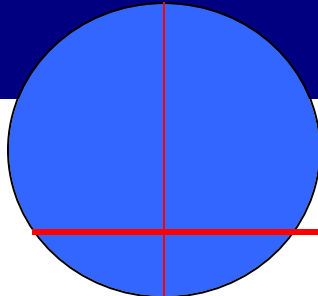




The University of Sydney

FINAL REPORT

**The Assessment of the Impact of the
Reconfiguration on Electronic
Gaming Machines as Harm
Minimisation Strategies for
Problem Gambling**



**A Report for
The Gaming Industry Operators Group**

By

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November 2001

The Assessment of the Impact of the Reconfiguration on Electronic Gaming Machines as Harm Minimisation Strategies for Problem Gambling

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University Printing Service, Sydney

Alex Blaszczyński, Louise Sharpe and Michael Walker of The University of Sydney Gambling Research Unit prepared this report. The Gaming Industry Operators provided financial support for The University of Sydney Gambling Research Unit to conduct the research project. The research grant was administered through the University of Sydney Business Liaison Office.

The University of Sydney Gambling Research Unit 2001

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1 EXECUTIVE SUMMARY

Background

In November 2000, the New South Wales Liquor Administration Board recommended a series of provisional determinations involving modifications to the structural characteristics of electronic gaming machines as potential harm minimisation strategies for problem gambling (*Gambling Harm Minimisation and Responsible Conduct of Gambling Activities Review of the Board's Technical Standards for Gaming Machines and Subsidiary Equipment in New South Wales*).

In reviewing the available evidence and arguments presented before it, the Board's determination included the following three specific changes to the design of gaming machines:

- High value note acceptors (i.e. those capable of accepting between \$50 and \$100) to be no longer acceptable, with consideration to be given to removing bill acceptors altogether at a later time.
- Slowing the speed of games to add a few extra seconds to the time of individual games. This should be achieved by requiring a minimum wheel spin time of 3.5 seconds and a minimum of 1.5 seconds in idle mode during which at least one standard data block must be transmitted.
- Limiting the maximum bet size on stand-alone machines to \$1 on a trial basis.

In response to the Board's provisional determination to the above changes, the Gaming Industry Operators approached the University of Sydney's Gambling Research Unit with a request to conduct a funded independent and objective research project to evaluate the impact of such changes on problem and recreational gamblers. The purpose of this research was to provide empirical evidence describing the differential impact of these changes on recreational and problem gamblers and to determine the possibility of negative unintended effects that might be associated with the recommended changes.

Project Objectives

The current Project on which this Report is based was designed to examine the impact of proposed changes to machine design features on:

- 1) Player satisfaction and enjoyment (Study 1).
- 2) Player behaviour (Study 2).
- 3) Player expenditure (Study 3).
- 4) The perceptions of self-identified problem gamblers on whether the modifications would have influenced the development and severity of their problems with gambling (Study 4).

Project Limitations

It is important to note that the study has certain limitations that need to be taken into consideration in interpreting the results and in generalising the findings to other populations of gamblers, gaming devices other than one-cent denomination poker machines.

- The clubs and hotels participating in this study represent a sample of convenience and should not be taken to be representative of all clubs or hotels in metropolitan or rural areas of New South Wales.

- Patrons in gaming venues were invited to participate in the research project. This introduces the possibility of a biased sample of participants being included in the study. For example, it is possible that more problem as compared to recreational gamblers declined to participate in the study. While the prevalence rate for problem gambling defined by a South Oaks Gambling Screen score of five or more, and ten or more, found in this study, is higher than that reported in the Productivity Commission (1999) Report, we do not know if the rate is an accurate estimate of the true rate of problem gamblers in gaming venues.
- It is also possible that fewer problem gamblers exhibiting higher levels of problem severity agreed to participate in the study. This may result in a biased sample of participants.
- It is possible that participants modified or modulated their patterns of gambling behaviour and expenditure in response to the experimental condition where they were directly observed by researchers while playing machines.
- On the recommendations of the GIO, it was decided to evaluate the impact of proposed changes on patrons playing modified and unmodified one-cent 'Pirate' poker-machines. One-cent machines appear to be the one of the more popular denomination machines played by venue patrons. The impact of proposed changes may be different for players preferring higher denomination gaming machines. There is an absence of data on the number of problem gamblers who play the various denomination poker machines, and the frequency with which they play higher denomination machines in comparison to one-cent machines.
- Notwithstanding these limitations, the findings of the project provide preliminary empirical evidence that can be used to give a broad estimate of the likely effects on behaviour and expenditure of the proposed changes to the design of gaming machines in a subpopulation of gaming machine patrons using one-cent machines.

1.1 Project Findings

- For purposes of this project, a South Oaks Gambling Screen (SOGS: Lesieur & Blume, 1987) score of 5 was used to classify problem gamblers. The mean SOGS score for hotel participants was 3.28 (standard deviation = 4.7), and for the club participants, 2.05 (standard deviation = 2.8).
- Of the total sample of hotel and club participants who completed the SOGS (n = 634), 20% obtained a score of 5 or more, and 5%, a score of ten or more.
- In the clubs, 16.2% of participants obtained a SOGS score of five or more. Of these 12.5% obtained a score between 5 and 9, and 3.7% a score of 10 or more.
- In the hotels, 28% of participants obtained a SOGS score of five or more. Of these, 20.7% obtained a score between 5 and 9, and 7.3% a score of 10 or more.
- Of n = 514 participants on whom data was available, 13% used high denomination bill acceptors. An analysis of this figure by gambling status revealed that 10% of recreational versus 22% of problem gamblers used high denomination bill acceptors at least once.
- Of n = 497 participants on whom data was available, 3.5% placed maximum bets of an amount greater than \$1. An analysis by gambling status revealed that 2.3% of recreational versus 7.5% of pathological gamblers placed bets greater than \$1.
- Problem gamblers were more likely to be male, bet heavier, use higher credits per bet, and smoked and drank more than recreational gamblers.
- Differences were found in the characteristics of hotel and club participants. Hotel participants tended to be younger males, spent less time gambling, made fewer bets and played fewer machines but had heavier losses, played more lines and smoke and

drank more than club participants. The differences between the characteristics of play in clubs versus hotels participants appeared to be a function of age rather than the characteristics of the venue.

- Problem gamblers in hotels used automatic teller machines (ATMs) more frequently as compared to recreational gamblers. There was no difference in the usage of ATMs between problem and recreational gamblers in clubs.

1.2 Reconfiguration of bill acceptors

- There was little evidence that the proposed modification to bill acceptors would impact either positively or negatively on the levels of enjoyment or satisfaction of patrons in either hotels or clubs.
- Although more problem gamblers were observed to use the larger denomination bill acceptors, the use of bill acceptors did not appear to be reliably associated with problem gambling status, severity of problem gambling, amount of money lost, or persistence of play.
- Limiting bill acceptors to \$20 denominations affected expenditure more than any other individual modification, reducing take by 42%.
- Anecdotal data obtained from pathological gamblers participating in the focus groups suggested that this proposed modification would be unlikely to lead to an alteration in patterns of play.
- The present study found no evidence supporting the contention that this modification would effectively reduce gambling behaviour amongst problem gamblers. Therefore, it is considered that this modification would be of limited effectiveness in minimizing harm associated with electronic gaming machines but would lead to an overall reduction in revenue to the gaming venues.

1.3 Reduction of reel spin speed

- Problem and recreational gamblers consistently rated lower levels of enjoyment and satisfaction with machines modified to 5-second reel spin speed.
- Interestingly, although proportionately more problem gamblers played with a rate faster than 5 seconds, rapid play was not found to contribute to problem gambling status, severity of problems or amount spent.
- However, when other factors were held constant, slower players displayed more persistence in their pattern of play.
- A reduction in reel spins on the modified machines was not found to have any positive or negative impact on observable parameters of play.
- This study suggests that introducing slower reel spins to machines would negatively impact on the enjoyment of all participants, recreational and problem gamblers alike. While it was found to reduce the profitability of machines, there was little evidence that it would reduce problems associated with gambling.
- The anecdotal reports of pathological gamblers in the focus groups suggest that they would not enjoy playing slower reel spin machines, but would adjust to some extent to such a change by spending more time at the machines.
- There was evidence of possible unintended negative impacts suggesting that problem gamblers who play more slowly spend more time playing. Findings suggest the possibility of an increase in the negative consequences to social and occupational activities if rates of play are further slowed.
- There is evidence from the present study that a reduction in reel spin speed would not be an effective harm minimisation strategy. Not only would it be unlikely to

reduce problems associated with electronic gaming machines, it may result in an increase in indirect social/family harm associated with problem gambling for a small proportion of problem gamblers.

1.4 Reducing maximum bet from \$10 to \$1

- Only a small percentage of participants reported bet sizes of an amount greater than \$1.
- Reducing the maximum bet from \$10 to \$1 was rated as slightly less satisfying and enjoyable for recreational gamblers in the hotels, even though problem gamblers rated machines with a \$1 maximum bet as more satisfying and enjoyable to play.
- For gamblers playing one-cent machines, this modification did not affect the player's views as to whether or not they would still play the machine.
- Although only a small proportion of all players observed in the present study bet in excess of \$1 per wager, those who did were relatively more likely to be problem gamblers.
- The number of credits wagered (which relates to bet size since the majority of all players bet on 20 lines), was a consistent predictor of problems with gambling and severity of problems.
- This modification appeared to reduce play. Players gambled for shorter periods, made fewer bets, lost less money and smoked and drank less on such modified machines in comparison to control machines.
- It was not possible to determine whether the reduction of maximum bet size differentially affected problem as compared to recreational gamblers. However, based on the data, since problem gamblers were almost three times more likely to bet over \$1 at least once it is reasonable to assume that this group would be affected more than recreational gamblers.
- Although expenditure was affected by reducing the maximum bet to \$1, the amount of take was less than for the other modifications. Thus, it is likely that this modification would reduce revenue, but to a lesser degree than the alternative proposed modifications.
- While many of the pathological gamblers interviewed in the focus groups reported that they did not usually bet in excess of \$1 per bet, they reported that this would be a helpful strategy for problem gamblers who did bet in excess of this amount.
- Consistent with the results of Study 2, few problem gamblers (7.5% of the 20% in the total sample who were problem gamblers) bet above this level of \$1, but for this small proportion reducing the maximum bet would be likely to minimize harm.
- The results of these studies suggest that reducing the maximum bet to \$1 would have a relatively small negative impact on the enjoyment of recreational gamblers. Problem gamblers (at least in the hotels) appeared to welcome the modification, giving it higher ratings for enjoyment and satisfaction.
- Reducing the maximum bet size potentially might, for a small proportion of players, reduce both the development and the severity of gambling problems. While this modification may affect machine revenue, the effect was less than with the other proposed modifications.
- Reducing the maximum bet size did not appear to lead to sessions being prolonged. However, it is possible that this reflected a player's choice to use a different machine where the larger bet sizes were available or to substitute other forms of gambling. While there was no evidence in this study that reducing the maximum bet size would have any effect on persistence in play, only further research that

investigated characteristics patterns of play in venue where all machines were modified would resolve this issue.

- This study provides preliminary evidence to support the effectiveness of reducing the maximum bet size from \$10 to \$1 on electronic gaming machines for at least a small proportion of players.

1.5 Conclusions and Recommendations

- 1) A review of the literature reveals a paucity of empirically derived information describing effective harm minimisation strategies that may inform and guide policy makers. While many strategies have been proposed, very few have been systematically evaluated over the short or long term. There is an imperative need for governments and industry to develop a co-ordinated national strategic plan to carry out systematic independent research on proposed harm minimisation interventions.
- 2) The present study found evidence to support the view that the reduction of maximum bet size from \$10 to \$1 on electronic gaming machines would be a potentially effective harm minimisation strategy for a small proportion of players. In the present study, it is important to note that relatively few participants bet in amounts greater than \$1. Overall, therefore, only a small percentage of players would be affected by this proposed modification. However, if the data accurately reflect the number of players who do make bets greater than one dollar, then the impact on revenue is likely to be small. On the other hand, if the proportion of players who bet in excess of one dollar is underestimated due to recruitment biases, then the effect on revenue would be greater, and so would the effectiveness of the modification as a harm minimisation strategy.
- 3) The reconfiguration of machines to accept denomination notes of \$20 or less was not found to be an effective harm minimisation strategy. This modification appeared to have the greatest impact on revenue.
- 4) Evidence did not fully support the adoption of slowing reel spin speed to 5-seconds as an effective strategy. The results of this study suggested that the introduction of this modification could potentially result in unintended harmful consequences of gambling to a small group of patrons without intended benefits. This modification might prolong the duration of gambling sessions.
- 5) This report has defined harm minimisation in arguably limited terms but follows the recommendations of the Canadian Centre on Substance Abuse National Working Group on Policy (1996) in distinguishing harm reduction as a strategy from harm reduction as a goal. The Working Group suggests that harm minimisation is a public health policy approach that places priority on reducing the negative consequences of gambling and protecting individuals from developing gambling problems rather than prohibiting gambling or ensuring abstinence. In treatment, the currently recommended goal of most interventions is abstinence. We have elected not to address the issue of treatment, either its effectiveness, adequacy of funding or efficiency of service delivery. Clearly, treatment of those who have developed serious problems with gambling is an important issue, one that requires substantive further research into determining and improving the efficacy and effectiveness of psychological and other counselling interventions. There is an imperative need to establish evidence-based best practice guidelines to inform service providers but this issue falls outside the terms of reference for this project.
- 6) The role of educational and other primary preventative strategies is largely neglected and is an area that should be experimentally evaluated over the long-term.

There are a number of initiatives currently being implemented but there is a lack of outcome studies evaluating their effectiveness presently available.

- 7) This study provides preliminary evidence regarding the effectiveness of three proposed harm minimisation strategies. However, it is the first study of its nature. In conducting this study, it became apparent that there are many gaps in our knowledge surrounding factors that contribute to the development of problem gambling at the individual, structural and social levels. There are significant areas of deficit in our basic understanding of the patterns and characteristics of play by problem and recreational gamblers: the proportion of problem gamblers using various bill acceptors and high denomination machines, credit by line combinations and preferred strategies of play. It is clear that a strategic collaborative research plan involving relevant government, gaming and academic bodies be undertaken with the specific aim obtaining necessary basic information and evaluation of proposed interventions to guide and inform policy-decision makers over the long-term. To obtain robust information requires the cooperation of government, gaming industry and academic organisations to allow ecologically valid research to be conducted in real-life settings with actual gambles in which all key variables are systematically manipulated.
- 8) It is recommended that the Government in collaboration with the gaming industry support the establishment of an independent academic research group whose terms of reference are to evaluate specific harm minimisation strategies, patterns and characteristics of gambling among problem and recreational gamblers and the effectiveness of treatment interventions.

2 Acknowledgments

A research project of this nature and complexity is not possible without the active cooperation and collaboration of key stakeholders from the areas of industry, government and academia.

I would like to gratefully acknowledge the financial and technical support of the Gaming Industry Operators Group without whose assistance this project would not be possible in the first instance. In particular, I would like to express my gratitude to Mr. Ross Ferrar (Convenor), Mr John Carr-Gregg (Secretary) and other members of the Gambling Industry Operators Group. They have guaranteed the independence and objectivity of the project by insisting in the research agreement that the ownership of the data reside with the University of Sydney Gambling Research Unit and that all reports and publications produced by the Unit should be made available within the public domain.

The Australian Gaming Machine Manufacturing Association provided the electronic gaming machines and necessary technical modification to the test machines and, in collaboration with gaming venue managers, the installation of these devices into selected hotels and clubs.

I would like to thank the individual club and hotel gaming venues participating in this study for fully cooperating with the University researchers to ensure the success of the project. All venues supported the project by permitting the display of posters outlining the nature of the study and requesting patrons volunteer to participate, by staff dealing positively with questions directed to them from patrons, and by providing refreshments for research assistants during their lengthy periods of data collection. In particular, we would like to express out sincere thanks to Mr Wayne Kendrigan for his many helpful suggestions, enthusiasm and assistance in supporting the project.

Modifying and relocating gaming machines requires approval from regulatory bodies. I would like to express my thanks to Mr David Armati and the members of the Liquor Administration Board for their genuine commitment to and support of the project and their unbounded patience in responding to requests made by the Gambling Research Unit for extensions of time. The Gambling Research Unit recognises and greatly appreciates the Liquor Administration Board's actions and decisions made to enable the successful implementation of the project.

I would also like to thank Mitchell Brown and Laurie Bowe of the Wesley Gambling Counselling Service for distributing to clients the advertisement calling for volunteers to participate in the focus group phase of the project, and for allowing access to their premises to conduct the meetings.

The data collection phase involved a substantial degree of planning and liaison with gaming venues and coordinating and training a team of more than thirty research assistants. In addition, the task of scoring and coding responses into computer databases was a mammoth time consuming task. In this regard, I would like to thank the tireless enthusiasm and professional dedication shown by Kirsten Enersen and Maree-Jo Coughlan in responding to the demands placed on them by the research investigators. I would like to thank the efforts of Raymond Lo in searching the literature and providing the initial draft literature review on

the some aspects of the state of current knowledge regarding structural characteristics of gaming devices and gambling behaviour.

My thanks go to the numerous Graduate Diploma and postgraduate Masters in Clinical Psychology students for their effort and time spent in attending venues, observing players, coding behavioural data and administering the psychometric measures.

Finally, but not of least importance, I would like to extend my gratitude to Drs. Michael Walker and Louise Sharpe for accepting the invitation to participate in the project as principal investigators. Both researchers have an extensive background and knowledge in gambling and problem gambling behaviour and their contributions and observations have made a substantial impact on the overall quality of the project. I also value their input and contributions in ensuring that the final report is methodologically sound and that its findings are objective and as free as possible of any bias and unfounded assertions that may be used unfairly to support the politics of the government, gaming industry, problem gambling welfare organizations or anti-gambling lobby.

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The University of Sydney Gambling Research Unit Project Team Members

The following staff from the University of Sydney Gambling Research Unit were involved in this research project:

Chief Investigator:	Alex Blaszczynski PhD
Principal Investigators:	Dr. Louise Sharpe & Dr. Michael Walker
Research coordinators:	Ms. Kirsten Enersen & Ms. Maree-Jo Coughlan

Research assistants: The majority of research assistants were Graduate Diploma and postgraduate Master of Psychology students currently enrolled at the University of Sydney.

3 Introduction

The New South Wales State Government *Independent Pricing and Regulatory Tribunal* (1998) and Australian Federal Government *Productivity Commission* (1999) reports reviewed the extent and impact of all forms of legalised gambling in Australia. Findings indicated that the majority of adult community members gambled responsibly within the limits of their available disposable income. However, while there were benefits associated with gambling by way of providing recreational activities, community support, employment and taxation revenue, both reports concluded that there was also evidence suggesting the presence of significant social, health and welfare costs associated with patterns of excessive gambling and problem gambling behaviours.

Depending on the definition used and the timeframe employed (lifetime, previous one, six and twelve months, or current), epidemiological studies suggest that between 1.8% and 10% of the adult population experience severe problems as a result of excessive gambling. Depending on the jurisdiction in which the research is completed, 0.2% to 1.6% of adults within the community meet criteria for a diagnosis of pathological gambling (Productivity Commission, 1999; Shaffer, Hall, & Bilt, 1997).

On the basis of data collected from its Australian national survey, the Productivity Commission (1999) concluded that 1% of the adult population experienced *severe* problems and a further 1.1%, *significant* problems with their gambling. Approximately 6.3% of the surveyed gamblers reported experiencing mainly *minor* gambling-related problems.

The prevalence of gambling has shown a steady increase over recent years in line with changes in public policies allowing for the expansion of community opportunities for gambling. The recognition by the community that excessive gambling represents a major social issue has led to the expression of community concern about the effects of problem gambling and calls for the introduction of strategies designed to restrict the availability and accessibility of gambling to protect vulnerable individuals from harm.

Increasing demands have been placed on the Government to cut back radically the amount of legalised gambling in Australia. The anti-gambling sector represents religious, ideological and social welfare perspectives and argues strongly for a major reduction in the availability of gambling opportunities. In its extreme form, this perspective would support prohibition of gambling. However, historically, prohibition has been demonstrated to be ineffective in eliminating gambling and is associated with an increased demand and supply of illegal gambling with all its associated problems. It is generally accepted that the total prohibition of gambling is not a viable proposition to implement (Productivity Commission, 1999).

