines than other gamblers (9 lines vs. 6 lines). Twenty seven percent of problem gamblers said that they often or always bet on more than one line per spin (vs. 16% of frequent non-problem gamblers). McMillen et al. (2003) in Victoria found that 86% of EGM gamblers gambled on more than 1 line and that almost 50% gambled more than one credit per line, although this survey did not specify how often this occurred. In South Australia, the SA Department for Human Services (2001) found that 47% of gamblers always bet on more than one line per spin, with 42% usually playing on 6–10 lines and 49% on 2–5 lines. Around 50% bet more than one credit per line (73% said 2–5 credits per line), but only 14% did this ‘always’ or ‘often’. When the results for problem gamblers were compared with other gamblers, it was found that problem gamblers were more likely to report always or often playing more than one line (89% vs. 74% of regular non-problem players), and were more likely to always or often bet multiple credits per line (27% vs. 16%). Such group comparisons are not provided in surveys completed in the Australian Capital Territory and Victoria even though these questions were included in the survey.

Other studies have inferred the nature of EGM play using observational methods. In this type of research, researchers visit venues and observe players and keep records of their style of play, the amount of time and money spent, and how they interact with specific machine features (Walker, 2000; Williamson & Walker, 2001; Walker, 2003). In one study by Williamson and Walker (2001), 220 players in the Star City Casino in New South Wales were observed in order to examine the nature of player betting styles. Each player was observed for 20 consecutive games. Any player that bet the same number of lines and bets for five or more consecutive spins was described as having a strategy. It was found that almost all players had a distinctive playing strategy. The most common strategy, observed in around 45% of players, the authors termed a “maximin” betting strategy. Players preferred to gamble on the maximum lines available on the machine, but at the minimum bet (e.g. 1 credit on all 20 lines on the machine). Around 10% of players preferred betting using the maximum bet-size and number of lines, around 1–2% used a minimum bet and minimum lines strategy, and almost no players consistently bet on the minimum lines using the maximum bet.

These findings were confirmed in a laboratory simulation by Delfabbro, Falzon, and Ingram (2005), in which regular players were given pre-exposure to four different machines with different line and credit combinations in a forced choice situation where players could gamble for 20 minutes, but keep all of their winnings. Even though the return to player was the same in each condition, players uniformly preferred the option with 3 lines, 3 credits, or 3 lines, 1 credit, as opposed to the 1 line, 3 credit option.

According to Walker (2003), players use this strategy for three reasons:

- (1) Because of a desire to avoid missing out on outcomes that might occur on pay-lines that were not played (i.e. to avoid near misses and minimise regret);
- (2) Because playing this way increased the players’ chances of obtaining scatter symbols that triggered free spin features, and
- (3) Because the bonus feature was statistically a much more likely event to occur than the major win sequences (e.g. getting 5 of the rarest symbols in a row).

Other similar studies conducted by Walker (see Walker, 2003 for a review) showed that players are generally reluctant to use the double-up feature on the machines,

particularly when they have just obtained large wins. Double up features allow players to double their winnings by correctly selecting one of two cards (red or black). An incorrect choice leads to the player losing their win. Despite the fact that this feature offers a 50:50 chance of winning, only a very small proportion of players appear to use double up. One analysis of all of the Aristocrat machines at a Sydney club (almost 78,000 wins) showed that only 5.38% of wins were doubled up. Another interview study involving 120 gamblers at a NSW club found that 71% of players never used double up, and that 67% believed that it was too risky, even though the odds were better than winning on the machine itself. Once again, this effect was explained in terms of people's desire to avoid regret. Consistent with the well established principle of prospect theory (Kahnemann & Tversky, 1984), players appear to be more risk averse (i.e. reluctant to take risks) when faced with certain wins (in this case, a win in hand) than they are when faced with a certain loss.

Walker's studies have high external validity in that they were all based on the observation of genuine players in a real gambling environment. However, it should be noted that the sampling frame and number of observations recorded for some players (particularly in the Williamson & Walker, 2001 study) was relatively small (only 20 observed trials per player). Within such a narrow frame of reference, it is possible that the study may have under-described the range of within-subject variability that might have otherwise been observed had the researchers observed the same players for longer periods (e.g. 30 minutes or longer). In addition, the findings are not all based on random samples of gamblers, so that it is not clear whether the findings can be generalised to all gamblers. A number of studies are also exclusively based on the Aristocrat Queen of the Nile, which has a particular bonus feature that is attractive to players. It is not clear, therefore, whether the findings can be generalised to other popular machines that do not have these features (e.g. Aristocrat's original Black Rhino had no such bonus feature, but was one of the most popular machines in Australia). Finally, most of the studies did not have any opportunity to administer a standardised problem gambling measure, so (as with the AIPC results above) it is difficult to determine whether these preferences are characteristic of problem gamblers or regular EGM players in general.

In summary, the findings summarised in this section allow some useful conclusions to be reached:

- (1) EGM players in general are highly motivated to obtain bonus features on certain gaming machines, and these features appear to be factors that contribute to persistent behaviour.
- (2) Many players are also encouraged to spend more (even on low denomination machines) by bonus or scatter features that can be obtained more frequently by betting maximum lines.
- (3) All players, including problem gamblers, prefer to gamble on low denomination machines and to gamble on more than one line spin, with around half betting more than 1 credit per line.
- (4) Problem gamblers typically bet on more lines and bet more credits per line.

Most of these findings are readily generalisable to different Australian jurisdictions because of the similarity in gaming machines across the country, in particular the preponderance of low denomination machines and similarity of software platforms. However, there are several ways in which this research could be strengthened to make it more useful for national comparisons, regulation and policy.

- Australian prevalence studies should include questions relating to betting behaviour on EGMs (i.e. how many lines and credits are selected). These questions should ask respondents to indicate the frequency at which these different betting options are chosen (never, rarely, sometimes, often, always) rather than just allow 'yes' and 'no' responses. It should always be possible to measure some of these responses using quantitative or closed-ended questions to allow inter-jurisdictional comparisons.
- Where such questions are included, there should be clear attempts to compare these responses across problem gamblers and other EGM players. Without these comparisons, it is unclear whether the patterns observed are unique to problem gamblers or regular players in general. Understanding these differences is important for the development of targeted regulatory responses that influence problem gambling, but not at the expense of other players.

- There should be greater use of observational data of the nature employed by Walker, but with a focus on determining how problem gamblers differ from other players in venues. The time frame for observations should also be extended so as to capture a more representative volume of data on the consistency of within-sample betting patterns.

4.4 In-venue EGM Studies in New South Wales and Queensland

4.4.1 EGM Playing Styles: Observational and In Vivo Research

In addition to the observational and self-report studies described above, there are also several studies that have gained access to objective EGM data within venues. A study by Haw (2000), for example, examined data from 700 EGMs with the support of Aristocrat Leisure Industries. The aim was to examine whether specific machine characteristics such as the availability of note acceptors and maximum number of betting lines influenced turnover on the machines. The results showed that both features significantly increased turnover, but it was not possible, due to the absence of any data relating to the status of individual players, to determine whether this effect was stronger in problem gamblers.

Another study undertaken by Brodie, Honeyfield, and Whitehead (2003) examined the Queensland Government's imposition of an upper limit of \$20 on the bank notes that could be fed into Queensland gaming machines. A survey of 359 people (all previous participants in the Queensland household gambling survey) who had gambled on EGMs at least once in the previous twelve months was conducted. When participants were asked to indicate the extent to which the modification had influenced their behaviour, 61% of respondents approved of the \$20 limit, and a further 28% believed that the limit should be restricted even further. Despite the fact that most people reported no change to their gambling behaviour, around 15–20% of the total sample indicated that they had reduced the amount they spent on EGMs, as based on both the amount bet per game, time spent, and their overall expenditure. The results also showed that these reductions were significantly stronger in those identified as high risk or problem gamblers. Within the problem gambler group, it was

found that 30–40% had reduced their expenditure and reported having gambled less frequently since the measures had been introduced.

A second study examined changes in net gaming revenue from 1997 to 2002 to determine the revenue effects of these modifications. The results showed no clear evidence that limits on note acceptors had influenced total gaming revenue. In other words, the authors found that there was a disparity between what survey respondents had indicated and what was evident through the analysis of objective data. However, as the authors pointed out, there may have been other factors that contributed to the changes in the perceived behaviour of problem gamblers during this period, or that the decrease in gaming expenditure in this group was not sufficient to have a discernible effect on overall gambling revenue. For these reasons, the authors concluded that imposing limits on note acceptors was a potentially useful strategy to reduce expenditure among problem gamblers.

In another study described by Walker (2003), 56 EGM players at a large Sydney club gave permission for their data to be tracked over a two week period based on their use of loyalty cards. The results showed that the vast majority (80%) of sessions on individual machines last only around 5–10 minutes, with a further 10–15% lasting less than 30 minutes. These results seem puzzling in that it would usually be expected that people using loyalty cards would gamble for longer because of the desire to accrue points to earn prizes. What the findings instead suggest is that people engage in considerable ‘sampling’ of individual machines before they make a decision to gamble on that machine for longer periods. People try to find the machine that is perceived to be more profitable or is ‘paying out’ at that particular time. Accordingly, players move from one machine to the next until they find the machine they are looking for.

In broad terms, it is likely that these findings could be generalised to a number of other jurisdictions where there are very large venues (Australian Capital Territory and Victoria), where people may have greater opportunities of being able to pick and choose between different machines in a short period. However, it is unclear whether the findings could similarly be generalised to smaller venues (e.g. in South Australia and Tasmania) where the popular machines are more likely to be occupied (i.e. there

are fewer machines from which to choose). These findings also do not provide any indication as to whether this behaviour differs between problem gamblers and other EGM players. Nor is it possible to determine whether people used their loyalty cards on all occasions, or if this sample was representative of other players within the venue.

Another study conducted by Svetieva, Walker, Blaszczynski and Sharpe (2006) used a similar methodology to examine the gambling habits of 102 EGM players in NSW clubs. All of the players who agree to participate in the study completed a short survey that included the SOGS. Using player membership cards, the researchers sought to determine whether problem gamblers' (classified as those who scored 5+ on the SOGS) style of EGM play differed in any way from that of recreational or non-problem players. The results showed that problem gamblers played for significantly longer (280 minutes as compared with 192 minutes for the recreational players) and played more often (2.28 days per week vs. 1.79 for the recreational players). The problem players also lost significant more money when they played (\$65 vs. \$26 per session). Contrary to predictions, there were no other major differences between the two groups in terms of how often they changed machines, how long they persisted on the same machine, or how they gambled. The authors concluded that the principal difference between problem and non-problem players was quantitative rather than qualitative. In other words, problem gamblers play for longer periods and more often than other players, rather than necessarily more intensely within a specified period of time.

In this sense, the findings from this NSW study are generally consistent with the national definition of problem gambling endorsed by Gambling Research Australia. People are more likely to experience harmful consequences as a result of gambling when they devote a greater amount of time and money to gambling, and particularly on continuous activities such as EGMs. However, before using these results to inform broader policies relating to EGMs, it is important to place these results in the context of other research studies that have not necessarily obtained entirely consistent findings. The Productivity Commission (1999), for example, showed that problem gamblers were more likely to play \$1 denomination machines than other players, and that they tended to play a greater number of lines, and bet more per line. Similar

results were also obtained by the SA Department for Human Services (2001) and SA Department for Health in both community prevalence surveys. These findings suggest that Svetieva et al.'s (2006) NSW findings may need to be treated with some caution because the balance of evidence suggests that problem gamblers do tend to gamble more intensively as well as for longer periods than other players. The difficulty with using card tracking to examine gambling behaviour is that it only usually provides information concerning the duration of sessions, the number of machines played, and overall expenditure. Thus, although it would appear that session duration and frequency were the principal differences between problem gamblers and other players, one cannot rule out the possibility that there were differences in the style of play (e.g. the number of lines and magnitude of bets chosen by problem players).