Contemporary community attitudes reflect a general acceptance of gambling coupled with a desire to limit harm that may arise out of, or is caused by, patterns of excessive gambling. In principle, Government policies on gambling should recognise the overall benefits and costs of gambling and should address the issue of costs by implementing intervention strategies that protect vulnerable sections of the community while minimising the level of interference to those members who gamble appropriately and responsibly. This is the fundamental principle underlying the concept of harm minimisation and the delivery of responsible gambling services.

In achieving this principle, it is argued that efforts should be directed toward the introduction of evidence-based harm minimisation strategies that have been shown to be effective in reducing the number of individuals exposed to factors that encourage excessive gambling and protecting current problem gamblers from continued harm.

The NSW Government has responded to community concerns by recommending the implementation of responsible gambling strategies, to minimise the harm associated with the gambling activities of problem gamblers and to foster the responsible conduct of gambling activities. The Gambling Legislation Amendment (Responsible Gambling) Act 1999 which came into operation in November 1999 included such initiatives as the provision of gaming machine signage and player information brochures, the location of cash dispensing facilities relative to gaming areas and prohibition on extension of credit, payment of prizes by cheque, guidelines for advertising, promotion and inducements to gamble, self-exclusion programs and staff training.

The Australian Gaming Council representing members from all sectors of the gaming industry, including wagering, licensed operators, hotels, casinos and lotteries, responded to demands for the provision of responsible gaming strategies by producing a self-regulated code of conduct for its members. In September 2001, the *Responsible Gaming Code: A Framework for Responsible Gaming* was released. This framework promotes four goals: responsible service to customers, responsible delivery of gaming, monitoring and assessment aimed at continuous improvement, and research and consultation.

The Victorian Gaming Machine Industry Secretariat has similarly produced its *Responsible Gaming Handbook* setting out its commitment to responsible gaming, independent complaint resolution processes and self-exclusion programs.

A range of potentially effective recommendations to limit problem gambling has been suggested, not only within these frameworks but also, by other industry leaders, government representatives and welfare organisation from various national and international jurisdictions. These include but are not limited to:

Education: strategies to educate participants concerning the nature and risks of gambling to provide greater levels of informed choice.

- Player and public education and the provision of accurate information on machine characteristics and how they operate.
- Display of odds and probabilities of winning on machines.
- Education directed toward public awareness of potential hazards associated with gambling.
- School-based educational programs designed to inform children and adolescents about the concepts of statistical probabilities and the potential hazards of excessive gambling.
- Signage promoting responsible gambling.
- Problem gambling counselling support notices.
- Responsible advertising and promotional activities: advertisements that do not mislead, over-emphasise wins or target vulnerable community segments.

Gaming environment: strategies designed to protect participants from developing gambling problems by modifying aspects of the environment, limiting inducements and the promotion of gaming, and restricting access to gaming or cash withdrawals.

- Prohibiting special promotions on pension payment days.
- Prohibition on undue inducements and complementary benefits to attract patrons into venues.
- Limitations on the types or location of gaming venues relative to regional characteristics.
- Limits on prize structures, size of maximum prize pools or signs indicating that a jackpot must be won within a specified timeframe.
- Warning signs directing attention to hazards associated with excessive gaming.
- Clocks and ambient lighting.
- Limitations to the number of gaming devices per establishment.
- Overall caps of gaming machine numbers within the State.
- Safety and security.
- Entry restricted to members and guests.
- Twenty-four hour notification of intended large betting.
- Policies and procedures to deal with problem gamblers: enhanced staff awareness and staff training in detection and sensitive approaches to problem gamblers taking into consideration intrusiveness, violation of privacy and anti-discrimination issues.
- Self-exclusion programs: voluntary or involuntary, lifetime or limited exclusion, conditions for lifting exclusions and penalties for breaches.
- Policies banning the offer or supply of free or heavily discounted alcohol during play.
- Restricted access to cash: prohibiting placement of ATMs in close proximity to gaming machines, limiting daily withdrawals from ATM, cheque cashing facilities and provision of credit.
- ATM facilities near gaming areas allowing immediate cash/cheque deposits to be made thereby reducing the need to carry large amounts of cash in, or away from, the gaming venue.
- Reduction of trading hours from 24 hours to 18 hours per day.

Enhancing control during gaming sessions: Limiting the potential for problems to arise and containing the impact of gambling once patrons commence gambling.

- Modifications to player environments designed to protect against excessive play and impulsive decision-making once a gambling session has commenced, for example, removal of ATMs from gaming areas and cooling-off periods after wins.
- Modification of machine design characteristics to limit expenditure: removal of large denomination bill acceptors, slowing reel spin and displaying cash figures rather than credit points.
- Limits placed on total expenditure over specified time-intervals.
- Displays on gaming machines indicating time, duration and expenditure per session.
- Credits displayed as cash rather than points.
- Wins paid by cheque rather than cash.
- Imposing mandatory breaks in play.
- Intermittent warning signs displayed on terminals.

Help in reducing excessive gambling: Reducing the severity of existing problems and prevention of relapses.

- Improving access to tertiary services through advertising and publication of printed material.
- Effective referral to treatment and counselling services.
- Provision of counselling services.
- Close liaison with treatment service providers, particularly with cases of self-exclusion.

These strategies are directed toward providing consumer protection through informed choice (education), eliminating inducements or misleading claims in advertising and imposing conditions that will minimise impulsive decisions to continue gambling such as the payment of large wins by cheques, restricting easy access to cash and imposing breaks in play to disrupt arousal and the narrow focus of attention (dissociation) to provide players with an opportunity to stop and reflect upon their behaviour.

Many of these recommended strategies appear to have face value validity in achieving their objectives while others may appear to be more superficial than substantial. However, currently there is little empirical evidence to guide and inform policy decisions. For example, there have been recent calls to implement the concept of breaks in play by forcing venues to regularly shut down machines for brief durations or to cease 24 hour trading by closing clubs for several hours per day. It is not known what impact such measures would have in reality. The intent of shutting down machines for five or ten minutes is to break the gambling cycle in persons who have been gambling continuously and excessively for a long period of time.

The strategy may cause some problems gamblers to stop and re-consider their behaviour, realise what they are doing and consequently leave the venue. However, it is also possible that shutting down all machines for five or ten minutes in venue would have limited effect in protecting problem gamblers but a significant impact on the enjoyment of all groups of gamblers. Although irritating recreational and problem gamblers, both groups may adjust to such interruptions by using the opportunity to purchase drinks or withdraw further cash before resuming play. Increased alcohol consumption would expose players to factors known to impair control over expenditure and duration of gambling (Kyngdon & Dickerson, 1999). If variable machines were shut down at any one time, gamblers would merely select an adjacent available machine and resume playing.

Following the experience of alcohol consumption associated with 6.00pm hotel closures, there may well be a rapid increase in intensity of play immediately prior to all machines shutting down with the imposed down time providing a convenient opportunity for problem gamblers to access more funds from ATMs. Thus, without research to establish a realistic expectation, any intervention may have positive, negative or mixed effects for patrons.

Closing venues for six hours, presumably during early morning hours, fails to recognise that the bulk of revenue for clubs is generated between 11.00am and 11.00pm. The sex ratio found in population of problem gamblers indicates that 40% are females with 80% of these females reporting a preference for gaming machines. Virtually all these females play electronic gaming machines during work hours, when their children are at school or in the evenings. Another small proportion may visit venues in the early hours after attending some other form of entertainment (cinemas or restaurants) or after shift work, but this group most likely represents a small proportion of problem gamblers. Closing venues from 1.00am to 7.00pm or 3.00pm to 9.00am would therefore have minimal if any effect on female problem gamblers.

In December 2000, the Nova Scotia Gaming Corporation announced modification to video lottery terminal machines designed to discourage excessive gambling. In addition to the provision of clocks, indicators of duration of play time, credits displayed in cash amounts, and mandatory cash out of winning after prescribed time frames, these new *responsible* machines will accept bill acceptors. This contrasts with recent recommendations in NSW for the removal of bill acceptors as a harm minimisation strategy.

At the theoretical level, effective harm minimisation strategies should be successful in achieving the following aims:

- They should be maximally effective in reducing the incidence and prevalence of problem gambling. That is, ideally effective strategies should reduce both the current number of problem gamblers and those who are likely to develop a problem with gambling.
- They should minimise the harm associated with continuing to gamble at a problematic level. That is, they should reduce the amount of time and/or money spent on gambling and the associated social and health costs to the community.
- They should not result in unintended negative effects.
- Preferentially, they should have a minimal impact on the satisfaction of recreational gamblers. However, this should not be the predominant variable that determines the acceptability or utility of any harm minimisation intervention. The predominant factor should be the potential for the protection against, and reduction of harm associated with, problem gambling.

There is an imperative need for systematic research to be conducted on all facets of harm minimisation. Responsible gambling initiatives that guide and inform policy should be based on evidence demonstrating the effectiveness of the proposed strategies. This will place decision makers in a position of achieving the desired objective of protecting community members from the harmful effects of excessive gambling without introducing additional unforeseen consequences for either problem or recreational gamblers.

The Productivity Commission (1999) and the National Research Council (1999) have conducted major reviews of the gambling industry in Australia and the United States of America, respectively. Both reports provide a comprehensive and detailed analysis of available data. In considering potential approaches to minimise harm associated with gambling, both Reports underscore the lack of empirical data evaluating the effectiveness of specific interventions and acknowledge that, in the absence of evidence, decisions made regarding policy are made on the basis of persuasive and vocal argument.

This project intends to evaluate the impact of modification to the configuration of gaming machines on gambling behaviour in actual gaming environments. As such, it represents the first systematic investigation of the structural characteristics of gaming machines on actual gamblers in real venues.

4 Terms of Reference

The Liquor Administration Board maintains a statutory duty to address gambling harm minimisation and the responsible conduct of gambling activities in New South Wales in addition to its duties to ensure the security and integrity of machine gaming. A request from the Minister for Gaming and Racing invited the Board to give consideration to revising certain technical standards of gaming machines. In its subsequent review and consultative process, part of the Board's aim was to take all possible steps to ensure that recommended changes address problem gamblers and those likely to become problem gamblers, and to give due consideration to the impact upon recreational gamblers.

On the 17th November 2000, the New South Wales Liquor Administration Board handed down a series of provisional determinations involving changes to the structural characteristics of electronic gaming machines as potential harm minimisation strategies for problem gambling. In its Appendix 1 *Gambling Harm Minimisation and Responsible Conduct of Gambling Activities Review of the Board's Technical Standards for Gaming Machines and Subsidiary Equipment in New South Wales*, the following measures were proposed:

- Improving player awareness of the true chances of winning by the introduction of information screens containing this data.
- Introduction of harm minimisation messages that are displayed on the screens of gaming machines at appropriate times.
- Reducing by 98% the amount of money that can be inserted into a gaming machine or transferred to it by CCCE.
- Slowing down the rate of play by 43% (typically 3.5 seconds to 5 seconds).
- Reduction of the maximum bet by 90% (\$10 to \$1).
- Increasing minimum return to player from 85% to 87.5%. Removal of auto play, auto-gamble and play through capabilities.
- Removal of the ability to play continuously by holding down or by jamming the play button.
- Providing breaks after significant wins with the requirement for an informed decision to be made to cash out or play on.

In considering the available evidence and arguments presented before it, the Board's determination included the following three specific changes to the design of gaming machines:

- High value note acceptors (i.e. those capable of accepting between \$50 and \$100) to be no longer acceptable, with consideration to be given to removing bill acceptors altogether at a later time.
- Slowing the speed of games to add a few extra seconds to the time of individual games. This should be achieved by requiring a minimum wheel spin time of 3.5 seconds and a minimum of 1.5 seconds in idle mode during which at least one standard data block must be transmitted.
- Limiting the maximum bet size on stand-alone machines to \$1 on a trial basis.

In response to the Board's provisional determination in respect to changes to gaming machine characteristics, the Gaming Industry Operators approached the University of Sydney's Gambling Research Unit with a request to conduct a funded independent and objective research project to evaluate the impact of such changes on problem and recreational gamblers. The purpose of this research was to provide empirical evidence

describing the differential impact of these changes on recreational and problem gamblers and to determine the possibility of negative unintended effects that might be associated with the recommended changes.

The Gaming Industry Operators (GIO) represents a group of members from the gambling industry including representatives from:

- The Registered Clubs Association of New South Wales.
- Australian Hotels Association.
- The Leagues Club Association of NSW Ltd.
- The Secretaries and Managers Association of Australia (CMAA).
- TAB Limited.
- Star City Pty. Ltd.

The Australian Gaming Machine Manufacturers Association, although not a member of the GIO, funded the research equally with other GIO members and also supplied the gaming machines and technical support required for the study.

In accordance with University of Sydney requirements, a research agreement was entered into between the University's Business Liaison Office and the members of the GIO.

All funds were administered through the Business Liaison Office with Professor Alex Blaszczynski nominated as the Chief Investigator undertaking the research project. Dr. Michael Walker and Dr. Louise Sharpe of the University of Sydney Gambling Research Unit were invited by Professor Alex Blaszczynski to participate in the project as principal investigators independent of the funding process.

To guarantee the independence and objectivity of the research findings, the GIO supported the inclusion of Schedule 3 stipulating that '*the completion of a final Report that outlines the major findings of the research project and a series of articles to be submitted for publication in scientific journals*'. This Schedule guarantees that the research findings will be made available to the public domain for the critical review.

4.1 Aims of the Project

The research project undertook to assess the impact of the following changes on recreational and problem gamblers:

- The reconfiguration and/or removal of bill acceptors from poker machines.
- Reduction in the speed of reel spins on poker machines.
- Reduction in the maximum bet from \$10 to \$1.

In order to achieve these aims the following series of studies were conducted:

Study 1: Impact of the changes on player satisfaction.

Players were asked to play both modified and unmodified versions of the same game. Players were then interviewed and completed questionnaires concerning their satisfaction with each machine. Additionally, players provided information that established the extent to which each person played the machines, ranging from occasional to excessive. This information enables conclusions to be drawn concerning whether the proposed machine modifications reduce player satisfaction more for problem gamblers than for recreational gamblers as anticipated.

Study 2: Impact of changes on regular patterns of play amongst problem and recreational gamblers

This study comprised an observational study of players in the gaming venue. Observations of indices, such as wager size, number of bets, wins and losses and time played. This allowed a range of information relevant to harm minimisation to be gathered about the usual play of both recreational and problem gamblers, including the average rate of play, the proportion of players who use the bill acceptors and the proportion of players betting over \$1. In a sub-group of participants, it was also possible to directly assess the effect of the modified machines on play.

Study 3: Evaluation of the impact of the changes in expenditure

To evaluate the impact of changes on the expenditure of players gambling on modified and control machines. It will be possible to determine in a sub-set of players whether changes in expenditure occur for both problem and recreational gamblers.

Study 4: Evaluation of the views of diagnosed pathological gamblers on the changes

Focus group methodology was employed to understand the views of pathological gamblers about the proposed changes and whether they believed that these changes might affect their gambling behaviour. This methodology also allowed exploration of additional changes that gamblers believe may have been helpful in minimising their difficulties.

Study 5: To carry out a literature review of alternative preferable harm minimisation measures

To conduct a review of specific harm minimisation strategies that have been implemented and evaluated in various jurisdictions. This review would provide information indicating which strategies have been demonstrated to be effective or ineffective in reducing harm among problem gamblers and gambling in general.

The objectives of this research project is to assist the gaming industry and the Liquor Administration Board by providing empirical evidence evaluating the impact of these three proposed harm reduction measures in terms of their effectiveness in reducing problem gambling and in particular minimising the risk and degree of harm associated with gaming for problem gamblers, and their potential effect on the enjoyment of recreational players.

Ethics approval:

The Human Ethics Committee of The University of Sydney provided approval for this research project to proceed:

Title: The assessment of the impact of the reconfiguration on electronic gaming machines as harm minimisation strategies for problem gambling. *Ref No:* 01/05/25.

5 Responsible Gambling and Harm Minimisation

The majority of people in the community who play poker machines do so for relatively small stakes on relatively infrequent occasions. Among the remainder, some play the machines regularly, perhaps every week, and on most (but not all) occasions lose relatively small amounts of money well within their available budget for leisure. Others gamble more consistently and may exhibit some signs associated with gambling problems or experience intermittent problems. For a further minority of individuals, playing the machines becomes an absorbing passion leading to the development of gambling related problems.

Heavy use of gaming machines necessarily causes loss of funds and strategies involving playing high denomination machines for high stakes can cause large monetary losses and associated serious harm to the individual's life. In principle, a responsible gambling strategy involves protecting vulnerable individuals on the one hand while maintaining satisfaction for the majority of gamblers who are able to limit their pastime.

Governments and the gaming industry have adopted the principle of responsible gaming by recommending and implementing strategies that are designed to minimise the harm associated with gambling by:

- Informing community members of the potential risks associated with gambling.
- Protecting individuals from gambling to excess and developing gambling-related problems.

While responsible gambling should be the fundamental principle guiding the gaming industry's practices, there is no clear definition of what constitutes responsible gambling practices or a description of its necessary components (Dickerson, 1998). The Victorian Gaming Machine Industry Secretariat in their *Responsible Gaming Handbook* offers the following definition "*Responsible gaming is each person exercising a rational and sensible choice based on his or her individual circumstances*" without elaborating on the meaning of the value-laden terms 'rational and sensible choice'.

In broad terms, the primary goal of responsible gambling involves the concept of gaming operators providing a recreational product that minimises or reduces the potential for causing harm to gaming patrons or the wider community. Harm minimisation or reduction is therefore construed as a set of practical strategies whose goals are directed toward:

- The reduction of the level of harm associated with all facets of gambling and by implication.
- The protection of at-risk community members from developing gambling problems.

There is no clear definition of harm reduction or harm minimisation. Harm minimisation is used synonymously with harm reduction and, consistent with the Liquor Administration Board's usage, the term minimisation will be used in this report. According to Marlatt (1998), van Wormer (1999) and others, harm reduction or minimisation emphasise the protection of the individual and community from the negative consequences and threat to health of an activity without the necessity of prohibition or abstinence. The Centre for Addiction and Mental Health in Canada suggests the following useful definition: "*Harm reduction aims to decrease the adverse health, social and economic consequences of drug [gambling] use without necessarily requiring abstinence (but without ruling out abstinence in the longer term, if this is the client's choice). Harm reduction is pragmatic and humanistic, focussed on harms and priority issues*".

The Centre on Substance Abuse National Working Group on Policy (1996) uses a narrow definition of harm reduction as a 'strategy' and distinguishes it from harm reduction as a 'goal'. In this context, harm minimisation strategies do not include abstinence-oriented programs even though they have a goal of harm reduction. Treatment programs explicitly pursue goals of abstinence. While treatment of problem gamblers is an essential part of any harm reduction program, for purposes of this project, the issue of treatment is considered to be outside the scope of harm minimisation as a public health strategy. The efficacy and effectiveness of treatment programs has been addressed in detail in other reviews appearing in the psychology literature.

The concept of harm minimisation originated from attempts to restrict the spread of hepatitis among Dutch intravenous drug users in the 1980's with the subsequent AIDS epidemic giving greater urgency to this approach (Single, 2000; Van Wormer, 1999). In this context, harm minimisation measures were designed to reduce the spread of blood borne infections and included needle exchange programs, the provision of bleach kits and the development of methadone maintenance programs. These programs provided a means of contacting addicts and fostering education, counselling and access to treatment facilities.

In the ensuing years, many of these harm minimisation strategies have been the subject of empirical studies to determine their efficacy. For example, good evidence now exists to suggest that needle exchange programs reduce the risk of HIV infection amongst intravenous drug users. Similarly, methadone programs have been shown to reduce mortality from overdose over ten years. Moreover, various psychoeducational programs targeted at high risk groups have been shown to reduce the risk of infection from HIV.

The empirical evidence for harm minimisation as a successful strategy in combating secondary social and health problems associated with drug use is now well established. This has led to changes in health policy towards the funding of interventions for intravenous drug users. Similar developments have been in place for other addictions, such as alcohol and tobacco. Despite continued debate, harm minimisation programs have gained official acceptance in many western countries throughout the world, including the United Kingdom, Netherlands, Europe, Australia, Canada, and more recently, in North America.

5.1 Perspectives on harm minimisation in gambling

In trying to understand the causes of problem gambling and thereby developing effective harm minimisation approaches, two quite different perspectives can be taken. On the one hand, problem gambling can be viewed as an addiction thereby emphasising the similarity with drug addictions, whereas, on the other hand it can be regarded as a social problem with its core feature being loss of funds by the individual.

The Addiction Perspective

The addiction model is the predominant conceptual paradigm applied to the aetiology of problem or pathological gambling. The application of the model has been based on the controversial observation that pathological gamblers experience a number of symptoms, such as tolerance and withdrawal that are common to other addictions (Shaffer, 1999).

Both alcohol and gambling are legal activities for adults within Australia and are highly regulated industries from which governments earn tax revenue. Laws prohibit drinking and gambling for those under eighteen. Unlike other addictions, such as smoking, for both alcohol and gambling it is generally accepted that there are safe levels of usage (Korn &

Shaffer, 1999) and that complete abstinence or total prohibition is neither a viable or desirable goal.

As a consequence of the similarities observed between alcohol and gambling, experts in the gambling field have recommended that health authorities adopt similar harm-reduction strategies to minimise the adverse health, social and economic consequences of excessive gambling behaviour for individuals, families, and communities (Korn, 2000; Korn & Shaffer, 1999).

The Social Problem Perspective

Gambling means playing a game where money is risked in the hope of winning more than was invested, thereby providing a net win to the gambler. Poker machines pay out small amounts frequently and larger amounts occasionally. The big win is always, potentially, in the next play of the machine. For some players, this prospect is so attractive that they continue play past all reasonable limits. Thus, gambling is little different from excessive involvement in playing computer games, playing bridge, playing golf and so on, but for one thing: excessive loss of money may have major implications and cause major harm in other spheres of the person's life. Important implications for gambling policy include the prospect that the sector of the community that is at risk of having gambling related problems is wider than is implied by an addiction perspective.

Implications for Harm Minimisation Programs

Responsible gambling and harm minimisation programs have shared goals. Specifically, the aims of harm minimisation are:

- To prevent vulnerable individuals from developing gambling problems.
- To reduce the current prevalence of problem gamblers within the community.
- To reduce the negative social and health consequences associated with problem gamblers for individuals, their families and their communities.
- To maintain a reasonable level of enjoyment from gambling by recreational gamblers.
- To ensure that the livelihood of those associated with the gaming industry is not unnecessarily compromised.

The basic assumptions inherent in the harm-minimisation approach are that:

- Gambling is a recreational activity that is common among individuals and within the community.
- Many individuals are able to engage in gambling without negative consequences to their lifestyle or to the community.
- A proportion of participants, family members and others suffer significant harm as a consequence of excessive gambling.
- Complete prohibition is not a realistic option.
- Harm reduction involves individuals at risk reducing gambling to a safe level of the behaviour.
- Harm reduction implies that safe levels of participation are possible.

According to Marlatt (1998), there are three basic harm minimisation strategies that can be applied:

- Education of individuals or groups.
- Modifying the environment.
- Implementing changes to public policy.

A useful analogy is that of a person learning to drive a car. Driving is a high-risk behaviour that has the potential to inflict significant health and social costs through the effect of road trauma. Most adults drive. To prohibit driving is unrealistic and would not be considered an acceptable strategy at the community level. To abstain from driving is safe but inconvenient and impractical. Therefore, following Marlatt's (1998) suggestion, there are three approaches that can be implemented to reduce harmful consequences:

1. Driver education and training in responsible behaviours.
2. Environmental changes to reduce harm in both the car itself (eg. seat belts, air bags, antilock brakes), and the environment (eg. safer road systems and improved road conditions).
3. Laws and policies designed to regulate driving (eg. speed limits, blood alcohol limits), and punish violators (fines, suspension of license, jail sentences).

Measures from each of these areas are necessary if harm minimisation strategies are to be optimally effective. Indeed, the proposed changes to electronic gaming machines would be characterised under the third approach of issuing policies that were legislated for by government concerning the acceptable parameters of machines. However, in keeping with the second approach, the reconfiguration of machines also aims to reduce the characteristics of the gambling environment in such a way as to reduce the harm of the machines themselves.

The present research project is primarily concerned with the impact of changes of legislative policy and/or gaming environments and their demonstrated impact on patterns of gambling behaviour and problem gamblers in particular.

While multiple recommendations and suggestions have been offered regarding the potential effectiveness of a diversity of putative harm minimisation interventions, it is imperative to underscore, as does the Productivity Commission (1999), that there is no systematic empirical evidence to support the utility of any specific measure. At best, most appear to be rational and to have credible face validity.

5.2 Terminology: Recreational and Problem Gambling, and Gambling Problems

In an ideal setting, individual harm minimisation interventions should exert their main effect on problem gamblers without minimal interference to the enjoyment of recreational gamblers. To this end, it is important to have a clear understanding of the concept of recreational and problem gambling in order to implement strategies that preferentially impact the targeted group of problem gamblers.

Gambling lies on a continuum of involvement ranging from no participation to recreational through to regular and heavy levels of activity. The Productivity Commission (1999) endorsed the conclusion that the majority of the adult population gamble in a responsible manner without any harm associated with their level of involvement.

Problem or pathological gamblers, on the other hand, occupy the extreme end of the continuum exhibiting a level of involvement that produces significant deleterious consequences across a diverse range of psychosocial functions. These consequences and their cost to society are set out in the Productivity Commission's (1999) report.

The question of whether or not problem gamblers are a separate category from other regular and heavy gamblers is not resolved. According to the dimensional view, problem gambling is all a matter of degree. If heavy gamblers lose sufficient money to cause major problems in their lives, then they become 'problem gamblers' by definition. Problem gamblers are not intrinsically different from other heavy gamblers genetically or in their personality. According to the qualitative view, problem gamblers are different from other gamblers by having a set of characteristics that place them at risk of gambling to excess. In many parts of the world, the term 'pathological gambler' is used as a label for this qualitatively different group of individuals. The word 'pathological' emphasises the abnormal nature of the problem, whereas a dimensional view emphasises the continuity of levels of involvement. Shaffer et al, (1994) note that individuals may at any time shift along the continuum of involvement in either direction indicating that the condition is not static.

Historically, the terms "compulsive gambler" and "pathological gambler" have been used interchangeably to denote individuals who report uncontrollable urges to gamble. More recently, alternative terms have been employed: "problem," "at-risk," "in-transition," "disordered", "excessive," and "level 2" gamblers.

Each utilise different criteria and classification schemes. For example, Abbott, Palmisano and Dickerson (1995) classify gamblers as either "excessive" or "normal," based on amount of time, expenditure, and number of trips to gambling venues. In contrast, Winters, Stinchfield, and Fulkerson (1993) employ a complicated classification scheme based on symptom count and frequency of gambling. Others use symptom count alone and differing categories (Fisher, 1993: social gambler, pathological gambler; Gupta & Derevensky, 1998: social, problem, pathological; Shaffer et al., 1994: non-pathological, in-transition, pathological; Vitaro, Arseneault, & Tremblay, 1997: recreational, low problem, high problem).

The Victorian Casino and Gaming Authority (1997) argued that the presence of harm rather than symptom count should be used to define problem gambling. Such a view is exemplified by the Victorian Casino and Gaming Authority's (VCGA) consensus definition: " 'Problem gambling' refers to the situation when a gambling activity gives rise to harm to the individual player, and/or to his or her family, and may extend into the community" (VCGA, 1997, p.106), and by the definition advanced by Ferris, Wynne and Single (1999): "*Problem gambling is excessive gambling behaviour that creates negative consequences for the gambler, others in his/her social network, and for the community*" (p 58).

A harm-based definition of problem gambling requires the definition of what will and will not constitute harm. Defining groups based on subjective criteria results in expanding the population pool of potential members. In the case of problem gambling, a loose definition of 'harm' leads to including gamblers with minor problems in the same category as pathological gamblers as defined by the DSM-IV criteria. Regular gamblers with minor problems associated with gambling are confused with individuals have lost all resources and all sources of pleasure in life. Furthermore, if problem gamblers form a separate group qualitatively from other gamblers, then gamblers experiencing gambling-related problems may be misclassified as persons unable to control and regulate impulses to gamble, thereby leading to an overestimate of prevalence figures.

It is necessary to determine the boundary between problem gambling and regular gambling if the impact of technological changes to gaming machines is to be fully understood. The three proposed modifications to poker machines in New South Wales are all intended to limit the involvement of problem gamblers. Implicitly, the proposals assume a dimensional view of gambling. The modifications are intended to reduce extreme levels of gambling while leaving moderate levels unaffected. However, what defines a problem gambler is to some extent arbitrary.

Beyond self-disclosure, there is no one adequate diagnostic feature of problem gambling. Impaired control is demonstrated either by subjective reports or by a combination of negative consequences that lead others to infer an inability to limit levels of expenditure. Frequency and amount gambled cannot in and of themselves be used as the predominant indicator of problem gambling *cases* given the large variance in disposable income and capacity to lose large amounts in single sessions of play.

As the Productivity Commission (1999) concluded, there is no existing single instrument that measures problem gambling. The most popularly used instrument is the 20-item self-report South Oaks Gambling Screen (SOGS) (Lesieur & Blume, 1997). While it has been shown to be reliable and to be highly correlated with the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (third edition revised) diagnostic criteria ($r = 0.94$) and clinician's rating ($r = 0.86$), the appropriateness of the screen for use in epidemiological surveys has been challenged. Nevertheless, in the absence of an alternative measure and to allow comparability with other studies, the SOGS will be used as the index measure to identify cases of problem gambling in this project. In accordance with the instruments instructions, a score of five or more is used to categorise gamblers as problem gamblers.

Possible impacts

Using the SOGS with its standard criterion of pathological gambling (a score of 5 or more), some evidence concerning the proposed modifications to machines is available. For example, turnover rates increased following the introduction of bill acceptors. Furthermore, more problem gamblers than recreational gamblers reported using bill acceptors (Productivity Commission, 1999). Interestingly, more gamblers (34%) with SOGS score of five or more reported always using bill acceptors than those with SOGS scores of ten or more (26%). However, putting aside this observation, there is no information regarding the intensity and frequency of use of bill acceptors by either recreational or problem gamblers. Thus while those with high SOGS scores may report using bill acceptors often or always, it may well be that it is the regular gamblers who use this facility more frequently and regularly. Without research, any view may be held.

Increased revenue may also be derived following the introduction of bill acceptors from low frequency recreational gamblers who elect to gamble residual credits representing amounts less than five dollars in value in preference to the inconvenience and embarrassment of having to press call buttons to summons gaming venue staff to cash payouts under five dollars.

5.3 Theoretical Models of Problem Gambling

In order to understand the possible mechanisms through which one might be able to reduce harm from gambling, it is important to understand the psychological processes involved in the development and maintenance of problem gambling.

Recent models have been proposed that acknowledge the multiple factors that are likely to contribute to the development and maintenance of pathological gambling. These models have proposed that the routes to problem gambling are likely to be varied with different factors having a different level of contribution for each individual. Nonetheless, these models provide a comprehensive overview of the available literature and its implications for the understanding of pathological gambling (Blaszczynski & Nower in press; Sharpe, in press).

Evidence now suggests that there are likely to be individuals within every community who are vulnerable to developing problems with gambling. According to theoretical accounts, there is evidence for three important characteristics in conferring vulnerability towards the development of problem gambling, namely genetic vulnerability, attitudes towards gambling and impulsivity (Blaszczynski & Nower, in press; Sharpe, in press).

Genetic vulnerability is unlikely to be amenable to harm minimisation strategies but data from two recent twin studies using structural equation models suggests that familial (genetic and environmental) factors accounted for 62% of the variance in risk for developing pathological gambling (Eisen, Nong, Lyons, Scherrer, Griffith, True, Goldberg, & Tsuang, (1998); Slutske, Eisen, True, Lyons, Goldberg, & Tsuang, (2000). In Slutske et al's (2000) study, the bulk of the variance (64%) was determined by genetic factors with familial factors failing to contribute significantly to the variance leading these authors to suggest that pathological gambling is as inheritable as alcohol dependence. The interpretation was reached that genetic factors rather than social modelling were of paramount importance in explaining the familial transmission of pathological gambling. The data from genetic field is still in its infancy with no firm conclusions available. However, these tentative findings do have implications for harm minimisation strategies: individuals may be vulnerable to lose control on gaming machines irrespective of any particular design features.

However, both gambling related attitudes and impulsivity might be variables that play important roles in influencing the maintenance of gambling behaviours. Research evidence suggests that those who have more positive attitudes towards gambling are more likely to take part in gambling as a leisure pursuit (Kassinove & Schare, 2001). Whether these attitudes are associated with excessive levels of gambling, or simply engaging in recreational gambling as a pastime is unknown but there is substantially more empirical evidence suggesting that impulsivity is a key vulnerability factor for the development of problems with gambling (Vitaro et al., 1999, Blaszczynski, Steel & McConaghy, 1997).

Impulsivity is characterised by:

- Sensitivity to positive and immediate rewards.
- Insensitivity to punishment or negative consequences.
- Fast responding without considering the consequences of action.
- Difficulty inhibiting behaviour (Vitaro et al., 1999).

These characteristics are likely to interact with the characteristics of the gaming environment to promote, and determine severity of, loss of control over gambling behaviour.

Gambling related activities are a common pastime in NSW and most people will at some stage take part in gambling related activities. Electronic gaming itself is characterised by reinforcement schedules that are conducive to learning a behaviour that is resistant to

extinction. That is, machines pay out regular small amounts on a variable (random) schedule. The outcome of wagers is immediate and associated with excitement (Coventry & Constable, 1999). It is impossible for gamblers to predict when wins are likely. These particular characteristics of machines have been shown in the learning literature to be associated with fast acquisition of behaviour that continues even in the course of periods where wins do not occur (Sharpe & Tarrier, 1993).

For individuals who are highly sensitive to positive rewards, impervious to punishment and find delaying gratification difficult, electronic gaming machines are likely to provide an ideal environment for the acquisition of excessive behaviour.

Once gambling is established as a frequent activity, it is considered that a series of cognitive belief structures emerge to play an important role in determining continued play (Walker, 1992). These structures include irrational beliefs, erroneous perceptions regarding the independence of random events and a misunderstanding of statistical probabilities and true chances of winning. The outcomes of early gambling experiences are likely to be important in shaping attitudes toward gambling as a means of deriving income rather than expenditure for a recreational pursuit. For example, large wins might affect a player's expectations of winning whereas smaller, but more regular, payouts might increase an individual's perception of control over the outcome (Sharpe, 2000). There is considerable evidence that regular gamblers engage in a high proportion of irrational beliefs (Gaboury & Ladouceur, 1989) that lead people to overestimate the likelihood of success. These cognitions are accompanied by levels of arousal (Coventry & Constable, 1999; Sharpe, Tarrier, Schotte, & Spence, 1995) argued to fuel the vicious cycle important in maintaining problematic levels of gambling (Sharpe & Tarrier, 1993).

Once these patterns develop, secondary problems ensue (Blaszczynski & Nower, in press; Sharpe, in press), making it progressively more difficult for gamblers to extricate themselves from their excessive play. Emotional, financial and social consequences of gambling increase the level of stress, which precipitates further gambling, for at least a proportion of gamblers, in an attempt to escape from the mounting problems in their life.

Sociocognitive Theory

There are two major kinds of theory about the nature and causes of problem gambling. One kind of theory argues that problem gamblers are different from social or recreational gamblers by having biological and personality factors that make them especially prone to the arousal and excitement of gambling. The other kind of theory argues that there are no biological and personality differences between problem gamblers and social gamblers. According to this kind of theory, problem gambling follows from erroneous thinking about gambling coupled with an unwillingness to exercise control.

According to sociocognitive theory (Walker, 1992), gambling is essentially about the winning and losing of money. Problems occur when too much money has been lost in the context of the gambler's life. Since all forms of gambling are constructed so that gamblers will lose in the long run, the problems of explanation concern why people take part and persist in an economically self-defeating activity. Part of the answer lies in our cultural heritage. Gambling is not equally prevalent in all cultures but rather thrives in capitalistic and materialistic cultures and in the less affluent working class areas of society. The central feature of all gambling is the transfer of wealth. The gambling industry is based on the sure

knowledge that the transfer of wealth will take place from the gambling community to the gambling operators

However, the gambler hopes and believes that the transfer of wealth, in his or her case, will be from the gambling operator to the gambler's pocket. The large majority of people in Australia gamble in one way or another at some time in the course of a year (Productivity Commission, 1999). Given that so many are attracted to try their luck at gambling, it is necessary to explain the reasons why some people stop early, why some persist until all their money is gone, and why the majority stop somewhere between these extremes.

According to sociocognitive theory, a major factor is ignorance of the true nature of the chosen form of gambling coupled with erroneous thinking about money won and lost while gambling. Both recreational and problem gamblers exhibit a wide range of erroneous thinking about gambling that contributes to a general optimism concerning success. At the core of this erroneous thinking is the perception that random events are predictable (Ladouceur & Walker, 1998).

The majority of people who try their luck on poker machines acknowledge that they have been unsuccessful. They exercise control. However, playing a poker machine does not lead automatically to loss. Wins can maintain the illusion that luck is changing and strengthen the optimism that more may follow. Playing poker machines represents an interaction of persistence with an activity with the hope of success subject to the individual's degree of self-control. The difference between a regular gambler and a problem gambler is blurred. In a sense it is all a matter of where the individual draws the line. How much evidence does the individual need in order to be convinced that the venture is a failure?

Thus, sociocognitive theory de-emphasises the role played by personality factors such as impulsivity; de-emphasises the role of any biological differences that may be found between recreational and problem gamblers, and de-emphasises the categorisation of gamblers as problem, pathological and compulsive. What is emphasised are the erroneous perceptions of the nature of gambling, the erroneous thinking about the meaning of actual gambling outcomes, the important role of winning, and the extent to which the individual is willing to exercise control in the face of conflicting evidence. Factors that decrease self-control can indirectly contribute to excessive gambling. Since self-control may be more difficult to learn than an accurate appreciation of the true nature of gambling, preventative measures for gambling problems may be more successful by focussing on education.

5.4 Implications for the Proposed Modifications

Since the amount of money lost by players is the immediate cause of gambling problems, any modification that reduces loss of money has the potential to curb the level of gambling problems caused by excessive poker machine play. Thus, superficially, it may seem as if the proposed modifications will achieve the desired end of limiting losses and thereby reducing problem gambling. However, there are a number of hidden assumptions in this argument that must be considered.

The reduction of the maximum bet for a game from \$10 to \$1 will lead to a dramatic reduction in losses per unit time, if a substantial proportion of bets exceed \$1 per game. However, if very few bets exceed \$1 then the introduction of this measure will have little impact. What is crucial is whether the excessive gambling of problem gamblers comes from the excessive time spent gambling or from the larger bet sizes that they might favour. If

problem gamblers frequently bet more than \$1 per game and recreational gamblers do not, then the modification may be successful.

Slowing the game speed will decrease the loss of money on the assumption that problem gamblers bet more rapidly than recreational gamblers and more rapidly than the slower game cycle. However, if the rate of play for problem gamblers is such that it remains slower than the game cycle or reel spin speed for the slower game, no impact would be expected. Again, if a problem gambler is intent on continuing until the money outlaid is expended, then a slower game speed will simply translate into a longer time spent playing the machines.

Limitations on note acceptors do not limit the money that can be spent playing the machines. The assumption is that problem gamblers will not split higher denomination notes into lower denominations. However, given the persistence that characterises problem gambling, it is unlikely that limited note acceptors will have an impact on problem gambling.

5.5 Theoretical Implications for Harm Minimisation Strategies

Features of the gaming environment have the potential to impact on gamblers in three ways. Elements of the gaming environment may:

- Either encourage or discourage players to initially engage in gambling as a social pursuit.
- Increase or decrease the likelihood that vulnerable individuals may develop problems.
- Increase or decrease the potential for those gamblers whose behaviour is out of control to continue to escalate.

Harm minimisation strategies are targeted towards reducing the likelihood that vulnerable individuals develop problems and/or reducing the ease with which self-identified problem gamblers can access gambling related activities. It is important to consider which characteristics of electronic gaming machines would be predicted to change gambling behaviour for those at risk of problems or who have already developed problems in their gambling.

In the literature there have been a number of potential elements of the gaming environment that have been argued to be associated with increased rates of problem gambling. These issues include:

- Availability of gaming opportunities.
- The nature of venues in which gaming opportunities are available.
- The speed of wager cycles.
- Reinforcement schedules.
- Maximum and minimum bet size.
- Line and credit combinations.
- Tokens: the use of credit points and bill acceptors.
- Machine effects.