The important policy implication of this work is that it suggests that card technology could be usefully applied in future research studies and as a regulatory tool to monitor some important aspects of gaming behaviour, most notably the amount of time and money spent by individual players over time. It would appear that policies relating to the length of gambling sessions, or how often problem gamblers can access venues, would appear to be potentially beneficial in that both frequency and the length of sessions have consistently been associated with a greater likelihood of gambling-related harm. Some steps toward the utilisation of this knowledge to assist problem gamblers have been made by Gambling Research Australia in the form of its support for projects relating to pre-commitment strategies or other technologies that might enable either players themselves or regulators to place limits on potential expenditure rates on EGMs.

4.4.2 Near Miss Effects

Other studies have sought to examine variations in the configuration of EGM technology more precisely, by actively altering or manipulating the nature of outcomes presented to players. A study of this nature was, for example, undertaken by Sharpe, Blaszczynski, and Walker (2005) who focused specifically on the role of near miss events on gambling behaviour. Near misses or 'near-wins' have been identified as potentially important in the EGM literature because these events (e.g. a close alignment of winning symbols) are thought to maintain player behaviour and may be

particularly reinforcing for, or attractive to, problem gamblers. In most previous international studies of this topic, near misses have typically been generated on very simplistic EGMs or simulators with only three lines and three or four columns of symbols. In these simplified machines, near misses are generally very salient to players. The authors were therefore interested in whether this effect could be replicated on more complex machine configurations where players are exposed to a greater number of symbols and multiple play lines.

In a first study, 57 social gamblers and a sample of university students were presented with 200 graphical representations of machine outcomes taken from Aristocrat's popular Queen of the Nile game. Machine outcomes were presented in simulated play situations involving 1, 5 or 20 line formats. The results showed that very few of the events thought to constitute near wins were identified by participants. Moreover, problem gamblers (defined as those who scored 3+ on the SOGS), were even less likely than the students to identify these particular events. In a second study, 149 student gamblers were asked to play a machine where they were exposed to different proportions of near win events. All players were given \$10 worth of 1c credits and asked to play for as long as they liked and to keep their winnings. One condition provided a combination of losses and near wins, a second condition had all losses, and a third had all near misses. There were no differences in player satisfaction, play rates or betting behaviour across the three conditions. Based on these findings, the authors concluded that near misses do not appear to play a very strong role in the maintenance of EGM behaviour on modern machines, and that other features are possibly more important.

The importance of near misses or wins is an issue that has seldom been considered by regulators because machine approval guidelines require that manufacturers avoid the inclusion of any features that deliberately distort players' perceptions of winning. However, there has been debate within some community organisations concerning the existence of contrived symbol patterns on machines that might constitute a deliberate attempt to encourage people to continue gambling. The research conducted by Sharpe et al. (2005) suggests that the effects of these patterns (whether deliberate or coincidental) is likely to be minimal because of the complexity of modern machines. Not only do players find it difficult to observe many events that might be considered

near misses, but their experience of gambling does not appear to be altered significantly by their presence. The policy implication of this research is therefore somewhat difficult to discern. On the one hand, the existence of multiple play lines gives rise to a greater probability of players experiencing near miss events, but this same increase in complexity may also make it more difficult for players to differentiate clear examples of this phenomenon from the range of other possible outcomes that typically occur on modern machines.

Sharpe et al's (2005) study is well designed in that it utilises both a self-report and experimental methodology, but it is important to recognise that this work has a number of limitations. Only student gamblers were used in the gaming experiment, people were not playing with their own money, the amounts wagered were relatively small, and the outcome sequences were artificial. In real-life gambling, near misses would occur in the context of a wider range of machine events including larger wins. People would also have an opportunity to play their preferred machine. For these reasons, this research does not rule out the possibility that near misses can play a role in the maintenance of gambling on some occasions, and that problem gamblers might be more significantly affected.

4.4.3 Sydney University Machine Reconfiguration Study

By far the most extensive study of machine characteristics was undertaken by Blaszczynski, Sharpe, and Walker (2001) in New South Wales clubs and hotels. With the assistance of industry, the popular Aristocrat game Pirates was placed into venues with specific modifications to the machines. The normal reel speed of 3.5 seconds was increased to 5 seconds on some machines, the usual note acceptor limit of \$100 was reduced to \$10, and the maximum bet (usually \$10) was restricted to \$1. In the hotels subject to investigation, the original machine was placed alongside a machine with all three modifications just described. In clubs, an unmodified machine was placed next to machines with every combination of modifications (as described below in Table 4.1).

Table 4.1. Blaszczynski, Sharpe and Walker (2001) Machine Modification Study

Note Acceptor (Max \$100)		
----------------------------------	--	--

	Maximum bet = \$1	Maximum bet = \$10
Play speed (fast, 3.5 seconds)	A	B (unmodified machine)
Play speed (slow, 5 seconds)	C	D
Note Acceptor (Max \$10)		
	Maximum bet = \$1	Maximum bet = \$10
Play speed (fast, 3.5 seconds)	E	F
Play speed (slow, 5 seconds)	G	H