The theories reviewed above provide some predictions about these aspects of machines. However, it is essential to relate these to the empirical findings related to each of these areas.

5.6 Availability of Gaming Opportunities

It has long been noted that there is a correlation between the level of availability in gambling opportunities and the proportion of problem gamblers within a community (Walker, 1992, Campbell & Lester, 1999). Whether those who have problems with gambling are attracted to areas where gaming opportunities are easily available or whether easily available gaming opportunities increase the prevalence of problem gambling is unknown. In NSW, turnover on poker machines has increased 182% between 1973 and 1994. During the same period, the availability of poker machines in the state has increased by 72%. A number of other changes in the configuration of poker machines have accompanied these changes and to what extent availability, per se, or other changes have influenced expenditure remains unknown. To what extent these figures represent increased recreational gambling or impact on the proportion of problem gamblers is also unknown.

The emphasis of community surveys has been on the estimate of *prevalence* rates of problem gambling, that is, the proportion of individuals who meet criteria at one point in time or over a defined period. No studies have adequately evaluated the *incidence* of problem gambling, that is, the emergence of new cases over a given period. Incidence rates are important in determining the social impact assessment of the introduction of increased gambling opportunities in a given region, and by implication, the increase in expenditure accounted for by *new* problem gamblers entering the market.

Ladouceur, Jacques, Ferland, & Giroux (1999) recently repeated a prevalence study of problem gamblers in Canada following an increase in the accessibility of gaming venues. The results indicated that the proportion of problem gamblers increased during the seven years by 75%. While it remains possible that problem gamblers may have relocated during that period due to changes in legislation, it seems unlikely that this could entirely account for the noted increase in the number of problem gamblers. Changes to the features of gaming machines, the venues in which they are available or other changes in community attitudes may all have contributed to the increase. Nonetheless, it is clear that a combination of these environmental factors has resulted in an increase in the rate of problem gamblers.

5.7 Nature of Venues

One aspect of increases in gambling availability that is pertinent to the effects on problem gamblers is the type of venue in which the gambling is offered. In particular, whether these are venues where people will attend with the specific intention of gambling or where the predominant activity is not gambling (such as in drinking establishments). Gaming is permitted only on licensed premises. Theories of gambling would predict that increased alcohol would be likely to reduce self-control and hence increase the likelihood of gambling to excess (Blaszczynski & Nower, in press; Sharpe, in press). Indeed, there are two sources of evidence that would support the influence of alcohol on gambling behaviour. The first is related to the high rates of comorbidity between alcohol and gambling (Cockford & el Guebaly, 1998) and the second, to empirical studies describing the effect of alcohol on gambling (Kyngdon & Dickerson, 1999).

Although co-morbidity studies have consistently found higher levels of alcohol use amongst gamblers than in the wider community and vice versa, the meaning of these findings is unclear. These studies are typically conducted with gamblers presenting for treatment and often to drug services that also treat gamblers. Therefore, it is likely that the estimates may be inflated and artificial.

Recently, however, a series of empirical studies by Dickerson and his colleagues have confirmed that alcohol is associated with increased gambling behaviour. Baron and Dickerson (1999) found that in the gaming venue, those who continued to consume alcohol throughout a period of play were more persistent. While interesting, the naturalistic setting precludes a determination of cause and effect. However, Kyngdon & Dickerson (1999) in a well-controlled experimental study showed that in comparison to a placebo, students who drank a moderate amount of alcohol (i.e. three units) were twice as likely to gamble until their money was gone.

In the Australian Institute for Gambling Research (2001) study commissioned by the ACT Gambling and Racing Commission, a series of focus groups were carried out to elicit the views of problem gamblers on prevention measures. Of note, all participating gamblers indicated that the consumption of alcohol was one factor closely associated to problem gambling.

The results of comorbidity studies with problem gamblers, naturalistic studies with gamblers in the venue and well-controlled experimental studies all provide consistent evidence as to the relation between alcohol and gambling. These studies would suggest that the increased availability of gambling opportunities in venues, whose predominant business is drinking, is likely to reduce the self-control of individuals during gaming. However, whether this would differentially affect those at risk for developing problems with gamblers remains unknown but logic suggests, likely.

5.8 Speed of Wager Cycles and Reel Spin

Learning theories are consistent in predicting that the faster that the outcome of the wager is known, the faster the likely acquisition of the behaviour. In addition to the learning principles, it stands to reason that the faster that one can play a machine the faster that one can lose their money. While this has considerable face validity, there is little information as to how the speed of wager cycles or reel spins influences betting. Observational studies conducted within gaming venues has demonstrated that high frequency players will play both faster and longer than low frequency players. However, average play rates in these studies were one spin per 8 seconds for low frequency gamblers and one spin per 6 seconds for high frequency players (Dickerson, Cunningham, Legg England & Hinchy, 1991).

Currently, in NSW electronic gaming machines can be triggered every 3.5 seconds for a new wager. However, Dickerson et al.'s results indicate that players do not in fact play as quickly as they are able. It should be noted that Dickerson and colleagues did not investigate whether the gamblers in their study were problem gamblers. It is often assumed that problem gamblers lie on a continuum with recreational gamblers. While the research evidence is unclear, it is certainly likely that those who have difficulties controlling their gambling will gamble even more quickly and for even longer than high frequency recreational gamblers.

This would suggest that the evidence might support one proposed strategy (i.e. to reduce the reel spin of machines) but this conclusion must be considered premature given that the relationship between time played and amount spent amongst problem gamblers has not been empirically investigated.

It is possible that lengthening the playing time will simply mean that it takes longer for players to lose all their money. Motivations for gambling vary not only between recreational and problem gamblers, but also between different types of problem gamblers (Blaszczynski & Nower, in press). Widely varying reasons for gambling have been reported in the literature. Some players play to win money, some to chase losses and some to escape from life problems. For those who gamble to chase losses and escape from daily life, the more money that is available to them, the more they are likely to play.

By definition, pathological and problem gamblers are preoccupied with the urge to gamble and will gamble away available funds whenever given the opportunity. It is known that problem gamblers participate on a regular, often daily basis. Duration of sessions is determined by a complex interaction of disposable income, available time and psychological dictates. Emotional needs and the pressure to chase losses may be sufficiently powerful forces to override competing social obligations and to cause the gambler to persist in play until all funds are exhausted. In this context, it is not uncommon for pathological gamblers to delay returning to work or home, fail to meet social commitments or leave children unaccompanied at home or in cars while they satisfy their urge to gamble. For individuals with a strong drive to gamble, reducing the rate of play may result in compensatory increases in time spent gambling leading to the situation where similar amounts are lost but now over longer periods of time.

In support, a number of researchers suggest that problem players play for the intrinsic 'action' (excitement) associated with gambling and continue to do so until available funds are exhausted (Lesieur, 1984). The primary motivation is to win in order to prolong the opportunity for continued play, in other words they play "with money rather than for it" (Griffiths, 1990a, p122). As Daley (1986) suggested, all players were in fact "buying time" and that winning money was a secondary motivation with the activity of gambling itself being the intrinsic reward.

Similarly, Griffiths (1990b) found that adolescent problem and regular players stated that their main motive was to stay on the machines as long as possible with all winnings returned to the machine. It was considered "skilful" to stay for a long time on a machine. However, as expected, problem players were more likely than regular players to state that they did not want to and/or could not stop gambling, and that after each session problem players were more likely to express the desire to continue playing.

When multi-line machines (machines which allow players to stake one coin per line, up to a maximum of five; compared with single-coin machines which only allow a stake of one coin on one line) were introduced, Daley (1986) hypothesised that players would prefer single-coin machines over these new machines because single-coin machines extended playing time (playing time could be cut by half if only two lines were played in the multi-line machines). But, as Walker (1992) argues, data revealed that players preferred the new multi-line over and above the single-coin machines, thereby apparently invalidating Daley's hypothesis.

An alternative explanation is possible. There is some evidence that players may believe that playing a multi-line machine (or maximum lines in the present-day machines) can extend their playing time through the perceived capacity of this strategy to increase chances of winning. As a general rule, playing more lines increases the probability of a (small) return

and the prospect of extending playing time despite the fact that in reality, gaming time is diminished because the returns may be less than the stake.

The primary motivation for a group of problem and regular gamblers is to “buy time”. Dickerson (1998) in a paper presented at the National Association of Gambling Studies Conference, reported that external factors were important reasons given more frequently by problem gamblers for terminating a session: running out of cash, the venue closing or the intervention of others. Given free rein, problem gamblers display a propensity to persist at gambling until forced to cease.

Thus, extending the length of each individual wager may not only extend the length of playing but also produce unintended negative effects in other aspects of functioning such as spending more time at the venue and away from work or home. It is important, therefore, to determine empirically if problem gamblers will continue to gamble similar amounts over longer time periods and if so, what proportion of problem gamblers this will affect.

5.9 Payout Schedules

Another characteristic of machines that requires consideration is the payout schedule. Machines in NSW are legislated to payout at the rate of at least 85% with the recommendation of increasing this percentage to 87.5%. This produces a high number of small wins with a small chance of a large win. Moreover, the introduction of cashcade jackpots increases the perception that large wins are possible.

A number of empirical studies have investigated the effect of wins on play. Coventry & Constable (1999) confirmed that players became more aroused in response to wins but not losing combinations in a laboratory experiment, but did not investigate the relationship between wins and play. Three studies, however, have investigated this relationship. Dickerson et al. (1992a) compared the effect of small wins (less than 50 cents) versus large wins (more than 50 cents) on rate of play. In their studies, larger wins were associated with a reduction in rate of play, while smaller wins were associated with an increase in play speed.

However, in a second study, these researchers failed to replicate this finding (Dickerson et al., 1992b). Indeed they found that large wins also increased play in this study. Delfabbro and Winefield (1999) also failed to replicate Dickerson et al.’s (1992a) findings and demonstrated that small wins maintained play rate, but did not increase it.

These findings are likely to reflect the complexity of modern day gaming machines and the number of variables that may account for any particular finding. For example, Dickerson et al.’s (1992 a, b) studies offered less frequent wins than Delfabbro and Winefield’s (1999). The degree to which this influenced responses is unknown.

Frequency of gambling is another factor that may affect results. Delfabbro and Winefield (1999) found that low and high frequency players paused for longer periods following large wins (more than 50 cents). However, the average stake size in this study was only 6 credits, thus 50c represents a net win. On some gaming machines, a win of 50c may potentially be a net loss. Whether this would affect the reported changes in rate of play is unclear. Other authors have argued that losses tend to fuel continued gambling in hope of recouping losses (i.e. chasing), which may be more characteristic of problem gamblers (Leopard, 1978).

In practice, altering the relative size and frequency of wins will have an unknown differential effect on recreational and problem gamblers. While attempting to influence one aspect of the payout schedule, other variables will be unwittingly changed and may have unexpected effects on play. The need for well-controlled, ecologically valid investigations to assess the likely impact of changes cannot be underestimated.

5.10 Maximum Bet Size

Bet size on modern machines is determined by a number of factors, including the denomination of machines, the number of lines and credits played.

In NSW, the range of possible bets ranges from playing 1 line for 1 credit on a 1c machine (total bet size = 1c) versus playing 20 lines by 25 credits on a \$2 machine (total bet size = \$10). Higher denomination machines (1c and 2c) were introduced in NSW in 1989 at the same time as the maximum bet size increased to \$10 and cashcade jackpots were introduced. That year was also associated with the largest annual increase in turnover in NSW.

However, the fact that three significant changes occurred simultaneously during that same year, make the increases in turnover difficult to interpret. One of the most popular strategies that recreational players use during play on electronic gaming machines is to bet the maximum number of lines with the minimum number of credits (Haw, 2000, Williamson & Walker, 2000). Clearly, if players maintain this strategy across machines of different denominations, then as the denomination of the machine increases, so too will the player's expenditure.

Across a number of studies, the number of lines and the denomination of the machine have consistently been found to be better predictors of the average stake size (Haw, 2000). Both these variables have been found to be of more importance than the number of credits wagered on each individual bet (Haw, 2000, Williamson & Walker, 2000). These results question whether reducing the number of credits per line will influence average stake and therefore question the usefulness of reducing the number of available credits per bet.

The studies of both Haw (2000) and Williamson and Walker (2000) did not assess the gambling status of patrons who were participants in their studies. Williamson and Walker did report similar findings for 'regular' and 'non-regular' players. However, regular players in their study were defined by the fact that they played with a membership card. Therefore, one can only assume that they actually gambled more regularly. Moreover, whether problem gamblers were represented in their sample is unknown.

Pathological gamblers consistently reported on questioning that they were likely to use the maximum credit function, whereas recreational gamblers did not (Gulliford, 2000). Gulliford's (2000) study was a laboratory study that relied on self-report and therefore whether these findings would generalise to naturalistic play is unknown. However, this is an empirical question that requires investigation.

5.11 Tokens: The Use of Credit Points and Bill Acceptors

Use of credit points, or '*tokenisation*', refers to the conversion and display of money wagered into 'credits'. Casino gambling has long operated on a token system with chips of

varying values being purchased, wagered and converted after the player has completed their session of play.

Tokenisation was introduced to electronic gaming machines in 1992. In 1c machines, 100 credits typically represent one dollar allowing easy conversion of credits into monetary value. However, on higher denomination machines, the conversion of credits to real money is less meaningful. In 1994, two years after the introduction of tokenisation, the second largest annual increase in expenditure from electronic gaming machines was observed in NSW. While little research has considered the role of tokenisation, two studies conducted in the late 1960s, demonstrated that gamblers tended to make more cautious decisions about wagers when they gambled with 'real' money in comparison to when they gambled with credits (Kogan & Wallace, 1967, Slovic, 1969).

High denomination bill acceptors may contribute to the tokenisation of money during gambling. That is, high denomination bill acceptors mean that larger amounts of money are converted at one time into credits and hence tokenised.

Haw (2000) has argued that this process introduces a suspension of judgement amongst gamblers. Haw (2000) investigated the effect of various machine characteristics on machine profit across over 700 machines in six different clubs. As in his earlier study, the combination of the denomination of the machine and the number of lines available on which to wager predicted greater profits.

However, the presence of a bill acceptor, a new machine (post 1995) and the presence of a cashcade jackpot all increased the profitability of machines and consequently the net loss of the players of those machines. Of these three variables, the presence of bill acceptors was the strongest predictor, indicating a strong effect on machine profitability or net loss to players.

Bill acceptors may increase spending through a number of mechanisms, such as tokenisation, reducing time away from the machine or increasing privacy to the gambler. However, whether players who wish to gamble larger amounts choose machine where this option is easier (i.e. those with bill acceptors) or whether the presence of the bill acceptor influence betting cannot be deduced from Haw's (2000) findings.

The impact of bill acceptors on gambling and problem gambling behaviours is difficult to estimate since these modifications were not introduced in isolation but in combination with other changes. This makes it difficult to tease out the relative contribution of bill acceptors from such other changes.

5.12 Machine Characteristics

Griffiths (2001) has speculated that technological advances have improved gambling opportunities and have restructured the nature of electronic games in such a manner that the risk for their addictive properties have escalated. He argues that particular structural characteristics of electronic machines in combination with unspecified biological, psychological and situational parameters would result in a proportion of individuals losing control and becoming addicted gamblers. Some relevant dimensions include:

- Stake size.
- Event frequency, that is, the time gap between each gamble.
- Prize size and structure.

- Near miss opportunities.
- Light, sound and colour effects.
- Skill and pseudo-skill involved.

In this context, continuous forms of games that permit rapid play, frequent and powerful reinforcement properties (wins), relatively large stakes and large prizes are highly addictive and associated with the development of severe problem gambling. For example, video lottery terminals (VLTs) have been termed the 'crack cocaine of gambling' for the very reason of their rapid action and stimulating subjective arousal (Korn & Shaffer, 1999).

Although intuitively appealing, the effects of these parameters on gambling behaviour and problem gambling have not been systematically and rigorously evaluated with respect to electronic gaming devices. At best, a hand full of preliminary analogue laboratory studies manipulating characteristics of VLTs are available (Loba, Stewart, Klein, & Blackburn, unpublished).

In the first and only study to specifically investigate the impact of changing structural characteristics of gaming machines and gambling behaviour, Loba et al. (unpublished), found that modifying a combination of decreasing speed and turning off sounds decreased the ratings of enjoyment, excitement and tension reduction for pathological gamblers relative to non-pathological gamblers. Pathological as compared to non-pathological gamblers also reported it easier to cease gambling when running counters displayed cash figures rather than credit points.

While providing interesting preliminary data, the design of the study included a laboratory setting, a relatively small sample of volunteer participants (22 female and 38 male) with each given an amount of \$50 in recognition of their contribution, and the SOGS 5-point threshold to identify problem gamblers. In addition, variables were manipulated in combination making it impossible to determine which made the primary contribution. Conditions included: speed of play slowed plus sound turned off; speed of play increased plus sound turned on; cash counter displayed; and inability to stop play through touch screen. Participants were instructed to play for set periods and it is not clear whether they played with their own money or money provided by the researchers. All these methodological considerations are important determinants of arousal and motivation to play. This raises questions as to the extent to which the findings of this analogue study can be reliably and validly extrapolated to in-vivo settings.

Graphics, sound effects and the introduction of features have also been included with the aim of making gambling more enjoyable for players. The assumption that these effects influence play is implicit and rarely tested. However, it is a well-known phenomenon that players enjoy new machines, presumably because they offer novel visual and sound effects that increase the enjoyment of the machines and presumably result in increased profits.

Little research has been conducted relating to the effects of these effects. However, authors have commented that primary colours and flashing lights are a common features of machines aim to increase the impression of fun and excitement (White, 1989, Caldwell, 1974). In the USA, Popkin (1994) noted that black, red and purple were the most common colour schemes in arcades.

Griffiths and Swift (1992) reported a similar finding in a survey of amusement arcades in the United Kingdom. Whether these colours and lighting effects are assumed to influence play or actually do influence play remains unclear from these studies.

Only one study has empirically investigated the effect of the coloured lighting on gambling behaviour. Stark, Saunders & Wookey (1982) found that (non-gambling) participants in their study placed more bets and lost more money when the gaming venue was the subject of red lighting in comparison to blue lighting. However, since these participants were not regular or problem gamblers, this finding can only inform us as to the effect of these parameters on novice gamblers. It is possible that colouring effects the acquisition of gambling behaviour, but does not influence more experienced gamblers.

5.13 Limitations of the Literature

The literature investigating gambling has advanced in recent years. We now have a greater understanding of the psychological and biological factors that contribute to the development and maintenance of problem gambling. However, the amount of research that has investigated the effect of characteristics of the gaming environment on gambling behaviour remains in its infancy. Many of the studies are observational in nature and demonstrate relationships between changes that have been implemented and subsequent changes in rates of gambling or prevalence of problem gamblers. However, in reality, legislative changes have rarely been introduced in isolation and therefore determining which particular aspects of the gaming environment have contributed to any resulting changes is impossible.

Many of the naturalistic studies help us to understand the way in which players, on average, gamble. However, little is known about the characteristics of the gamblers. In some studies, gamblers are categorised as regular or not, but this is on the basis of the possession of a member's card (e.g. Williamson & Walker, 2000). Whether these players actually gamble more often or larger amounts, remains an assumption. Moreover, whether any of these gamblers can be classified as problem gamblers is completely unknown. This lack of information is particularly difficult in determining what are likely to be helpful harm minimisation strategies. The most effective harm minimisation strategies will specifically target the behaviours common to problem gamblers but not frequently observed amongst recreational players. However, without information relating to the different effects of various strategies on problem versus recreational gamblers, optimal harm minimisation strategies are unlikely to be developed.

Those studies that have investigated problem or pathological gamblers are typically conducted with gamblers presenting for treatment. This group are self-selected by virtue of the fact that they seek treatment. To what degree different sub-groups of pathological gamblers are over-represented amongst those presenting for treatment is unknown (Błaszczynski & Nower, in press). Therefore, it is difficult to speculate to what degree the findings are applicable to the population of problem gamblers, many of whom never seek treatment.

In recent years, the emergence of experimentally sound manipulations of variables of interest, such as payout schedules or alcohol intake has occurred. While these studies are methodologically more rigorous, and allow confounding variables to be held constant, ethical considerations preclude problem gamblers from taking part in these studies. Thus, whether the results are applicable to this group is unclear. This compounds the difficulty in

determining which harm minimisation strategies would most effectively target the groups for whom they are developed.

5.14 Research Methods

The empirical evidence both in Australia and in other countries where similar legislative changes have occurred in recent decades, clearly suggests that the rate of problem gamblers has increased in recent years (Ladouceur et al., 1999; Walker, 2000). Expenditure on electronic gaming machines in NSW has increased by 182% between 1973 and 1994. There is sufficient evidence to support the view that harm minimisation strategies are necessary to reduce the cost of problem gambling to the individual, their family and the community. However, what measures are likely to be effective are less clear. International health policies are now emphasising the importance of evidence based health reforms and so a consideration of the standard of research evidence that has been reviewed here is imperative to making appropriate recommendations.

Evidence-based guidelines developed within the health area define levels of evidence that are required to have confidence in the effectiveness of any intervention strategy. Uncontrolled trials are considered to be the weakest form of evidence. Uncontrolled trials refer to the introduction of a strategy or intervention followed by an observation of changes in the population for study. Such evidence is generally considered to be suggestive that the intervention (or harm minimisation strategy) may possibly be effective, however, such a strategy should not be assumed to be effective. This is the weakest level of evidence and is generally not considered in health service delivery.

Case-controlled studies are a stronger empirical design. These studies refer to the introduction of some reform or strategy for one group of people when another group are studies without the introduction of the same reform. Studies of this nature allow more confidence in the applicability of the results because there is some reason to believe that the changes are not simply a reflection of time or some other confounding variable. However, in these studies it cannot be guaranteed that some difference between the two groups did not exist prior to the intervention that may account for any resulting differences. This level of evidence is considered stronger than uncontrolled studies, but still lack the experimental rigour of controlled designs.

Randomised controlled trials are the gold standard of health research. These refer to the introduction of an intervention to a group chosen randomly so that the effects of the intervention can reliably be established. Interventions that have been demonstrated across a number of randomised controlled trials or in meta-analytic studies are considered to be more robust. This is the level of evidence that is typically required to influence funding intentions of health care services.

The bulk of evidence presented in this review falls far short of the gold standard. There is some evidence that suggests possible changes that may be effective in minimising harm. However, in all cases the evidence remains inconclusive. While there is undoubtedly a need for effective harm minimisation strategies, it is imperative that these are evidence based. If strategies are introduced on the basis of face validity, they may be ineffective at targeting problem gamblers, or worse may have unforeseen negative consequences. The recommendation of this review is that a strategic plan is developed to assess the efficacy of harm minimisation strategies.

A case in point is the notion of education as a harm minimisation intervention. Informing people of the health risks and harm associated with an activity should, at face value, result in some reduction in levels of participation or use. However, it may be the content, message and the extent to which it normalises a behaviour that determines the success of an educational campaign. Erickson (1997), in a brief critique of harm reduction strategies for illicit and licit drug use among adolescents, noted that some traditional educational and school-based prevention programs that emphasised harmful consequences had not been demonstrated to be effective. As a consequence, some have argued that the promotion of safer use, delayed use and encouragement of responsibility over one's own behaviour as an educational strategy should be pursued. But critics have countered this suggestion by claiming that such an approach will stigmatise individuals, act as a barrier to help seeking or at worst, encourage drug use by portraying its attractiveness. Similar arguments can be applied to school-based education programs for gambling. Consequently, it is imperative that such programs are evaluated systematically over the long-term rather than left to ideological or political based decisions regarding their implementation.

It is important that harm minimisation strategies that are proposed are based on strong theoretical and/or empirical grounds. Evidence should be available that provides sufficient reason to think that these strategies may be effective in reducing problem gambling, but would not unduly interfere in the enjoyment of gambling for recreational gamblers or compromise the livelihood of those involved in the gaming industry.

Once potential strategies are identified, high quality research should be conducted to empirically investigate whether the strategy meets the criteria for effectiveness. Outcomes should include at least the following:

- The effect on problem gamblers with regard to amount and time spent gambling.
- The effect on the enjoyment and play rates of non-problematic recreational gamblers.
- The effect on expenditure and profits.
- A range of possible confounding behaviours, such as smoking and drinking.

Optimal harm minimisation strategies need to be identified. Optimal strategies will:

- Protect participants from developing gambling problems.
- Reduce problems for problem gamblers.
- Have little impact on the enjoyment or play rates for recreational gamblers.
- Have an impact on revenue such that a sustainable gaming industry is viable.
- No unforeseen or unintended negative consequences.

Clearly, legislators will need to determine a balance between the competing needs of the different parties in order to make policy decisions. However, research that empirically determines the effect of different strategies on outcomes as described above will facilitate informed policy-making that is based on clear evidence.

This review points to a number of possible strategies that may be worthwhile investigating in this regard. Possible effects of the proposed changes of slowing the reel spins, eliminating high denomination bill acceptors and limiting the maximum bet all have some minimal evidence that suggests that these may possibly be effective harm minimisation strategies, although the evidence is weak. The following empirical studies will provide evidence as to whether these changes are, in fact, likely to be effective strategies.

In addition, a number of other findings warrant consideration for further evaluation:

- There is some evidence that gambling increases with the increased intake in alcohol. Strategies that minimise the likelihood of gambling and drinking concurrently may minimise harm.
- There is some evidence to indicate that strategies that encourage tokenisation may encourage risky gambling. Thus, strategies aimed at reducing this phenomenon, such as relating credits to money on higher denomination machines could be researched.
- Given some emerging evidence that the number of lines, rather than the denomination of the machine or the number of credits may predict amount gambled, reducing the maximum lines on a machine may be considered.
- Cashcade payouts have been suggested to increase estimates of the likelihood of winning and limiting these amounts may be useful.
- Little investigation of the sound and visual effects of machines has been conducted, particularly characteristics such as free spins and the gamble button. Both of these may potentially influence a gambler's belief about machines and their subsequent play and therefore adapting these may be a fruitful area for research.
- Finally, given research that supports the relationships between beliefs, arousal and continuation of gambling. Strategies that reduce the illusion of player control, that reduce player's belief that they nearly won or that reduce the level of arousal associated with the game would be worthy of exploration. Research that first explores these within the laboratory should be encouraged.

6 Current Project

6.1 Procedure

The following sections outline the four studies that were undertaken as part of this project:

- **Study 1: Satisfaction.** This study will examine how the different design feature modifications will impact upon player satisfaction. Participants will play modified machines and complete rating questionnaires concerned with their level of gambling and how they liked each machine.
- **Study 2: Behavioural patterns of play.** This study will explore the effect of design feature modifications on patterns of play.
- **Study 3: Expenditure.** This study will involve the tracking of actual expenditure on modified and unmodified machines.
- **Study 4: Focus group.** This study involves interviewing groups of problem gamblers in treatment to obtain subjective responses, attitudes and expectations regarding the effectiveness of proposed modifications to machines as harm minimisation strategies.

Participants were recruited from seven hotels and four clubs in NSW. In accordance with their request for confidentiality, the names and specific locations of these venues will not be listed. It should be emphasised that these participating venues represent a sample of convenience and therefore should not be interpreted as being representative of all hotels or venues in metropolitan or rural New South Wales. The seven hotels and three of the clubs were all in the Sydney Metropolitan Region. The fourth club was in a regional centre near the border of NSW.

'Pirates' is a recently developed poker-machine manufactured by Aristocrat Industries that is a clone of the popular 'King Ra' and modelled on the 'Queen of the Nile' machines. 'Pirates' includes a 16 free spin game feature won with 3x, 4x, or 5x scattered Compass symbols appearing on the reel. During the free spins, all prizes are tripled. The feature can be won again during the feature. In standard form, the machine accepts \$5, \$10, \$20, \$50, and \$100 denomination notes.

Unmodified 'Pirate' machines used for comparative purposes in this project had a maximum bet size of \$10 (i.e. 20 lines x 25 credits), reel spin set at 3.5 seconds, capacity for continuous play and accepted bills up to the value of \$100.

Aristocrat Industries provided fourteen modified machines specifically for the purposes of the present study. All modified machines were 'Pirates' machines.

Aristocrat Industries modified machines these according to specified technical requirements. All modifications were carried out and the machines installed in venues in compliance with statutory requirements and with the approval of the Liquor Administration Board. The return for modified and unmodified machines was set at 90%.

The following machine design feature modifications were made to the 'Pirate' machines:

- Reel spin set at 3.5 seconds or 5 seconds.
- Reconfiguration of bill acceptors to allow the insertion of \$5, \$10 and \$20 notes only.
- Reduction of maximum bet size from \$10 to \$1.

The modified machines were configured as follows:

1. Maximum bet \$1, reel spin at 3.5 seconds, high denomination bill acceptor.
2. Maximum bet \$1, reel spin at 5 seconds, high denomination bill acceptor.
3. Maximum bet \$1, reel spin at 3.5 seconds, \$20 or less denomination bill acceptor.
4. Maximum bet \$1, reel spin at 5 seconds, \$20 or less denomination bill acceptor.
5. Maximum bet \$10, reel spin at 3.5 seconds, \$20 or less denomination bill acceptor.
6. Maximum bet \$10, reel spin at 5 seconds, high denomination bill acceptor.
7. Maximum bet \$10, reel spin at 5 seconds, \$20 or less denomination bill acceptor.

The eighth machine was a standard unmodified 'Pirate' machine used as the control machine for purposes of comparison: maximum bet \$10, reel spin at 3.5 seconds, high denomination bill acceptor

STUDY 1

SATSIFACTION

7 Satisfaction Study

The aim of this component of the project was to determine if players were able to detect modifications made to the design of machines and to evaluate the likely impact of these on the level of reported satisfaction playing such machines. The objective was to investigate whether or not recreational gamblers responded differently to problem gamblers in their level of satisfaction playing modified as compared to unmodified machines.

7.1 Procedure

The ratings of player satisfaction were undertaken in the seven hotels and four clubs over a consecutive period of two weeks for each venue.

For the hotels, one modified and one unmodified machine was placed adjacent to each other on the gaming room area.

In the clubs, one unmodified and seven modified machines were arranged next to each other in a bank of machines. These machines were roped off in three of the four clubs to ensure that non-participating patrons did not occupy these machines during the research period. These machines were switched off and unavailable for play during periods when data was not collected. The roping procedure was not implemented in the fourth club.

Two research assistants were allocated to each hotel and four researchers to each club with the task of interviewing and observing volunteer participants to obtain data.

To advertise the fact that a research study was in progress and seeking volunteer participants, a number of signs were displayed on the gaming floor and where appropriate, announcements to patrons were made over the public address (PA) system.

7.2 Hotels

In the hotels, the research assistant approached a patron who was about to commence, or were playing other machines and invited them to participate in the study. Patrons were given an information sheet explaining the nature and purpose of the study. In addition, the research assistants explained that they would be required to play both study machines for a minimum of twenty games on each machine and that they would be observed and their behaviour recorded, and on completion would be required to complete four brief questionnaires. Patrons were required to play with their own money using their regular strategy of gaming. Willing participants were asked to sign a consent form as required by the University of Sydney Ethics Committee.

When possible, the order of play was counterbalanced to minimise practise effects. The first participant played the modified machine prior to the unmodified machine and this order was reversed for the next participant. However, at times this was not possible given that another patron or participant was occupying the other machine.

The entire period of play took no longer than 40 minutes for any participant.

In the observation phase, research assistants recorded the pattern of credits and multi line games (expenditure per game), winnings per game and whether the double-up gamble option was played.

At the completion of each session of a minimum of twenty games, participants were asked to complete a series of four questionnaires (see attached) regarding their level of enjoyment experienced during play and how keen they were to continue playing that particular machine. Following completion of both machines, participants were asked to rate their level of satisfaction, if they considered the machine to represent a standard Pirate machine or differed in some manner, and if it did differ, in which way.

7.3 Clubs

A similar procedure was used in the clubs with the exception of the following. In three of the clubs, seven modified and one unmodified machines were placed in a row and roped off. Research assistants asked participants to play each of the eight machines prior to administering the questionnaires. Participants commenced play on each machine in a random order to minimise order effects.

7.4 Measures

Four questionnaires were constructed to assess aspects of satisfaction.

- *Satisfaction Scale*: This questionnaire asked participants to rank order the preference of machines played, the ranking of the speed with which they considered each machine would consume \$100, how they played 'Pirates' previously and if so, how frequently, the extent to which they enjoyed playing 'Pirates' in comparison to other machines in general, and general characteristics of play, that is, use of features (free spins, double-up gamble option), average expenditure in terms of time and money per average session and usage of bill acceptors.
- *South Oaks Gambling Screen (SOGS)* (Lesieur, H.R. & Blume, S.B. (1987). 'The South Oaks Gambling Screen (SOGS): A new instrument for the identification of pathological gamblers', *American Journal of Psychiatry*, 9, 1184-87). This 20 item self-report measure of problem gambling is the most widely used reliable and valid screening instrument to detect problem gambling. It is a useful measure of the severity of problem gambling. Modification of the set of instructions allows for lifetime estimates of gambling level to be obtained. Wording of the questionnaire was altered to reflect Australian gambling forms; for example 'poker machines' was substituted for 'slot machines'. The recommended five cut-off threshold for identifying cases of pathological gambling is reported.
- *Centre for International Economics*: This was a 14-item questionnaire eliciting data on regular patterns of gaming, expenditure and duration of sessions, use of other club/hotel facilities and the likely impact that machine design modification would have on patterns of spending.

7.5 Participants

Ninety-five participants in the hotels played both the control machine and the modified machine. Full data was available for 81-84 participants depending on the analysis. In the clubs, 110 participants played all eight modified machines. However, between 175 and 188 participants played the control machine and at least one other machine, allowing paired comparisons to be made for the larger sample.

7.6 Results

7.7 Hotel Venues

A 2 (satisfaction ratings) x 2 (recreational versus problem gambling status) x 2 (each modification present or absent) mixed model analysis of variance (ANOVA) was conducted for two questions. The first question relating to enjoyment was “Is this the sort of machine that you like to play?” and the second assessing satisfaction was “How satisfied were you with this machine?” Responses were rated on five-point scale (1 to 5). All ratings were normally distributed.

In all analyses, large and significant differences in enjoyment ratings were found in problem as compared to recreational gamblers. Participants scoring above the cut-off point of five on the SOGS consistently reported enjoying modified machines less than recreational players ($F(1,84) = 11.771, p = 0.001$).

When machines with a maximum bet of \$1 were compared to those with a maximum bet of \$10, no differences in overall ratings of enjoyment were found between the two groups ($F(1,84) = 1.507, p = 0.223$). Relative to the modified machines, there was a trend for recreational gamblers to report more enjoyment of the unmodified machines whereas the reverse was true of problem gamblers ($F(1,84) = 2.960, p = 0.089$).

There was a small non-significant trend for problem gamblers to report a greater level of enjoyment for modified machines in contrast to recreational gamblers who reportedly enjoyed modified machines to a lesser extent.

When comparing enjoyment ratings of machines with fast (3.5 seconds) versus slow (5 seconds) reel spins, there was a trend for a difference that narrowly failed to reach significance ($F(1,84) = 3.502, p = 0.065$). This represents a small, but consistent tendency for players on the slower machines to rate their enjoyment lower than players on the faster machines.

In these analyses, there was no interaction for gambling status ($F(1,84) = .114, p = 0.737$), indicating that both problem and recreational gamblers preferred the unmodified machines. Overall, problem gamblers rated all machines as less enjoyable than recreational gamblers ($F(1,84) = 10.664, p = 0.002$).

The modifications to bill acceptors did not appear to affect enjoyment ($F(1,84) = 1.472, p = 0.228$) across all participants, nor was there any specific differential effect on enjoyment between problem and recreational gamblers ($F(1,84) = 0.045, p = 0.833$).

The results of the analyses for satisfaction are almost identical. Again, in each analysis recreational gamblers reported higher levels of satisfaction than those participants who scored above the cut-off point on the SOGS ($F(1,82) = 9.695, p = 0.003$).

There was no general effect produced by reducing the maximum bet size on player’s ratings of satisfaction ($F(1,82) = 0.03, p = 0.86$).

However, there was a significant interaction between gambling status and enjoyment of machine type ($F(1,82) = 4.078, p = 0.047$). On the ratings for enjoyment, problem gamblers

were more satisfied, but recreational gamblers less satisfied, with the unmodified machines relative to modified machines. As shown in Table 1 below, these are small, but consistent and significant differences between the groups.

Table 1: Means and (standard deviations) of enjoyment ratings for problem versus non-problem gamblers on machines modified for the maximum bet and unmodified machines.

	\$10 maximum bet (n = 37) Mean (SD)	\$1 maximum bet (n = 49) Mean (SD)
Problem Gamblers (n = 25)	1.78 (0.83)	2.31 (1.08)
Recreational Gamblers (n = 61)	2.86 (0.89)	2.33 (0.85)

For reel spin, there was an overall reduction in satisfaction associated with the modified machines for both gambling groups that was significant ($F(1,82) = 4.899, p = 0.03$). However, there was no interaction for gambling status ($F(1,82) = 0.504, p = 0.48$). No effect on satisfaction ratings was apparent for machines modified to limit the bill acceptor ($F(1,82) = 0.007, p = 0.932$). There was also no interaction between gambling status and such modification ($F(1,82) = 2.232, p = .139$).

In order to determine the independent contribution, a multiple regression analysis was conducted to determine what factors independently contributed to player's ratings of satisfaction and enjoyment. This allowed other factors, such as the number of features, use of the gamble button, alcohol consumed and reported dissociation to be entered into the equation, as well as the three modifications and score on the SOGS.

The whole model accounted for only 14% of the variance in enjoyment ratings, but the regression equation was significant ($F(8,73) = 2.701, p = 0.012$). The only independent predictor of enjoyment was level of gambling, according to the SOGS ($t(1,81) = -2.826, p = 0.006$). The higher that players scored on the SOGS, the less they reported enjoying the machine, regardless of its characteristics.

These results were essentially the same for levels of satisfaction, except that the overall regression equation accounted for only 3% of the variance in satisfaction ratings and the regression equation failed to reach significance ($F(8,73) = 1.312, p = 0.251$). Similarly, the only predictor of satisfaction ratings was scores on the SOGS ($F(1,81) = -2.294, p = 0.025$), again indicating that the more severe the reported problem with gambling, the less satisfaction players report.

Two further questions were asked of participants. Firstly, if they would like to continue playing the machine had they not been in the study. Secondly, whether or not they recognized any modification to the machine.

Approximately, 54% and 53% respectively responded that they would like to continue to play the unmodified and modified machines. There were no differences in responses for

problem or recreational gamblers (Chi-square = 0.870, $p = 0.647$). Only 14% accurately identified the modifications. Players were unable to identify the maximum bet or bill acceptor modification and only a small minority accurately recognised changes to the speed of reel spin. However, problem and recreational gamblers did not differ in their ability to identify this characteristic (Chi-square = 0.669, $p = 0.716$).

7.8 Club Venues

To examine differences in ratings of enjoyment and satisfaction across machines, a series of paired t-tests were conducted for all the participants who played control and one other modified machine. Differences between the machines emerged for four of the modified machines, as described below:

Maximum bet	Reel spin speed	Bills accepted	Significance
A: \$1	5 second	\$20 only	($t(1,185) = 2.461, p = 0.015$)
B: \$1	5 second	\$50 & \$100	($t(1,181) = 4.169, p = 0.000$)
C: \$1	3 second	\$20 only	($t(1,187) = 0.912, p = 0.363$)
D: \$1	5 second	\$50 & \$100	($t(1,179) = -0.68, p = 0.498$)
E: \$10	5 second	\$20 only	($t(1,174) = 2.089, p = 0.038$)
F: \$10	5 second	\$50 & \$100	($t(1,182) = 1.903, p = 0.059$)
G: \$10	3 second	\$20 only	($t(1,184) = -1.40, p = 0.162$)
H: \$10	5 second	\$50 & \$100	CONTROL MACHINE

Differences were observed for machines A, B, E and F (although F narrowly failed to reach significance). These four machines were rated as less enjoyable than the control machine and all four had the same modification of the slower reel spins.