In the club study, between 175 and 188 players gambled on both the unmodified machine and at least one modified machine, and 110 gambled on every machine, so that it was possible to compare participant responses across all the conditions described above. Another strength of the study was that participants completed the SOGS so that it was possible to compare results for problem and non-problem players. Once players had finished gambling on the machines, they were asked to rate their enjoyment, excitement, and satisfaction with the machines on a scale of 1 to 5. The results showed that lower excitement and enjoyment ratings were obtained for the machines with slower play speed, but that the effect was very small (< 0.5 points on the 5 point scale). Restrictions on maximum bet size reduced enjoyment, but not satisfaction, whereas restrictions on note acceptors had no effect on ratings. As a check on the validity of the experimental manipulation, players were asked to indicate whether they had noticed anything different about the machines. Most noticed the change in play speed, but few noticed the change in note acceptors or bet size. Nevertheless, as Delfabbro and LeCouteur (2007) point out:

“...when asked which machine they most preferred, 23% rated the control [unmodified] machine as most preferred compared with only 7.5–15% who preferred the other machines. All of these effects did not differ depending upon whether a person was a problem vs. non-problem gambler.”
(p. 98)

Based on these findings, it was concluded that machine modifications appear to have little influence on customer satisfaction. However, it is important to draw attention to an important methodological limitation of this research that may have influenced the validity of the findings. In this study, the researchers had no control over play activity conducted on machines not included in the investigation. Players were able to come and go from the experimental machines whenever they desired. As a result, player

responses may have also been influenced by other gambling activities occurring in the venue (e.g. how much they were generally winning or losing). Some players might, for example, play other machines (not a Pirates machine), lose money and feel dissatisfied, and then come back to the Pirates machines in a bad mood. Others might come back having won and be optimistic about their gambling. If this were the case, it would have been more difficult to detect variations that were merely due to the experimental manipulations.

A second issue was the choice of machine itself. Although the authors describe Pirates as a well known game, it is unclear whether it is one of the most popular games. If it were the case that Pirates was not one of the most popular machines (such as Queen of the Nile), it is possible that players might not have had a lot of interest in any form of the game. Responses may therefore have been subjected to ceiling effects. Ratings for the unmodified condition may have converged on only a modest average and then remained very similar when the modifications were made because the feature changes did not influence the nature of the game itself. In other words, although the modifications were designed to reduce the rate at which money could be inserted into the machine, these factors may not necessarily be the factors that influence the 'consumer value' or attractiveness of the machine. As discussed in the previous section, when players are asked to indicate what factors make machines more attractive, they usually refer to the availability of bonus features, graphics, and sounds. No mention was made of the availability of note acceptors, maximum bet sizes and playing speeds. It suggests, therefore, that if the modification had involved placing restrictions on the number of betting lines available (see Delfabbro et al., 2004), the effects on consumer satisfaction and machine preferences may have been more strongly observed.

In a second part of the research by Blaszczynski et al. (2001), observers recorded the behaviour of 779 players on the machines for a 5 day period with 10 hours of observation each day. All players included in the study were surveyed prior to being allowed to play on the experimental machines. The results showed that problem gamblers were more likely to insert higher denomination notes (\$50 or \$100) into the note acceptors (22% vs. 10% of other gamblers), they were slightly more likely to bet more than \$1 per spin (7.5% vs. 2.3%), but there were no significant differences in

play speed between the two groups. Problem gamblers also tended to play for longer (42 minutes vs. 29 minutes), and to consume more alcohol and cigarettes while they gambled. A further finding was that slower play speeds appeared to be associated with longer sessions, which implied that reductions in reel speed might be compensated for by longer playing sessions.

As pointed out by Delfabbro and LeCouteur (2007) in the AGR, these findings need to be interpreted with caution. The fact that problem gamblers smoked and drank more during their sessions may only be due to the fact that they had longer sessions of gambling. Similarly, even though longer play sessions appear to have been associated with slower play rates, this may have been due to other confounding factors, including the particular style of play adopted by problem gamblers. If this group spent more per spin by betting on more lines and more credits per line, they would have obtained more win events in general, and more bonus features. This in itself would have been sufficient to slow down play rates. Accordingly, for all of these variables, it would have been better to have recorded the data in terms of a rate per minute (i.e. how many cigarettes/drinks consumed per minute, or number of plays, taking out the time spent waiting for bonus and payout sequences to be completed).

The most convincing component of the Blaszczynski et al. (2001) study was a series of analyses conducted on objective machine data to determine whether machine turnover had been influenced by the different modifications. The results showed that the amount of money inserted into machines with lower play speed and smaller note acceptors was 34% lower than on the unmodified machines. In a sense, this finding is unsurprising in that these modifications were designed (all things being equal) to decrease the rate at which players could insert money into the machine within a specified time interval. However, the significance of the modifications was further confirmed by a 48% decrease in the amount lost (cash in – cash out) on modified machines, suggesting that the manipulation had been successful in influencing actual expenditure.

These findings were promising in that they suggested that the reduction in maximum bet size as well as the restriction on note acceptors could be useful strategies to curb gambling expenditure and minimise final harm associated with gambling. However,

in their conclusions, the authors were more cautious about their findings. In some parts of their report, they suggested that these changes could be useful harm minimisation strategies, whereas elsewhere (most notably in the executive summary) the authors expressed doubts about bet-size reductions on the grounds that few players gamble more than \$1 per spin, and few insert large denomination notes into the note acceptors. In response to this inconsistency, a review of the research was undertaken by Tse, Brown and Adams (2003) from the New Zealand Centre for Gambling Studies. The reviewers concluded that the authors of the New South Wales report had not been entirely consistent in their conclusions and that restrictions on bet sizes and note acceptors appeared to show some promise as harm minimisation strategies.