The same analyses were repeated with satisfaction ratings as the outcome measure. The results were essentially the same, as follows:

Maximum bet	Reel spin speed	Bills accepted	Significance
A: \$1	5 second	\$20 only	($t(1,185) = 2.006, p = 0.046$)
B: \$1	5 second	\$50 & \$100	($t(1,181) = 3.948, p = 0.000$)
C: \$1	3 second	\$20 only	($t(1,187) = 0.063, p = 0.950$)
D: \$1	5 second	\$50 & \$100	($t(1,179) = 1.418, p = 0.158$)
E: \$10	5 second	\$20 only	($t(1,174) = 1.284, p = 0.070$)
F: \$10	5 second	\$50 & \$100	($t(1,182) = 2.275, p = 0.024$)
G: \$10	3 second	\$20 only	($t(1,184) = 1.280, p = 0.202$)

Differences were observed for the same four machines A, B, E and F (although in these analyses it was machine E that failed to reach significance).

These same four machines, that is, those with the slower reel spins, were rated as less satisfying than the control machine. However, the differences in ratings were small, as can be seen from Figure 1.

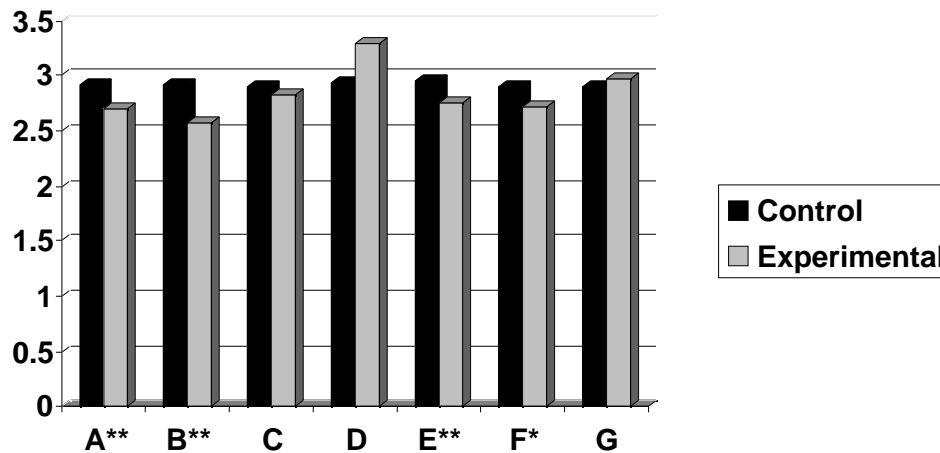
For the 110 participants who played all eight machines, a 2 (bill acceptors) x 2 (maximum bet) x 2 ANOVA (reel spin) with repeated measures was conducted to compare the ratings of enjoyment and satisfaction across each of the eight machines. Only 13 participants who

played all eight machines obtained a SOGS score of 5 or more. Therefore, in the following analyses it was not possible to investigate specific effects of gambling status on enjoyment and satisfaction.

For enjoyment, a main effect was observed for speed of the reel spin speed ($F(1,101) = 5.545, p = 0.02$). Players preferred machines with the unmodified reel spin of 3.5 seconds.

There was also a main effect for maximum bet, suggesting that players preferred the usual maximum bet size of \$10 ($F(1, 101) = 4.795, p = 0.031$) and there was no effect of the modified bill acceptors on enjoyment ($F(1, 101) = 0.055, p = 0.815$). There was no interaction between the modifications, indicating that players were indifferent to the different combinations of modifications.

Figure 1: Mean ratings of satisfaction for control and modified machines in paired comparisons in the clubs. ** $p < 0.05$, * $p < 0.06$.



For satisfaction, the only main effect was for the speed of reel spins ($F(1,101) = 7.952, p = 0.007$). Neither modifications to bill acceptors ($F(1,101) = 0.03, p = 0.81$) or maximum bet size ($F(1,101) = 2.247, p = 0.12$) independently affected satisfaction ratings. However, there was an interaction between these two modifications that reached significance ($F(2,101) = 9.65, p = 0.002$) suggesting that satisfaction ratings were roughly similar when both modifications were included or were absent.

When maximum bets were reduced to \$1 but machines still accepted \$100 bills, or when machines were limited to \$20 denominations but still with \$10 maximum bets, satisfaction ratings were found to be lower. While this finding was highly significant, the effect size is very small as can be seen from the means presented in Table 2.

Table 2: Mean satisfaction ratings (and standard deviations) for machines with and without the maximum bet and bill acceptor modifications.

Maximum Bet \$1 Mean (SD)	Maximum Bet \$10 Mean (SD)
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Bill acceptors to \$20	2.6 (1.04)	2.44 (1.06)
Bill acceptors to \$100	2.55 (1.04)	2.71 (1.12)

Despite these effects, only a quarter of participants were able to identify any modification present. With the exception of one participant, all participants were able to identify the slowing down of the reel spins but no other modification. This is a larger proportion than were able to identify the same modification in the hotel sample.

Despite the fact that so few participants were able to identify the differences between the modified and unmodified machines, when asked to identify which machine they liked most, 23% rated the control machine as preferred. This is in comparison to the 7.5%-15% of participants who preferred each of the other machines. Interestingly, four machines had 10% or fewer participants rate the machines and three of these four machines were those with the slower reel spin modification (Figure 2).

Figure 2: Proportion of participants preferring machines with the modified versus unmodified reel spins.



Similarly, a large proportion of the participants reported that the control machine was configured to take money most quickly (35%) compared to the 4.5% - 13% who reported similar perceptions for the modified machines.

7.9 Discussion

The objective of the satisfaction study was to examine whether proposed modifications would affect the level of enjoyment and satisfaction playing various modified machines. It is interesting to note that most participants (75%) were unable to recognize any modification present with the only modification reliably identified being speed of reel spin. Of the participants, 23% expressed a preference for the control machine above others, and 35% considered that the control machine was configured to take the most money quickly.

In terms of particular modifications, the results indicated that there was little effect on satisfaction or enjoyment of limiting the bill acceptors alone. The only finding in which this modification affected participant's ratings was in interaction with the maximum bet.

Maximum bet did affect satisfaction and enjoyment in some analyses, although the results are somewhat complex and difficult to interpret, particularly in light of the finding that only 1 of the more than 300 participants who took part in this study was able to identify this

modification. Within the hotel context, there was no overall effect on satisfaction or enjoyment associated with limiting the maximum bet to \$1.

However, there was an interaction between gambling status and satisfaction that was significant, a similar trend also being noted for enjoyment. That is, problem gamblers in hotels preferred machines that were limited to \$1 maximum bet, whereas recreational gamblers preferred machines with the option for \$10 maximum bets retained. This is an unexpected finding. It is possible that problem gamblers prefer environmental changes that limit their ability to lose control and larger amounts of money and hence rated the modified machines more positively. However, it is surprising then that gamblers did not recognize this modification explicitly.

This finding also complicates the interpretation of the findings for maximum bet in the clubs. For enjoyment, there was a clear effect that gamblers (most of whom were recreational gamblers) rated machines that would accept \$10 maximum bets more favourably. However, for satisfaction there was no overall preference expressed for machines with a \$10 maximum. Instead, it seemed that players' ratings were only affected by the maximum bet in conjunction with the maximum bill accepted by the machine. That is, ratings of satisfaction were higher for machines where high maximum bets were accompanied by high bill acceptors, or the reverse where the machine had both low maximum bets and bill acceptors.

Those machines where maximum bet was limited, but accepted large bills or where large maximum bets were available but only accepted \$20 or less denomination were rated as significantly less satisfying. It may be that players viewed that to bet high stakes (e.g. \$10 per wager) in a machine that only accepted \$20 notes would be frustrating and hence they rated these machines least favourably. It is surprising that this effect is found without explicit knowledge of the differences between the machine and other machines.

The results for the speed of reel spins are far more consistent. Reel spins affected both enjoyment and satisfaction in all analyses. Players, both in hotels and clubs, expressed preference in their ratings for machines that had the faster speed (3.5 second cycles) rather than the slower machine. This was true of both recreational and problem gamblers. Although these results are clearly consistent across questions, sites, problem and recreational players, the effects are small. The largest difference between ratings of satisfaction or enjoyment across analyses was 0.35 on a five-point scale. Thus, the strongest difference was one equivalent to 8.75% reduction in satisfaction. Most of the differences between machines were even smaller. Nonetheless, these results quite clearly indicate that players express a small but significant preference for machines with faster reel spins.

STUDY 2

BEHAVIOURAL PATTERNS OF PLAY

8 Behavioural study

In order to understand the likely impact of the proposed changes to the patterns of play amongst problem and recreational gamblers, it is important to observe the usual patterns of play amongst patrons in gambling venues. Little is known about the different ways that recreational and problem gamblers play and what characteristics differentiate problem from recreational gamblers. In order to be confident that specific harm minimisation strategies will be effective in reducing harm for problem gamblers, the following to be demonstrated:

- The variables to be modified differentiate problem from recreational gamblers.
- Particular variables predict problem levels of gambling, including amount lost and persistence.
- That introducing the changes influences the way in which gamblers play.
- That the influence is specifically targeted towards problem gamblers.

The present study will give evidence relevant to each of these four issues for the three proposed changes. That is, evidence relating to the speed of play, the use of higher denomination notes and the maximum bet size. In the first instance, whether problem gamblers play more quickly, use higher denomination notes and have larger maximum bet sizes than recreational players will be established. The proportion of problem and recreational gamblers who gamble in wager cycles faster than 5 seconds, bet in excess of \$1 on an individual wager and use the higher denomination bill acceptors will be reported. If the frequency with which both groups utilizes these strategies is the same, then it is less likely that the proposed harm minimisation strategy will have a differential impact on the two groups and be optimally effective.

In addition, it will be determined whether these characteristics of play are associated with problematic levels of gambling or the harm associated with excessive gambling. The use of bill acceptors, speed of play and maximum bet size may be factors that could potentially differentiate problematic gamblers from their recreational counterparts. If this is the case, then targeting these factors should have some influence over the levels of gambling that the problem player engages in. However, if use of bill acceptors, rate of play or maximum bet size do not predict which players have problems with gambling, which players have the heaviest losses and/or which are the most persistent, then they are unlikely to impact upon the type of gamblers for whom harm minimisation strategies target.

Thirdly, characteristics of play for those gamblers who play on the modified machines will be compared for machines with and without each of the three modifications. This will allow a comparison of play on machines that are identical with the exception of each modification. If the characteristics of play are different, one can have confidence that the modification has impacted in some way on the nature of play.

Finally, whether problem and recreational gamblers are equally affected by these changes will be determined.

In this component of the project, the following questions will be investigated:

- Do problem gamblers differ from recreational gamblers in the speed of play, the denomination of the machines and the maximum bet size of over \$1?
- What aspects of play are associated with problematic levels of gambling, amount lost and persistence of play?
- Are the patterns of play observed on the modified machines systematically different from those observed during usual periods of play? If so, do the changes affect problem gamblers specifically or do they affect the play of recreational gamblers?

8.1 Methods

Modified and unmodified machines were placed next to each other at locations chosen by each venue. Each of the seven hotels was allocated a differently modified machine.

The research in the seven hotels was conducted over five hours per day for seven days in a row in peak periods. Peak periods were determined by the turnover graphs provided to the researchers by each of the venues. While these times varied slightly, most of the periods were in the evenings, with the exception of the weekends where daytime periods were also sampled from several of the hotels.

Peak periods were chosen in the hotels in order to maximize the number of participants likely to be recruited. Seven consecutive days ensured a representative sample of those players who gambled during the peak periods, although those who only gambled at other times (e.g. during weekdays) were not represented.

Two hotels chose to withdraw from the study after five days of participant recruitment.

In each of the four clubs, eight experimental machines were placed in each of the venues in a bank of machines in a location chosen by the Club Manager. The eight machines represented every combination of the three proposed changes, including the control machine, as described above.

In the clubs, the research was also completed over seven consecutive days. Research assistants were present ten hours each day. The times were chosen in the venues to ensure that all time periods were sampled, with the exception of times between 1.00am and 9.00am. Times in the early morning were excluded in order to ensure the safety of the researchers. Thus, the participants were likely to be representative of those who gamble during the periods sampled, but do not represent players who gamble only during the hours of 1.00am to 9.00am. The excluded times do not reflect peak times of trading at any of the clubs in the present study.

Patrons were invited to participate in the study by researchers as the prospective participant approached the gaming floor. Where possible, patrons were not approached once they were already playing machines.

In hotels, patrons were made aware of the research by signs that were posted in convenient locations around the gaming floor. In addition, each of the experimental machines bore a sign indicating that the machines were experimental machines, but that the chance of winning was unchanged.

In clubs, the PA system was also used to announce the research and encourage patrons to participate. Signs were also placed around the clubs and flyers were placed in the coin return trays of each machine in the venue.

Patrons who volunteered to participate were instructed that they were to play as they wished, with their own money and that the researcher would simply observe the way that they chose the play. When the person had completed their period of play, they were then asked to complete the South Oaks Gambling Screen.

8.2 Participants

A total of 779 participants agreed to take part in the study. The majority of these participants ($n = 593$; 76% of the sample) were recruited from club venues. Therefore, clubs patrons are likely to be over-represented in the analyses based on the combined sample of hotel and club patrons.

8.3 Results

8.4 Proportion of Problem Gamblers in the Sample

Data was available from the South Oaks Gambling Screen (SOGS) for 634 participants (81.5%) of the sample (see Table 3).

Table 3: SOGS scores for $n = 634$ participants

SOGS Score	Percentage
Less than 4	80.4
5 to 9	14.8
10 or more	4.7

The majority of participants (80.4%) fell within the non-problem gambling range for the SOGS (i.e. 0 – 4). Subject to the classificatory cut-off point used, that is, a score of 5 or more or ten or more, the rate of problem gamblers found in the combined sample of hotel and club patrons was 20% or 5%, respectively.

The rate of problem gambling differed significantly between the hotel and clubs ($t(2,632) = -4.518$, $p < 0.0005$) with significantly more problem gamblers being found within the hotel sample.

The mean SOGS score for the club sample was 2.05 ($SD = 2.76$) with 83.7% falling within the non-problem range, 12.5% demonstrating a likely problem with gambling (SOGS score of 5 to 9), and 3.7% meeting the 10 or more SOGS score criteria. This provides a rate of 16.2% for club participants obtaining a SOGS score of 5 or more.

In contrast, for the hotels sample, 72% fell within the non-problem range, with 20.7% demonstrating likely problems with gambling (SOGS score of 5 to 9) and a further 7.3% representing a severe problem. This provides a rate of 28% for hotel participants with a SOGS score of 5 or more. The mean SOGS score was 3.28 ($SD = 4.7$).

8.5 Use of bill acceptors, fast rates of play and bet sizes in excess of \$1

The three variables of use of bill acceptors, speed of play and bet size were dichotomized to give the proportion of players who used higher denomination bill acceptors, those who played with reel spin faster than 5 seconds and those who made median wagers in excess of \$1.

The proportion of players who used these features was calculated across the sample. In addition, the proportion of players by gambling status was compared using Chi-square analyses.

A small proportion of the sample was observed to use each of these three features in the present study. Only 12.8% (n = 514) of the sample were observed to use higher denomination bill acceptors, 11.6% (n = 332) of the sample were observed to use a rate of play faster than 5 seconds and as few as 3.5% (n = 497) were observed to wager in excess of \$1 per bet. Note: to estimate rate of play the total length of the session was divided by the number of plays to obtain an average number of seconds per play. This estimate needs to be qualified by the fact that some gamblers may have used gamble option or have obtained free spins that would lead to an apparent slower rate of play. Therefore it is accepted that the reported rate of play may be underestimated.

Differences in the usage rates of these features were found between problem and recreational gamblers in respect to use of higher denomination bill acceptors (Chi-square = 14.079, p = 0.007). It was found that 10% of recreational gamblers compared to 22% of problem gamblers used the higher denomination bill acceptors.

Similarly, there were observed differences between problem and recreational gamblers for the proportion of players who bet in excess of \$1 per wager (Chi-square = 6.807, p = 0.03), with 2.3% of recreational and 7.5% of problem gamblers wagering the higher amounts.

Speed of play, however, did not demonstrate significant differences between problem and recreational gamblers. Only 12% of the entire sample, 12% of recreational gamblers and 14.7% of problem gamblers used wage cycles in excess of the 5 second reel spin across sessions of play.

8.6 Characteristics of Problem versus Recreational Gamblers Play

A 2 x 2 Multiple ANOVA statistic was conducted on the following variables: age, time gambled, number of bets, median credits played, median lines played, net losses, rate of play, number of cigarettes smoked, number of alcohol drinks consumed and visits to the ATM (See Table 4).

Table 4: Differences between Control and Modified machine according to the particular modification. Positive differences indicate reductions in aspects associated with the introduction of the modification. * p < 0.05, ** p < 0.01.

Difference between Control and Modified Machine	Maximum Bet \$1	5 Second Reel Spin Speed	Bill Acceptors Modified
Time spent gambling	4.6 minutes**	-2.7 minutes	1.52 minutes
Number of bets	11.73*	-6.7	0.56

Credits per line	0.03	0.26	0.29
Lines per wager	-0.29	-0.02	-0.13
Net Loss	\$5.19*	\$2.32	\$4.58
Use of bill acceptors > \$20	0.57	0.24	0.55
Cigarettes smoked	0.11*	0.01	-0.06
Alcohol consumed	0.22**	0.0	0.02
ATM visits	0.02	0.03	-0.02

Many of the variables were not normally distributed but, where appropriate, were transformed using square root or logarithmic transformations dependent upon the degree of data skew.

Sex differences and median bet size were analyzed using two Mann-Whitney U tests examining the differences between hotels and clubs and the difference between problem and recreational gamblers.

Differences were observed for problem gamblers versus recreational gamblers for sex ($U(1,571) = -3.200$, $p < 0.001$) and median bet size ($U(1,496) = -4.051$, $p < 0.0005$). Similarly, sex differences were observed between hotels and clubs ($U(1,755) = -7.034$, $p < 0.0005$), and differences were also found between the median bet size in the two venues ($U(1,661) = -4.051$, $p < 0.0005$).

In summary, these results indicated that problem gamblers were more likely to be male and to bet more heavily on each wager. Similarly, hotel patrons were more likely to be male ($U(1,755) = -7.034$, $p = 0.000$) and bet more heavily ($U(1,661) = -4.205$, $p = 0.000$).

For the other variables, parametric analyses were available which allowed the interaction between venue and gambling status to be examined as well as the main effects.

Main effects for gambling status were found for number of bets wagered ($F(1,278) = 3.916$, $p = 0.049$), credits staked per line ($F(1,278) = 13.496$, $p < 0.0005$), total lost in the session ($F(1,278) = 17.308$, $p = 0.0005$), number of cigarettes smoked ($F(1,278) = 8.760$, $p = 0.003$) and alcohol consumed ($F(1,278) = 9.599$, $p = 0.002$). A trend was also observed for the amount of time spent gambling ($F(1,278) = 3.068$, $p = 0.081$). No other main effects were observed for gambling status.

These results indicated that those scoring above the cut-off score on SOGS for problem gambling made more bets, staked higher credits on each bet, sustained greater losses, smoked more cigarettes and consumed more alcohol during play than those scoring in the non-problem range on the SOGS (score less than 5). There was also a trend for problem gamblers to spend more time gambling than recreational gamblers.

Main effects that differentiated patrons of clubs and hotels were also observed. Differences between hotel and club patrons emerged for age ($F(1,278) = 59.245$, $p < 0.0005$), time spent gambling ($F(1,278) = 14.354$, $p < 0.0005$), number of bets ($F(1,278) = 13.815$, $p < 0.0005$), number of machines played ($F(1,278) = 4.678$, $p < 0.031$), amount lost ($F(1,278) = 10.219$, $p = 0.002$), number of cigarettes smoked ($F(1,278) = 3.881$, $p < 0.001$) and amount of alcohol consumed ($F(1,278) = 18.086$, $p < 0.0005$).

These results indicated that players recruited from the hotels were younger, spent less time gambling, made fewer bets and played fewer machines. However, hotel patrons were noted

to have had heavier losses, played more lines, smoked more cigarettes and consumed more alcohol.

In addition to the main effects, a number of interaction effects between gambling status and venue were found. Interactions were found for credits wagered ($F(2,278) = 4.139, p = 0.043$), total losses incurred ($F(2,278) = 10.466, p = 0.001$) and visits to ATMs ($F(2,278) = 3.999, p = 0.046$). There was also a trend towards an interaction effect for the amount of time spent gambling ($F(2,278) = 3.136, p = 0.078$). The means are available in Table 5.

Table 5: Means (and standard deviations) for variables for patrons in clubs and hotels and recreational and problem gamblers.

	Hotels (n = 80) Mean (SD)	Clubs (n = 218) Mean (SD)	Recreational (n = 231) Mean (SD)	Problem (n=67) Mean (SD)
Age	30 (9.8)	50 (18.6)	46.1 (19.2)	39 (19.0)
Speed of play (sec)	6.8 (4.4)	7.8 (5.8)	7.5 (5.8)	7.5 (3.8)
Time gaming (min)	21.1 (24.0)	31.3 (38.7)	28.8 (35.8)	41.6 (31.7)
Number of bets	152.9 (229.3)	247.8 (317.4)	198.8 (249.6)	303.4 (420.3)
No. machines played	1.44 (1.24)	2.5 (4.14)	2.24 (3.76)	2.12 (3.13)
Lines played	18.3 (6.4)	15.9 (6.3)	16.5 (6.4)	16.6 (6.3)
Credits wagered	2.2 (2.1)	2.3 (3.4)	1.8 (2.2)	3.7 (4.8)
Amount lost	\$24.97 (39.5)	\$25.10 (59.3)	\$16.80 (33.3)	\$53.60 (92.3)
Cigarettes smoked	0.65 (1.11)	0.35 (1.26)	0.3 (0.8)	0.9 (2.0)
Alcohol consumed	0.71 (1.0)	0.35 (0.91)	0.32 (0.86)	0.91 (2.4)

These results indicate that problem gamblers in hotels sustained heavier losses than problem gamblers in clubs, whereas recreational gamblers in hotels lost less than recreational gamblers in clubs. The mean total loss for problem gamblers in the hotels was \$28.41 (SD = \$42.02) as compared to \$17.49 (SD = \$36.77) for those in the club sample. However, recreational gamblers in the clubs lost on average \$14.16 (SD = \$24.98) while those in the hotels lost \$9.70 (SD = 18.67).

The use of ATMs was higher for problem gamblers in the hotels, but did not differ amongst problem or recreational gamblers in the clubs.

In clubs, problem gamblers gambled more credits than recreational gamblers, but this difference was not found among hotel participants.

Similarly, there was a trend towards problem gamblers spending longer time in clubs that was not evident in hotels.

8.7 Predictors of Gambling Problems, Net Loss and Persistence of Play

A series of multiple regression equations were conducted in order to determine which observed factors predicted gambling status, severity of self-reported gambling problems, and net losses and persistence within session. Since many of the variables are associated with each other, these analyses allow the independent contribution of each individual variable to be determined.

In order to predict gambling status (i.e. whether a patron scored over 5 on SOGS or not), the following variables were entered into a logistic regression analyses as predictor variables: venue, age, gender, time spent gambling, number of bets, number of machines, lines played, credits wagered, cigarettes smoked, alcohol consumed, denomination of machine, use of bill acceptors, visits to the ATM and playing speed.

The model significantly predicted problem gambling status, with the following variables being independent predictors of problem status: age (Wald (1,302) = 10.03, $p = 0.002$), credits wagered per bet (Wald (1,302) = 12.06, $p = 0.03$) and play rate (Wald (1,302) = 3.843, $p = 0.05$).

These results suggesting that those who score in the problem range for gambling are younger, wager more credits per bet and play more quickly.

A multiple regression equation with simultaneous entry of variables was conducted to predict severity of gambling based on SOGS scores. The same set of predictor variables was entered into the equation. The full set of predictors accounted for 15% of the variance in scores on the SOGS, 12% of the variance was accounted for by four factors, three of which contributed independent variances to the severity of gambling problems. Those four variables were age ($t = -2.583$, $p = 0.01$), number of credits wagered ($t = 2.375$, $p = 0.18$), amount of money lost ($t = 3.060$, $p = 0.002$) and the number of cigarettes smoked ($t = 1.77$, $p = 0.08$).

These results indicate that younger players, who play more credits per wager, lose more money and tend to smoke more cigarettes, are more likely to have higher scores on the SOGS.

In addition to predicting status of gamblers with regard to problem versus non-problem status or severity of reported problems, multiple regression analyses were conducted to predict net loss during the observed pattern of play and persistence of play (i.e. time spent gambling). Predictor variables entered into the equation simultaneously were sex, venue, SOGS score, denomination of machine, credits wagered, lines played, number of bets, age, time spent gambling, rate of play, alcohol consumption, use of bill acceptors, cigarette usage and visits to the ATM. The model accounted for nearly 40% of the variance in net loss during the observed session of play ($F(14, 307) = 15.738$, $p = 0.000$). The following six variables contributed independently to the variance in net loss, gambling status according to the SOGS ($t = 3.060$, $p = 0.002$), number of bets ($t = 1.974$, $p = 0.049$), credits per line wagered ($t = 5.997$, $p = 0.000$), amount of alcohol consumed ($t = 2.471$, $p = 0.014$), visits to ATMs ($t = 5.828$, $p = 0.000$) and venue ($t = -2.212$, $p = 0.028$).

These results indicate that those who reported higher levels of gambling problems, who made more bets, wagered more credits per line, drank more, visited more ATM machines and were in clubs were more likely to have larger losses.

The same variables were entered into multiple regression equations to predict time played by entering the time variable as the dependent variable and the loss variable as a predictor variable. All other predictor variables were held constant. The equation to predict persistence was highly significant ($F(4,307) = 341.668$, $p < 0.0001$) and the combined model accounted for 94% of the variance in time played. In other words, the model

accounted almost perfectly for persistence of play in this group of participants. Only four of the variables contributed a significant amount to the variance. These variables were the number of bets made ($t = 53.426$, $p < 0.001$), the number of machines played ($t = 2.319$, $p < 0.02$), the number of cigarettes smoked ($t = 2.411$, $p = 0.016$) and the rate of play ($t = -24.325$, $p < 0.0001$).

These results indicated that those players who made more bets, played more machines and smoked more were also more likely to play for longer periods. Interestingly, the relationship between rate of play and persistence was negative. That is, gamblers who played slower (once all other variables were controlled for) played for longer periods. Rate of play was a very strong predictor and when the regression analyses were conducted with and without this variable: rate of play in itself contributed 12% to the variance in persistence.

8.8 Effect of Modified Machines on Patterns of Play

Two hundred and ten participants played at least one of the modified machines. However, the number that played any particular machine of the eight combinations varied between 30 participants down to only 8. Therefore, analyses were performed that compared those machines with and without each of the three variations.

Mann-Whitney U-tests comparing the gambling patterns of players who played the modified machines with limited maximum bet compared to those without limited maximum bet demonstrated differences on a number of variables. Differences were observed for time spent gambling on the machine ($U(1,170) = -2.920$, $p = 0.03$), number of bets ($U(1,205) = -2.012$, $p = 0.04$), total loss ($U(1,208) = -2.485$, $p = 0.013$), number of cigarettes smoked ($U(1, 208) = -2.248$, $p = 0.025$) and alcohol consumed ($U(1,207) = -3.471$, $p = 0.001$). No differences were observed for the number of lines, credits, use of bill acceptors or use of ATMs.

These results indicated that those playing machines with the usual \$10 limit on the maximum bet played the machines for longer, placed more individual wagers, lost more money, and smoked and drank more. It was not possible to identify whether these patterns were specific to problem gamblers as an insufficient number of problem gamblers were available in the analysis.

Mann Whitney U tests were also performed to look for differences in patterns of play between players who played machines with the fast (3.5 second) and slow (5 second) minimum reel spin; and for machines with and without the high denomination bill acceptors. No differences were observed between any of the variables. That is, neither of these modifications was associated with any differences in the time spent on machines, the number of bets placed, the amount lost, credits or lines staked, nor for alcohol or cigarette consumption or visits to the ATM.

8.9 Discussion

The aim of the present study was fourfold. Firstly, to determine whether problem gamblers differed from recreational gamblers on the variables proposed for change. Secondly, to establish which variables of play were associated with problematic levels of gambling, amount lost within session and persistence. Thirdly, to determine whether design changes affected behavioural pattern of players. Finally, to determine whether changes associated

with the modified machines were specific to problem gamblers. These data will allow the likely efficacy of these three strategies as harm minimisation strategies to be determined.

8.10 Limitations of the Present Study

The present study has a number of strengths with regard to its design. The study is relatively naturalistic with no attempt made to influence the manner in which participants played. It was conducted in actual venues and therefore has considerable ecological validity. Patrons attending venues with the explicit purpose of gambling were recruited as participants, and these participants played with their own money. A large sample of participants was recruited into the study.

Sampling occurred for each day of the week. In the clubs, data representing most times of the day was collected. The modified machines were reconfigured specifically for this study with each machine identical to the other modified machines with the exception of the three systematically manipulated variables.

Nonetheless, there are some limitations of the study that need to be considered. The first is the likely recruitment biases inherent in conducting a research project of this nature. It was not possible to determine the proportion of participants approached who agreed or not to take part in the study. Anecdotal observations by research assistants suggest that a large proportion of those approached did not wish to take part.

Nothing is known about whether those patrons differed systematically from participants, but it is likely that there are systematic differences. In the hotels, for example, few of the 'regular' gamblers in most venues agreed to take part. Similarly, the vast majority of participants appeared to be of Euro-Australian descent. It is intuitively likely that problem gamblers may have been more reluctant to volunteer for the study. While these differences were the impressions formed by researchers in the venues, no data is available from patrons who refused to take part and therefore these can only be speculative. Study 3, however, will allow a comparison of gambling patterns between those that volunteered versus other patrons who are members of the particular venues. The results of Study 2 therefore should be used as a guide to inform decision-making policies with the proviso that findings may not be generalized to the total population of hotel and club patrons.

The second limitation relates to the fact that simply observing regular patterns of play is likely to affect the way in which individuals gamble. Participants may have changed the way they play in order to maintain an "appearance" of 'normal' or 'expected' gambling behaviour. It would seem reasonable to suggest that under such demand characteristics, players may have been less likely to place larger bets while observed than they might otherwise.

Similarly, participants may have played at a slower pace in order to appear more moderate in their play or because they were distracted by the observer. Although observers were instructed not to talk to participants while they played, inevitably some interactions initiated by participants took place. This is likely to have affected the manner in which players gambled. Assuming that players will gamble more moderately while being observed has implications for the interpretation of data. For example, the proportion of players who gambled with a rate faster than the five seconds, who use higher denomination bill acceptors or who had maximum bets of over \$1 may be underestimated. However, it may also mean

that any relationships between variables observed in the present study are likely to be underestimates of the true extent of the relationship.

Another major limitation of the study is that the venues were not chosen randomly or in order to represent the distribution of various socio-economic variables. Rather, hotels and clubs were chosen if they used the turbo data system employed in Study 3 and if they agreed to take part in the study. All the hotels were in the Sydney metropolitan area and thus regional hotels were not represented. Moreover, not all venues resulted in the same recruitment rates with some hotels and clubs generating considerably larger samples. This neither the venues or the participants can be construed as being representative of their respective populations.

While major factors that may have influenced recruitment rate included the support from management for the study, the number of machines and/or patrons in the venue, demographic variables of the patrons were also likely to affect recruitment. Again, these factors warrant caution in extrapolating these results to all gamblers across NSW or indeed other states or countries.

8.11 Prevalence of Problem Gambling

In our sample, 15% of the club participants and nearly 20% of the hotel participants volunteering for the study scored above the SOGS cut-off point of five for likely problems with gambling. More participants who volunteered in the hotels reported problems with gambling than those who volunteered in the clubs. However, in analyses where other variables were controlled for, this seemed to reflect the higher proportion of young people who were patrons in hotels. Younger age appeared to confer additional risk of having problems with gambling, rather than attending hotels per se.

The degree to which a prevalence rate of 15-20% of patrons experiencing problems with gambling is an accurate one of the prevalence of problem gambling within venues is unclear for a number of reasons. Firstly, the SOGS is a problematic instrument in that it assesses lifetime prevalence of problems with gambling. This means that recovered problem gamblers will still score in the problem gambling range, which can potentially lead to an overestimate of the proportion of patrons who experience problems. Importantly, there were predicted differences amongst players between those scoring over the SOGS cut-off, indicating that these players were heavier gamblers and at the very least likely to be vulnerable to problems with gambling.

While the SOGS may lead to some overestimation of the proportion of individuals who have problems with gambling, one must also consider the recruitment and reporting biases that are likely to have affected the nature of the sample. As mentioned previously, it would be expected that problem gamblers might be less likely to volunteer for the research. However, without information on the gambling status of this group, this is impossible to determine. Similarly, response biases may also have led to some reluctance to admit problems, which may again have led to an underestimate.

It seems difficult to know how accurate the rates of problem gamblers reported in this study are. There are factors that may lead to an overestimate and those that may lead to an underestimate. On balance, these rates of problems within venues are probably indicative of a relatively large minority of patrons in hotels and clubs who experience problems

controlling their gambling. Whether or not these patrons desire or would utilize treatment services is a separate matter for consideration.

8.12 Characteristics and Predictors of Problem versus Recreational Gamblers

The harm minimisation strategies that have been proposed assume that problem gamblers more often bet over \$1, play quickly (i.e. rate of play less than 5 second cycles) and more often use bill acceptors. This assumption was tested in the present study with qualified support found for two of the three variables.

Problem gamblers often wagered more than \$1 per bet than recreational players and utilized high denomination bill acceptors more frequently. Although rate of play was associated with problematic levels of gambling, problem gamblers in the present study did not more often play quicker than a 5-second play cycle.

Indeed, the degree to which participants relied on these three strategies was surprisingly low. That is, only 12% of participants used bill acceptors, 11% wagered more than \$1 per bet and only 3.5% played at rates faster than 5 seconds across the entire period of play. These percentages may underestimate the true rates of play if participants were playing more conservatively than usual as a result of being observed. However, if these rates are accurate it is unclear whether changing these features would be helpful to a large proportion of players.

In regression analyses, problems with gambling were predicted by younger age. In fact, once age was controlled, hotel-based gamblers were no longer more likely than club participants to be problem gamblers. Problem gamblers predictably played longer, placed more bets and experienced more losses. Problem gamblers were also more likely to smoke and drink more heavily.

However, the two features of play that accounted for variance in problem gambling were the number of credits played and the speed of play. Speed of play was a factor in predicting which players were problem gamblers, but did not predict severity of gambling according to the SOGS.

Number of credits played (but not lines) predicted both the presence of likely problems and their severity. The majority of players played the maximum number of lines available in both problem and recreational gambling groups, but problem gamblers were more likely to wager more credits per line. Moreover, the tendency to gamble this way was a strong, independent predictor of problems with gambling. Use of high denomination bill acceptors was not predictive of gambling status or of gambling severity.

Gambling in hotels was also heavier, characterized by more time gambling and increased smoking and drinking. As described earlier, the heavier rates of problem gambling in hotels was primarily related to the younger age of participants, rather than differences in betting strategy. There were, however, some interactions between the venue in which the participant was recruited and their gambling status. For example, recreational gamblers in hotels actually bet less than recreational gamblers in clubs, but the reverse was true for the problem gamblers in both venues. That is, problem gamblers in hotels actually bet more than those in the clubs. Similarly, it was in the hotels that problem gamblers made more use of ATMs, but problem gamblers in clubs did not. Similarly, recreational gamblers in clubs gambled fewer credits than problem gamblers or recreational gamblers in hotels. Problem gamblers in

hotels gambled more credits than problem gamblers in clubs or recreational gamblers in hotels.

One feature that may account for these interactions is the role of alcohol in inhibiting self-control. If one assumes that one of the most accurate indicators of loss of control is within session losses, then it is of interest that losses were predicted by gambling status and venue. That is, problem gamblers in hotels made the greatest losses.

Players who made more bets with a higher number of credits wagered per line also suffered heavier losses. Interestingly, heavy losses were the only aspect of gambling in the regression analyses that were predicted by alcohol consumption and visiting the ATM.

Together, these factors suggest that those problem gamblers who gamble in hotels and drink heavily are particularly at risk for losing control. Alcohol was associated with heavy losses, as were betting a large number of credits per line and accessing additional funds. These factors combined predicted the total amount lost within the observed session of play, accounting for 40% of the variance.

Given that net loss should also be affected strongly by other factors, such as random outcomes of electronic gaming machines and amount of disposable income, these findings suggest that loss of control associated with alcohol contributes significantly to net losses experienced by players, even when other factors are controlled for. Notably, however, with the exception of increased credits (which relate to the maximum bet), neither speed of play nor bill acceptors were related to losses.

Speed of play was related to persistence. Persistence (i.e. time spent gambling) was predicted by the number of bets made, the number of machines played and the number of cigarettes smoked. However, these factors are artificially associated with persistence in that in order to play for a long time, a person is present in the venue for longer and hence would be likely to play more machines, place more bets and smoke more. When controlling for these three variables, the only other variable to predict persistence was speed of play.

It was the participants who gambled more slowly who were likely to play for longer. Indeed, speed of play accounted for 12% of the variance in persistence on its own. This is an important finding because it suggests that if one were to slow down the speed with which the wager cycles were played, players might simply play for longer. This suggests that slowing down the speed of games might actually increase the harm associated with gambling because the gambler would remain at the machines longer. Further research is required to clarify this point.

While at a theoretical level, reducing the maximum bet to \$1 could increase the length of each gaming session there was no evidence to support this expectation. One explanation is that changing the maximum bet size affects the choices that a player can make about how much to bet on individual wagers. This may interfere with the player's tendency to chase losses and as a result, cause her/him to cease play or to seek substitute forms of gambling that allowed larger bet sizes. In contrast, slowing down the reel spin may not affect the amount a player chooses to gamble or her/his capacity to chase losses and therefore would have no effect on persistence in play.

8.13 Effect of modified reconfigurations on gambling behaviour

Unfortunately, the sample size available for assessing the reconfigurations of modified machines was insufficient to allow interactions between the different variations to be compared. There was sufficient data to allow the main effects for each of the three proposed changes to be examined.

Neither the limiting of bill acceptors nor the slowing down of the reel spin to 5 seconds affected the gambling behaviour of the participants in the present study. There was a large effect on almost all variables of reducing the maximum bet to \$1. Players on these machines played for less time, made fewer bets, lost less money and drank and smoked less than the players who played machines with a maximum bet of \$10.

Interpretation of this finding is complicated by the fact that in the study design, participants could choose to move from one machine to another, if they did not like one aspect of the machine. This would not be the case if harm minimisation strategies were brought in within all venues in NSW. The differences between play on machines with a limited maximum bet may represent the choice of some players to change machines in favor of a machine that allows larger wagers. Nonetheless, coupled with the predictive value of number of credits wagered in other analyses, these findings support the view that reducing the maximum bet to \$1 would be an effective harm minimisation strategy with regard to its ability to reduce the impact on vulnerable patrons.

8.14 Discussion

This study specifically aimed to assess the degree to which the three proposed strategies would be effective in minimizing problems associated with gambling. There was little evidence from any of the analyses that reconfiguring the bill acceptors on electronic gaming machines would reduce the gambling behaviour of either problem or recreational gamblers. Only 22% of problem gamblers in the present study used higher denomination bill acceptors. While this was twice the rate as those in the recreational gambling group, the use of bill acceptors did not appear to be independently related to any aspect of problem gambling. Introducing of the modified machines to limit bill acceptors was not associated with differences in any aspect of play.

Results relating to reel spin supported the fact that problem gamblers bet more quickly than recreational gamblers. However, there was no difference in the proportion of problem versus recreational gamblers who bet on wager cycles that were on average less than 5 seconds per bet. Only 14% of problem gamblers used wager cycles that were faster than the proposed 5 seconds speed. This suggests that if the speed of wager cycles were reduced to 5 seconds, this modification would affect only a small proportion of the minority of gamblers who experience problems with their gambling.

Speed of play did predict those individuals who had problems with gambling but failed to predict the severity of reported gambling problems or the size of losses. Speed of play did predict persistence, such that those who played more slowly, when other factors were controlled for, gambled for longer periods.

These results offer a complicated picture that is difficult to interpret. Although problem gamblers did play more quickly, few gambled more quickly than the 5-second wager cycle, and on the modified machines there was no effect of changing the speed of the reel spins.

Hence, there was only weak, indirect evidence that this modification may produce some benefit to a small proportion of problem gamblers.