In summary, despite its limitations, the Blaszczynski et al. (2001) machine modification study remains the most ambitious and comprehensive study of its type ever undertaken in the world. The use of a field experimental design with orthogonal manipulation of the experimental conditions (machine changes) was a considerable strength of the project and the study used real EGM gamblers who gambled with their own money. Further utilisation of this style of research has the potential to provide very useful insights into the nature of EGM gambling, and appropriate regulatory and policy responses. Some of the particular features of this research that should be replicated, or included, in future studies include:

- The use of modified EGMs within venues. Such research should consider using very popular machines to ensure that people are playing one of their favourite machines.
- The orthogonal (independent) manipulation of machine features in the same study (as per the Blaszczynski et al., 2001 study).
- Players should only be able to play the experimental machines at the venue to reduce the potential influence of other gambling in the same session.
- Observers should record response rates, smoking rates, alcohol consumption rates by per unit time rather than just in total (CCTV footage might be

utilised for this purpose). Running response rates should be differentiated from response time calculated on the basis of total time on the machine/number of presses. To do this requires removing the time spent listening to bonus sequences or payouts, although it may be interesting to examine how many problem gamblers over-ride the payout sequences on machines that have a 'play through' feature.

- Some attempt might be made to differentiate between changes that influence the 'consumer value' of the machines as opposed to the amount of money that can be expended. For example, one could also examine restrictions on the number of pay lines, or the availability of bonus features.

4.5 Psychological Studies of EGM Gambling

The AGR also includes a detailed review of psychological research into the nature of gambling, with a particular focus on the mechanisms that appear to maintain gambling on EGMs. Three principal theoretical areas are evaluated in the review: (1) addiction and dispositional approaches, (2) behavioural approaches, and (3) cognitive theory. Only a brief summary will be provided because not all of this theoretical material necessarily directly relates to the key research priorities identified by Gambling Research Australia. However, some discussion is provided because of the importance of highlighting the mechanisms underlying problem gambling and the characteristics or personality profiles that make certain people more vulnerable than others to problem gambling (Research Priority 4).

4.5.1 Traditional Addiction Perspective

According to the traditional addiction perspective, problem gambling is very similar to other forms of addiction involving substances (e.g. alcoholism and drug dependence). Gambling is thought to be based on desire to obtain physiological arousal or excitement. People become addicted to gambling because they eventually develop tolerance, withdrawal symptoms and cravings. Increasing amounts of money need to be spent in order to maintain the same level of arousal (tolerance), and people feel depressed and anxious when they are not gambling, or have strong desires of preoccupations with gambling when they are engaged in other activities.

Over the last two decades, most Australian researchers have tended to reject this model of gambling because there has been relatively little evidence to support the existence of these processes. Although it is true that problem gamblers spend larger amounts of money over time, this may only be due to the desire to chase earlier losses. Similarly, despite the fact that many experience considerable disruptions to their psychological and physiological health, all of these symptoms may be due to the stress associated with losing money, and the many other related impacts described in Chapter 3. There is also earlier Australian research that has found little systematic relationship between arousal and gambling behaviour, and particularly in relation to EGM gambling. Dickerson et al. (1992), for example, tracked the heart rates of regular EGM players in venues in relation to the patterns of activity occurring on the machines (wins and losses) and found little relationship between the two. More broadly, there are a number of prevalence studies and consumer surveys (see Sections 2.7 and 4.3) that have shown that EGM players are often more strongly motivated by a desire to relax and escape their worries than to obtain stimulation or excitement. Indeed, mere observation of EGM players in any Australian venue can confirm that few EGM players display a great deal of emotion when they gamble, apart from frustration at having not obtained the outcomes they desire. Traditional addiction approaches are also unable to explain why many people are able to overcome gambling-related problems without formal clinical interventions.

Despite this pessimistic assessment of traditional addiction models as valid explanations for problem gambling in Australia, there has been some renewed interest in this area because of recognition of the likely diversity of problem gambling. Blaszczynski, for example, argues in a number of papers (e.g. Blaszczynski & Nower, 2002) that traditional addiction models may play a role in the aetiology of some problem gambling, particularly for those people who have broader pathologies that make them prone to addictive behaviours. For this reason, Blaszczynski, Walker, Sharpe and Hill (2005) conducted a reassessment of the value of traditional addiction models in Australian gamblers. The study involved a comparison of the reported symptomology of three groups of people seeking assistance from a treatment clinic in Sydney. One group comprised problem gamblers with no alcohol dependence; a second group had difficulties with gambling and also alcohol dependence; and a third group had alcohol dependence but no problems with gambling. The study investigated

whether systems of tolerance and withdrawal were prevalent in the samples of problem gamblers, or whether such experiences were only a feature of substance dependence.

The study found some evidence to support the existence of both these processes. Problem gamblers had a tendency to increase their bets over time to maintain the same level of excitement, a behaviour that is consistent with the process of tolerance – although, as the authors conceded, it was likely that this behaviour was more strongly associated with a desire to win money rather than with a pathological need for physiological stimulation. Evidence for the existence of withdrawal-like symptoms was stronger in the samples of problem gamblers. Many reported feelings of irritability, anxiety and restlessness when they were no longer gambling. These reported symptoms were more prevalent in the problem gambling samples than in those who were affected only by alcohol dependence. Based on these findings, the authors argued that withdrawal does appear to be a significant component of problem gambling, but could not rule out the possibility that these experiences were due to financial and other situational pressures caused by the gambling rather than a direct physiological response.

Although theoretical debates about the nature of problem gambling would appear to be primarily a subject for academic discussion, these issues also have relevance for policy development in Australia. If a certain proportion of problem gamblers genuinely experience addictive behaviours similar to alcohol or other forms of substance misuse, this has implications for how problem gambling might be regulated or treated. In terms of regulation, it would suggest that the cause of the gambling problem is very much central to the individual rather than being brought about by environment factors (as some psychological theories would propose). If gamblers develop addictive behaviour, their behaviour is less likely to be influenced merely by the provision of information in venues, or other subtle changes to venue design or machine characteristics. In effect, their behaviour is driven by a need to gain access to gambling and escape unpleasant experiences. Similarly, from a treatment perspective, there may need to be more effective interventions that focus on the negative symptomology that drives the behaviour (e.g. negative mood states) rather than merely people's desire for monetary reinforcement. It therefore remains important

that ongoing developments in this theoretical area be taken into account by both policy-makers and clinicians.

4.5.2 Pathology Model

Despite some debates about the validity of the traditional addiction approach to problem gambling within Australia, there is nonetheless some support for the view that certain people have dispositional or neurophysiological characteristics that make them more vulnerable to addictive behaviours. This view is supported, for example, by Blaszczynski and Nower (2002) who argue that there are several pathways into problem gambling. One of these pathways (termed 'Pathway 3') relates to a distinct subgroup of problem gamblers who appear to show a predisposition for various forms of addictive behaviour or psychopathology, and whose gambling appears to arise from some common underlying factor. Termed 'antisocial impulsivists', these people often present with various co-morbidities including substance abuse, personality disorders, criminal behaviour, and other clinical symptomology (see also Battersby & Tolchard 1996). Such people appear to share a number of neurophysiological differences that make them more prone to self-destructive behaviours than are other gamblers.

A number of studies have been conducted in Australia to identify individual differences or personality traits that might predispose certain people to risk-taking behaviour. One strain of this research has focused on measures such as sensation-seeking (SS) (or a pathological desire for high-risk or arousal-generating activities). Burnett and Ong (1997), for example, conducted a study of 251 women living in inner-city Melbourne and found that SS predicted an involvement in EGM gambling. Similar results were obtained by the same research team in a study of 778 Year 12 students in Melbourne. Burnett, Ong and Fuller (1999) found that those with higher SS scores were significantly more likely to be regular (weekly) gamblers than those with lower scores. Similar work conducted by Steel and Blaszczynski (1996) involving 115 problem gamblers in treatment reached very similar conclusions. This sample obtained higher SS scores than population norms, although no analysis was undertaken to determine whether these higher scores were unique to problem gamblers or merely gamblers in general. Taken as a whole, these results suggest that people who gamble are more likely to have a high desire for risk-taking or arousal inducing activities. However, the findings do not provide any convincing evidence

that SS is a reliable predictor of problem gambling. Instead, SS only appears useful in profiling those segments of the population who are more likely to gamble.

It has also been suggested that the behaviour of this segment of problem gamblers may share some traits in common with children diagnosed with attention deficit hyperactivity disorder (ADHD), in that both appear to be highly impulsive, sensitive to reward, but relatively insensitive to punishment. Both find it difficult to optimise or regulate their behaviour so as to avoid sub-optimal decision-making. To examine this hypothesis, Blaszczynski et al. (2002) undertook a detailed assessment of 77 adolescents (37 with ADHD and 40 without). The results showed that scores on the DSM-IV were positively related to impulsivity scores, but that there were otherwise no significant differences between the two groups on any measure related to gambling. In other words, the results did not provide any support for the idea that adolescents with ADHD are any more prone to developing problems with gambling.

Although the exact patterns of symptoms and mechanisms require further research within Australia, the principal public health and policy implication of this area of research is that there appears to be a sub-sample of problem gamblers within the community in whom one is likely to observe a strong clustering of problems. Such people may present with various forms of psychopathology or cross-addictions and may have personality disorders. In a conceptual sense, these people create a challenge for policy makers and regulators in that it may be difficult to draw clear associations between the availability or introduction of gambling and the prevalence of various problems that appear to be associated with gambling. Within this sample, there are likely to be many problems that precede, or which are concurrent with, an involvement in gambling activities. In effect, the person's difficulties with gambling may only be a corollary of a broader range of risk-taking and self-destructive behaviours. This group also provides challenges for service providers in that not all agencies may be equipped to deal with the range of problems present in the clients. Basic services such as counselling would need to be combined, or linked with, specialist mental health and/or drug and alcohol treatment services. Moreover, counsellors would be faced with the difficult task of avoiding any transference of problems from one activity to another. Treatment of the person's problem gambling may only lead to increases in other forms of dependency or 'addictive' behaviour, so

that it would be important for evaluations of service efficacy to take into account a range of outcome variables, rather than concentrating on gambling behaviour alone.

4.5.3 Psychological Vulnerability

Another subgroup of problem gamblers identified by Blaszczynski and Nower (2002) are thought to gamble because of a desire to cope with significant depression and anxiety. Such people (often more women than men), termed ‘emotionally vulnerable’ tend to have a history of trauma, abuse, or life changes that create a need to escape from their difficulties. Rather than being attracted by the excitement of gambling, these people become psychologically dependent on activities such as using EGMs because they help to regulate their moods, and block out undesirable thoughts. When they are not gambling, they feel depressed or anxious and unfulfilled, and so they develop strong preoccupations with reliving the experience of gambling, and strong urges to gamble. In some cases, the stimuli associated with gambling can become so strongly associated or conditioned that these people start hearing the sounds of EGMs in their heads even when they are at work, or at home.

There is considerable support for the notion that people can become ‘psychologically addicted’ to gambling in this fashion. As discussed previously in Section 2.7 in relation to gender differences in gambling, there are many Australian studies (e.g. Di Dio & Ong, 1997; Pierce et al., 1997; Quirke, 1996, Scannell et al., 2000; Thomas & Moore, 2001) that have shown that women in particular use EGM gambling as a form of avoidant or emotion-based coping. More broadly, there is a wider national and international literature (e.g. Jacobs, 1986; Walker, 1992a) that suggests that this is a consistently observed pathway into problem gambling.

The important policy or regulatory implication of this research is that there are likely to be people in the community who are not usually prone to addictive behaviours, but who are vulnerable to EGM gambling because of the way in which it is promoted or made available. Due to the strong emotional or conditioned component of the gambling, such people may have strong gambling urges that are triggered by gambling-related stimuli (e.g. the sight of a venue, advertising, sounds of a machine: Sharpe & Tarrier, 1993). Within venues, such people may also easily lose track of time and reality, so that there is a need to consider the introduction of regulatory

measures relating to the design or operation of venues that might influence these patterns of behaviour. Findings such as these may therefore be taken into account in informing policy discussions about the potential value of breaks or reality checks within the gambling environment. These findings also have implications for policies relating to the range and provision of treatment services, including the value of psychologically-based services that would be capable of addressing the underlying anxiety, depression and trauma associated with the problematic gambling behaviour.

4.5.4 Behavioural Approaches

Since the early 1990s, several studies have been undertaken to examine whether EGM gambling can be understood in terms of the basic principles of psychological learning theory, in particular, the principles of operant conditioning. According to this perspective, people come to gamble excessively on EGMs because of the fundamental links between the reward structures of the games and behaviour. When people (or animals) engage in a behaviour that is subject to intermittent random rewards (as is the case in EGM gambling), they develop a characteristically rapid rate of responding that is very hard to extinguish. Rapid responding occurs because people sense that a win can occur after any spin or game, so that one will obtain a greater number of wins if one plays more games. Moreover, since substantial wins occur quite infrequently on most gaming machines, people grow used to not winning very often and therefore build up a resistance to losing. The longer one plays without reward, the greater the expectation of winning because people become accustomed (from countless hours of experience) to expect a good win if they persist long enough on the same machine.

EGM gambling corresponds most closely to what is termed a variable or random ratio schedule of reinforcement. In random ratio schedules, people are rewarded for every X responses, but where there is a certain probability of obtaining various outcomes on each spin. On many trials this may be a losing outcome, whereas on others it might be a small or large win, but this cannot be predicted from one trial to the next, or by examining what outcomes might have occurred previously. To determine whether a behaviour is scheduled or conditioned according to operant conditioning principles, one examines the pattern of responses to determine whether it confirms to a pattern typical for the specific type of schedule involved (in this case a VR or RR), or

whether behaviour appears to be sensitive to machine events (e.g. the pattern of wins or losses).

Several studies have examined EGM player behaviour to look for evidence of schedule-based behaviour. Dickerson et al. (1992), for example, studied the behaviour of 12 high-frequency poker machine players in gaming venues in the Australian Capital Territory. On-site observers kept records of player response rates and other relevant behavioural data. The results showed that players had a tendency to increase their rate of responding following small wins and to slow the rate following larger wins. A similar methodology was used by Delfabbro and Winefield (1999) in a study of 60 regular and non-regular EGM players in South Australian hotels. Response rates, betting patterns and other relevant behaviours were observed in a venue environment. The results showed that players did not slow their play-rates after large wins, but tended to have short breaks from play. Small wins had little effect on play rates because it was common for very small wins to occur almost all the time on more modern machines (wins of 2–5 credits), so that the effect was difficult to discern. The results further showed that regular players had more consistent or stereotyped patterns of play as compared with infrequent players. Bets were typically increased following wins, and decreased following losses.

Although the specific implications of these studies may not appear immediately relevant to policy and regulation, the findings nonetheless suggest that variation in machine events can have an influence on the pattern of gambling behaviour. It raises the possibility that modifications to machines, or variations in the parameter of gaming schedules, could influence how fast or the manner with which people gamble. However, since 2000, very little, if any, research has been undertaken to examine how changes to EGM schedules (e.g. variations in win frequency or magnitude) might influence response rates, bet sizes, or general persistence.

4.5.5 Impaired Control and Gambling Urges

The AGR also reviews some specific measures that have been developed in Australia to identify patterns of gambling behaviour that might place gamblers at risk of future harm. These measures are potentially useful from a policy and treatment perspective because they relate more specifically to the goals of harm prevention or minimisation,

rather than focusing solely on the identification of problem gambling (as is the case with the DSM-IV, SOGS, VGS and CPGI).

The first of these measures is the Scale of Gambling Choices, which was developed and applied during several studies in the 1990s (e.g. Baron, Dickerson, & Blaszczynski, 1995; Dickerson, 1993; O'Connor, Dickerson, & Phillips, 1999; O'Connor & Dickerson, 2003). This scale asks players to respond to a series of items relating to the extent to which they have control over their gambling behaviour. To what extent can people resist the urge to gamble when they have an opportunity to gamble? How hard do they find it difficult to stop once they have commenced gambling? O'Connor and Dickerson (2003) administered this scale to a convenience sample of 84 TAB gamblers and 137 EGM gamblers and found that impaired control (as measured by the Scale of Gambling Choices), was significantly related to chasing behaviour, as well as the amount of time and money spent on gambling (the key components of the current national definition of problem gambling). Similar results were obtained in a study by Dickerson, Haw, and Shepherd (2003) using 200 EGM players in New South Wales.

A similar and related scale, the Urge to Gamble Scale, has recently been developed by Raylu and Oei (2004a) in Queensland based on a similar measure utilised in the alcohol literature. This 6-item scale measures the strength of people's desire or urge to gamble, and was validated using a sample of 968 participants including first year psychology students and volunteers from the community. Scores on this scale were found to correlate significantly with the SOGS and other measures of gambling motivation.

As Neal et al. (2005) and Delfabbro and LeCouteur (2007) point out in the AGR, neither of these scales is without limitations. In both scales, there are no specific cut-off scores to determine when a gambler might be at risk. The Urge to Gamble Scale was validated on a very mixed sample that included psychology students, rather than a random population sample or group of gamblers classified according to risk level (e.g. CPGI classifications), so that it is difficult to generalise the results to populations of gamblers. By contrast, although the Scale of Gambling Choices has been well validated using appropriate samples, the theoretical interpretation of the scale is

unclear. No framework is provided as to why certain people might find it more difficult than others to control their gambling.

Nevertheless, from a policy and regulatory perspective, scales of this nature are useful in that they attempt to capture problematic forms of behaviour that may place people at risk of subsequent gambling-related harm. Further validation of scales of this nature may therefore provide useful tools for monitoring people's responses to the introduction of various regulatory or harm minimisation provisions, or their responsiveness to formal treatments. Such measures could, for example, be included in studies that examine the impact of particular regulatory provisions (e.g. limits on venue advertising, changes in gambling accessibility) on gambling behaviour. The principal advantage would be that the scales could be used to detect behavioural changes in both problem and non-problem gamblers.

4.5.6 Cognitive Approach

The third psychological approach reviewed in the AGR relates to the application of cognitive theory to gambling behaviour. According to this view, gambling is considered to be heavily influenced by how people understand and conceptualise gambling (Walker, 1992a). Since most gambling activities are designed to yield a long-term negative return to players, it is argued, by logical inference, that gamblers are either irrational or misguided in their understanding of gambling activities. Instead of processing information in a rational and objective fashion, people fall victim to a range of cognitive biases, all of which lead them to over-estimate their chances of winning. Some of many common biases described in the AGR include:

1. *The Gambler's Fallacy or Representation Bias*: People believe that short-term sequences of events should reflect the long-term expected probabilities. This belief leads to the expectation that long sequences of one outcome (e.g. losses on EGMs) should be followed by the opposite event. Players believe that the machine self-corrects the outcomes according to the 'law of averages' so as to maintain a consistent return to player. Machine events or outcomes are no longer considered independent.

2. *Illusion of Control*: People believe that they can increase their chances of winning using skilful play. On EGMs, players may use various betting strategies, superstitious rituals, or other techniques to influence outcomes.
3. *Availability Heuristic*: This bias refers to people's tendency to focus on very salient events or outcomes when making judgements about the qualities of a particular object or activity. In the case of EGMs, people tend to recall very memorable wins or sessions and pay less attention to the occasions when they lose. As a result, they develop an overly optimistic view about the long-term profitability of gambling on EGMs.
4. *Optimism Bias*: People who gamble sometimes believe that they are luckier or more fortunate than others. They believe that good events, in this case, large wins, are more likely to be obtained by them than other players (Lo, & Anjoul, (2001))
5. *Personification/Personalisation of Machines*: People talk to or argue with gaming machines and treat them as electronic friends or adversaries.

Two sources of evidence have been used to draw links between gambling and irrational beliefs or irrational thinking. The first, derived from the work of Ladouceur in Canada, involves asking EGM players to speak aloud their thoughts while gambling. One study undertaken by Walker (1992b), involving a small sample of regular EGM players gambling in venues, found that 80% of gambling-related statements were irrational. Very similar results were obtained by Delfabbro and Winefield (2000) with 20 regular EGM gamblers playing in a South Australian hotel. These authors also found that the degree of irrationality was related to the level of risk-taking (average bet sizes), and that there were some noticeable gender differences (women were more likely to personalise the outcomes, for example, by talking to the machines or encouraging them to pay out).

The second primary source of evidence arises from survey studies of gambling beliefs. For example, Joukhador, Blaszczynski, and Maccallum (2004) developed an 8-item irrational belief scale and administered it to 56 problem gamblers in treatment

and 74 non-gamblers. The results showed that problem gamblers scored significantly higher on irrationality than the other sample, and that SOGS scores were positively correlated with greater irrationality. However, a limitation of this study was that some of the items related to religious and psychic abilities that may be related to broader belief systems unrelated to problem gambling. The study also did not include a sample of regular non-problem gamblers as a comparison group, so it is unclear whether the group differences represent clear differences between problem gamblers and other gamblers, or merely gamblers and non-gamblers. In addition, the scale does not differentiate between different types of irrational belief.

A similar investigation was conducted by Ralyu and Oei (2004b) as part of the validation of a comprehensive measure of gambling-related cognitions (Gambling-related Cognitions Scale, or GRCS). This measure was derived from a larger set of belief statements administered to 968 volunteers drawn from the community and from Psychology 1 classes at the University of Queensland. Five subscales were developed: Gambling Expectancies, Illusion of Control, Predictive Control, Inability to Stop Gambling, and Interpretative Bias. Once again the results showed that scores on these scales tended to be significantly higher for people with higher SOGS scores. A follow-up investigation based on this original study examined whether parental beliefs about gambling were related to young people's beliefs and their likelihood of gambling (Oei & Raylu, 2004). Both adults and their adolescent children were administered the scales and questions about gambling habits. The results showed that cognitions appeared to play a mediating role in young people's gambling. Adolescent beliefs were related to parental beliefs and these beliefs, in turn, appeared to influence young people's likelihood of gambling.

In theory, these findings from cognitive research have many important implications for policy, regulation and the treatment of problem gamblers. The fact that problem gamblers hold many irrational beliefs about gambling supports the ongoing development of policies relating to effective consumer awareness and education that are designed to reduce the strength of these beliefs. The findings highlight the importance of policy discussions concerning the value of interventions that provide gamblers with greater knowledge about the objective true odds of winning, the nature of irrational beliefs or biases, and how to avoid them. The value of such information

could be examined in several different contexts, including its role in venues, on machines, or as a part of broader community or school-based education campaigns.

Over the past decade, there have been many attempts to use this information in exactly these ways. However, when applying this research, it is very important to be aware of some of the limitations of the methodologies used and to be cautious in the interpretation of the results (see Delfabbro, 2004). The first issue is that a number of studies in Canada have shown that students with little gambling experience also produce many irrational statements when asked to speak aloud and play a gaming machine. A second issue is that beliefs and verbalised statements are not the same as behaviour, so there is a danger that people's descriptions of their behaviours may not always reflect the true basis for those behaviours, i.e. irrational beliefs may be a symptom of gambling rather than a cause of the behaviour.

There are several other challenges associated with using this type of information in interventions, and these will be revisited in Chapter 5, which considers some of the specific strategies that have been used to minimise or prevent the harms arising from problem gambling.