However, since speed of play was inversely associated with persistence, this suggests that slowing down the reel spin may have unintended negative consequences, such as increasing the time that players gamble. However, other data from the turbo study suggests that most recreational gamblers could absorb the additional time within the overall time spent at the venue. The data suggests that patrons spend only a portion of their time gambling at a venue. Thus, if the rate of play was slowed, it may mean that they gamble may elect to play for a longer period of time but accommodate for this by spending less time in other activities at the venue. This means that the overall length of time spent at the venue would not change. However, for a proportion of problem gamblers, slowing the reel spin could potentially prolong their time if they attend the venue only for the specific purpose of gambling. Further research is required to determine this issue.

In conclusion, on the basis of this study, there is very weak evidence to suggest that slowing down the reel spins of electronic gaming machines may help a small proportion of problem gamblers, but there is evidence of potential unintended negative consequences, specifically that it may simply extend the period of play for a cohort of individuals.

The interpretation of results of data related to the lowering of the maximum bet size is clearer. In practice, lowering the maximum bet size means lowering the number of credits that are staked per line. Evidence from this study consistently supports the fact that increased bet size is associated with problematic levels of gambling.

Although only a few participants in this study bet over the \$1 maximum bet, the number of credits usually staked was consistently associated with gambling variables. Credits predicted gambling status, severity of problem gambling and the amount lost within an individual session. Of the gambling variables, lowering the available credits on the modified machines markedly reduced time spent gambling, number of bets and losses.

In addition, the benefits of reduced cigarette and alcohol use were observed. This latter finding may be an artifact. That is, because participants played for less time on these machines, they smoked and drank less. However, it may also be associated with the levels of tension that are engendered by higher wagers. That is, as the wager becomes greater, the player becomes more on edge and makes greater use of nicotine and alcohol to “settle their nerves”. Future research would be needed to clarify these relationships.

The results from this study suggest that reducing the maximum bet size to \$1 through reducing the number of credits wagered per line is likely to be effective in reducing losses and reducing the severity of gambling particularly for those who are vulnerable. These results suggest that from the perspective of the effect of this strategy on the problem gambler, reducing the maximum bet size would produce the intended benefits with no evidence of unintended negative consequences.

However, the other proposed modifications of slowing down the reel spins and reconfiguring bill acceptors to accept only lower denominations were not supported. In the case of reconfiguring bill acceptors, there was little evidence that this would affect gambling behaviour from any of the analyses. For slowing down the reel spins, some weak, indirect evidence suggested that for a small proportion of problem gamblers this might be of

potential benefit. However, this finding needs to be weighed against the finding that participants who use slower wager cycles, simply play for longer periods, suggesting that the introduction of this modification may be associated with longer periods of play. For problem gamblers this may result in even greater disruption to other activities, such as employment and relationships.

STUDY 3 EXPENDITURE

9 Expenditure on Modified Machines

Study 3 concerns the variation in expenditure on the modified machines compared with the standard machines. Expenditure on the machines was monitored automatically by the Turbo computer system that is used by some clubs and hotels to maintain a record of the performance of different machines.

Aim 1: to compare expenditure on modified and unmodified machines and to evaluate the impact that the modifications have on player expenditure.

Aim 2: to determine whether the time spent on the modified machines by problem gamblers is different to that for recreational (non-problem) gamblers.

9.1 Method

Data Source

The turbo monitoring system for poker machines automatically logs two kinds of information:

- A summary of cash flow for each machine logged on a daily basis.
- An ongoing log of bonus points for each player based on the insertion of player loyalty cards in machines.

The daily metre readings provide four measures of cash flow that can be used to assess the performance of a machine:

- Turnover: the sum of the bets made including reinvested wins.
- Cash in: the sum of the money entered in a machine.
- Cash in-cash out: the sum of the money lost by players, excluding large wins.
- Take: the total money lost (or won) by players including large wins.

Venues are required by law to pay out wins in excess of \$1,000 by cheque. They may also pay smaller wins by way of cheque. Thus, cash in-cash out and take are not necessarily equivalent.

Clubs and hotels issue player loyalty cards to members allowing them to acquire a range of bonuses by inserting their cards in machines when they wish to play. Provided that the player's card is inserted, the turbo system logs the bonus points accrued in play and the time at which the bonus points were awarded. Thus, the bonus log provides a reasonably accurate measure of the time spent playing each machine, provided that the player's card is entered.

Period of Observation

The study was conducted over a two-week period in four clubs and seven hotels. This period was:

- Clubs: July 27 to August 2 (week 1) and August 3 to August 9 (week 2)
- Hotels: June 28 to July 4 (week 1) and July 5 to July 11 (week 2)

9.2 Procedure

9.3 Experimental Design

The study can be regarded as taking place at five venues. The venues consisted of four clubs and one set of seven hotels. From the perspective of the design, the set of seven hotels is equivalent to one club. Whereas each club had fourteen 'Pirates' machines dedicated to the study over the two-week period, the set of hotels had two 'Pirates' machines per hotel representing fourteen machines in total.

In week 1 all machines were standard (unmodified) with a \$10 maximum bet, 3.5-second reel spin speed, and a note acceptor that accepted the full range of notes from \$5 to \$100. The machines were distributed around the gaming floor in pairs. Thus, in hotels there was one pair and in clubs, seven pairs of machines with each machine in a pair placed side by side.

In week 2, one machine in every pair was modified. Thus, players in clubs could play any of seven modified or seven unmodified machines. In hotels, players could play one modified and one unmodified machine. The seven modified machines in week 2 had the following characteristics:

- Machine 1: \$1 maximum bet.
- Machine 2: 5 second game.
- Machine 3: limited bill acceptor (\$20 max).
- Machine 4: \$1 maximum bet & 5 second game.
- Machine 5: \$1 maximum bet & limited bill acceptor.
- Machine 6: 5-second game & limited bill acceptor.
- Machine 7: \$1 maximum bet, 5-second game & limited bill acceptor.

This design controls for location on the gaming floor, unintended difference between machines in pairs (for example, a difference in loudness or brightness), and prior experience with the machines by players. Thus, the design is a four-group design for each modification:

- Week 1: Standard & Standard;
- Week 2: Standard & Modified.

9.4 Expenditure on machines

Expenditure on machines was monitored automatically by the turbo system for the two weeks of the study.

Three indices of players' expenditure on each machine, measured in dollars, were calculated from the daily log of meter values:

- Cash in.
- Cash in-cash out.
- Take.

Analysis of turnover data is provided in a separate report (the Centre for International Economics Report, *Gaming machine revenue at risk: The impact of three proposed modifications to gaming machines in NSW*).

Time spent on machines

Only participants who had given permission for their play to be tracked as part of this study were included. Thus, data from all other participants were automatically excluded from the database.

From the bonus log data, time on each machine for each participant was calculated from the time of the first and last events recorded. This data yields three indices of time on machines for each week of the study:

- Total time spent playing poker machines.
- Time spent playing each standard 'Pirates' machine (14 in week 1, 7 in week 2).
- Time spent playing each modified 'Pirates' machine (7 in week 2).

Measure of problem gambling

Participants who gave permission for their bonus log data to be analysed completed the South Oaks Gambling Screen (Lesieur & Blume, 1987). Lesieur and Blume recommend that a score of 5 or more on the SOGS be used to define a problem gambler. In Australia, research has shown that problem gamblers seeking help to control their gambling typically score 10 or more on the SOGS. Scores of 5 to 9 are used to define gamblers at risk of developing serious problems (Dickerson et al, 1995).

In this study, the intent is to determine whether problem gamblers spend relatively less of their time on the modified machines in week 4 than do recreational gamblers. Thus, three groups of gamblers were defined in order to examine this question:

- Recreational gamblers: score less than 5 on the SOGS.
- Gamblers at risk: score 5-9 on the SOGS.
- Problem gamblers: score 10 or more on the SOGS.

9.5 Limitations to the interpretation of data

It is important to note that this study is being conducted under conditions of choice. Players may elect to play the standard or modified machines or to avoid them. If all machines were modified in any of the ways investigated here, it would not be possible to draw strong inferences concerning expenditure and time on machines under conditions of no choice from the data available in this study. Both the expenditure data and the time data are best regarded as measures of the extent to which players prefer one kind of machine (standard) over the other kind of machine (modified), or their indifference to the modifications. Extrapolations to conditions of no choice must be made with caution.

9.6 Data Analysis

The modifications to machines can be expected to have an impact on various aspects of play. Compared to standard machines, modified machines can be expected to:

- Have lower (cash in) values.
- Have lower (cash in – cash out) values.
- Have lower (total take).

It may be assumed that persistence in playing a machine is directly related to the extent to which it is perceived by the player to have attractive features. Where persistence is higher, the player enters more money into the machine (cash in), plays for longer before withdrawing the remainder (cash in – cash out) and loses more to the machine (take). All of these measures will be highly inter-correlated. Each can be regarded as a measure of player preference. If players do not like machines with a particular modification, they can be expected to spend less time playing the machine, to enter less money and to lose less money. For a variety of reasons, the detailed data analysis reported here will be carried out with the cash in measure. In contrast to take, cash in is relatively stable over the course of a week for a given machine. Furthermore, for some venues, cash out meters did not record correctly preventing the calculation of cash in and take.

Missing Data

For various reasons, some data were lost from the data files. Where data was missing for a machine for a day, subsequent meter readings were used to estimate the missing values: where usable meter values were two days apart, the calculated value was averaged over the two days. Where a value could not be estimated by later readings, the average for the machine for that week was interpolated.

9.7 Results

9.8 Overall impact of machine modifications

Data from one venue was insufficient to allow reliable estimates. Thus, all analyses are based on the data from four venues only. The overall impact of the proposed machine modifications on the money wagered by players (cash in), the money lost to the machine in regular play (cash in – cash out), and the take of the machines after big wins have been included are shown in the following tables. Overall, the volume of money entered into ‘Pirates’ machines dropped by 35% when the machines were modified. Details of the impact of specific modifications are shown below.

Table 6: Impact of machine modifications on money wagered. The figures shown are for total cash in during week 2 when standard and modified machines were grouped in pairs.

	Standard Machines \$ cash in	Modified Machines \$ cash in	% decrease in \$ cash in
Venue 1	30,031	15,187	49.4
Venue 2	30,921	25,086	18.9
Venue 3	15,649	11,582	26.0
Venue 4	14,553	7,622	47.6
TOTAL	91,154	59,477	34.8

Data for the cash in-cash out measure was available from three venues only. Ignoring the impact of large wins, the money left in the machines after completing a session (cash in – cash out) behaves similarly to amount entered in the first place. Overall, cash in – cash out (ignoring large wins) shows a 47% decrease from standard to modified machines.

Table 7: Impact of machine modifications on money lost in regular play

	Standard Machines \$ cash in – cash out	Modified Machines \$ cash in – cash out	% decrease in \$ cash in – cash out
Venue 1	19,437	6,708	65.5
Venue 2	15,377	11,150	27.5
Venue 3	8,610	5,207	39.5
TOTAL	43,424	23,065	46.9

Similarly, the total take of machines (profit) could be calculated for three venues only. Given the results for money entered and cash in – cash out, it is predictable that the profitability of the modified machines will be less than that for the standard machines. The average daily take by the standard ‘Pirates’ machines dropped by 43% when the modifications were added.

Table 8: Impact of machine modifications on the take from machines

	Standard Machines \$ take	Modified Machines \$ take	% decrease in \$ take
Venue 1	12,612	4,128	67.3
Venue 2	8,107	5,862	27.7
Venue 3	5,271	3,472	-27.6 (+34.1)
TOTAL	25,990	13,462	48.2

A single large win of \$2,550 occurred on a standard ‘Pirates’ machine during the study. This exceptional score was omitted in presenting the data in Table 8.

Compared to unmodified machines, the modified machines:

- Attracted less money entered (35% decrease).
- Lost less money in general play (47% decrease).
- Decreased overall take (48% decrease).

9.9 Effects of each modification on ‘cash in’

The effect of each modification in isolation and in combination with other modifications is shown Table 9 for data across two weeks and paired machines. Thus, the value for standard machines is the mean of three values, two from week 1 and one from week 2. The value of F is that for the simple effect in week 2.

Thus, based on all cash in values across the two weeks, the mean effect of all modified machines was 34%, consistent with the analysis based only on week 2 (Table 6).

Table 9: Impact of machine modifications on money wagered. The data is the mean daily dollars entered (cash in)

Modification	Standard Machines	Modified Machines	Significance
\$1 maximum bet (A)	441	275	F(1,49) = 14.8, p<0.001
Slower game (B)	506	386	F(1,48) = 9.9, p<0.01
Limited note acceptor (C)	461	233	F(1,48) = 23.7, p<0.001
A & B	514	358	F(1,48) = 8.0, p<0.01
A & C	457	283	F(1,48) = 10.8, p<0.01
B & C	388	286	F(1,48) = 12.6, p<0.001
A, B & C	411	267	F(1,48) = 41.0, p<0.001

Multiple linear regression analysis demonstrates that the mean decrement in cash in from standard to modified machines (\$298) is significant, but that the variations in the decrements across different modifications do not differ significantly from each another. Thus, each of the modifications alone or in combination has a similar effect on players' preferences as measured by cash in. Interestingly, regression analysis also demonstrates that there is a significant difference in the decrement between Saturdays and Tuesdays (beta = -0.22, $p < 0.05$). This may be accounted for by the different volumes of cash in on the two days with the highest cash in on Saturdays and lowest on Tuesdays.

9.10 Effects of each modification on 'cash in – cash out'

The index cash in – cash out represents a measure of players' persistence in continuing to play the machine. If the machine is unattractive to the players then cash in – cash out will tend to be low. Table 10 shows that all modifications to the 'Pirates' machines produce significant decrease in the cash in – cash out data. Averaged across all machines, cash in – cash out decreased by 48%.

Table 10: Impact of machine modifications on money cash in – cash out. The data is the mean daily dollars lost by participants.

Modification	Standard Machines	Modified Machines	Significance
\$1 maximum bet (A)	373	156	$F(1,24) = 8.0, p < 0.01$
Slower game (B)	268	174	$F(1,36) = 9.3, p < 0.01$
Limited note acceptor (C)	255	162	$F(1,36) = 6.0, p < 0.05$
A & B	420	191	$F(1,36) = 5.0, p < 0.05$
A & C	343	170	$F(1,36) = 7.3, p < 0.01$
B & C	288	161	$F(1,36) = 12.3, p < 0.01$
A, B & C	264	142	$F(1,36) = 21.8, p < 0.001$

If cash in - cash out decreased by the same percentage as cash in, then the decrease in cash in – cash out would reflect little more than the impact of machine modifications on cash in. However, the overall decrement for cash in was 34%. The increase in the decrement from 34% to 48% is significant ($F(1,6) = 7.0, p < 0.05$) and can be interpreted as a decreased persistence in playing modified machines. Consistent with this interpretation is the fact that only one modification (limited note acceptor) did not show an increased decrement for cash in – cash out over cash in. Since once money has been entered (cash in) into the machine, the limited note acceptor machine can be effectively regarded as being identical to a standard machine, resulting in participants persisting equally with the modified and standard machine (no increased decrement in cash in – cash out).

9.11 Time playing machines: a comparison of social and problem gamblers

Table 11 shows the numbers of gamblers falling in different categories based on SOGS scores.

Table 11: Sample for whom SOGS scores are available

Category of gambler	SOGS scores	N of cases
Social	0	134
Serious	1-4	302
At risk	5-9	86
Problem	10+	18

9.12 Time spent playing modified and unmodified machines

In a two-week period, not every gambler played poker machines at the venue where the study was conducted. Participants had the option of playing at other venues, playing at the designated venue but without inserting their membership cards, or not playing at all. At two of the five venues, no participants taking part in this study fell in the problem gambling category.

Table 12 shows a comparison of the time spent playing the standard and modified Pirates machines in week 2 of the data collection. The expectation is that problem gamblers will spend relatively more time on the standard machines than the modified machines compared to non-problem gamblers. In table 12, non-problem gamblers are divided into those with a zero score on the SOGS and those with a score of between 1 and 4.

Table 12: The total time (in minutes) spent playing standard and modified Pirates machines in a one-week period.

SOGS score	Standard 'Pirates'	Modified 'Pirates'
0	397	465
1-4	849	671
5+	108	564

The data in table 12 provide no evidence that problem gamblers avoided modified machines more than did non-problem gamblers.

9.13 Time spent playing poker machines each week

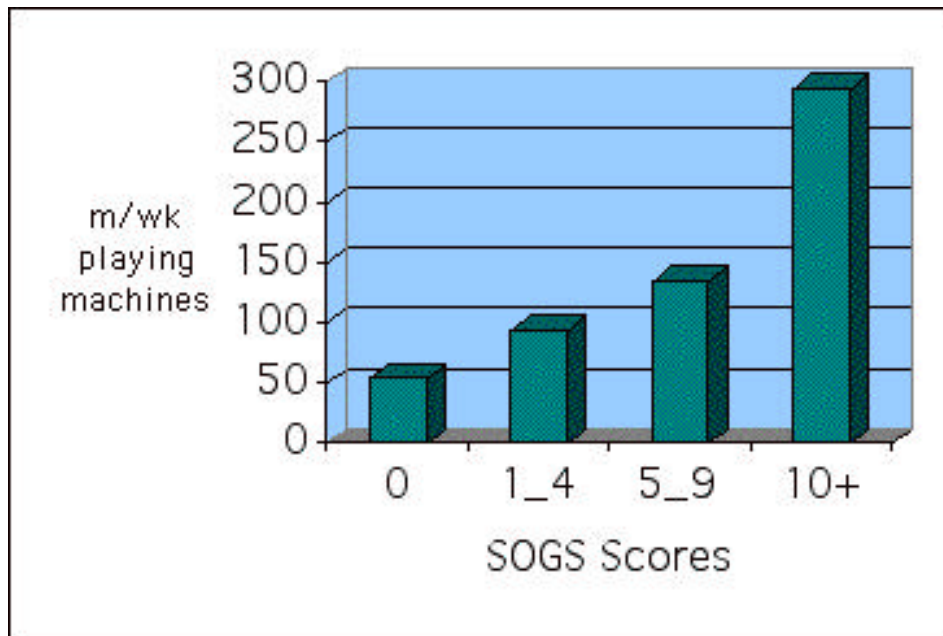
The turbo tracking system allows a more general consideration of the time that participants spend playing poker machines. Where members of the venues gave permission, play could be tracked during two weeks of the study without the presence of an observer. Since all of the participants also completed the SOGS, it is possible to relate time spent playing poker machines in general, to the evidence of problems associated with gambling as indicated by the SOGS.

Figure 3 shows the relationship between SOGS scores and the mean number of minutes participants spend actually playing the poker machines (excluding the time between playing one machine and the next).

It is clear from Figure 3 that time spent playing poker machines is a strong indicator of the extent to which the play is likely to experience gambling related problems. It is likely that it is not the time spent playing which is directly associated with problem gambling, but the

fact that the money lost is closely associated with time spent playing. The implication is that an effective harm minimisation strategy will reduce the money lost and, possibly, reduce the time spent playing.

Figure 3: Amount of time spent playing poker machines as a function of SOGS scores



9.14 Time at venue, time playing machines, and number of machines played

Table 13 shows the analysis of time at venue, number of machines played, and total time spent playing machines for a sample of N = 5 recreational gamblers with SOGS scores of 0, N = 25 gamblers with SOGS between 1 and 4, and N = 5 with SOGS scores of 5 or more.

Table 13: The playing behaviour of recreational gamblers

Participant's SOGS score	Days per week at venue	Total time at venue (hrs/ms)	N machines played	Total time on machines (ms)
0	2.5	4:57	42	119
1 to 4	2.4	5:46	37	116
5 to 9	2.4	8:27	32	133
Mean	2.4	6:04	37	119

None of the participants providing the data for Table 13 was a problem gambler with a SOGS score of ten or more. All participants were members of one venue.

Several features of the table are worthy of comment. First of all, frequency of play and time spent at a venue were not necessarily indicators of problems with gambling. Most of the participants played on two or more days per week. Participants spent at least twice as long at the venues as they spent playing machines, irrespective of their SOGS score. There is some indication that players with SOGS scores exceeding 5 are spending more time at the venue and more time on the machines. Time spent at the venue is simply the period from first game to last game summed across a week. Secondly, it is very common for both recreational participants (SOGS 0-4) and participants with problems (SOGS 5 – 9) to play a large number of machines sampling a few games on each machine. In some cases a player will play many machines but not settle down at any one. Finally, some participants spent a large part of their life at a venue. One gambler spent the equivalent of a working day playing machines or moving between machines.

9.15 Discussion

In a situation where players are free to choose between \$10 and \$1 maximum bet machines, it appears that on average players prefer the \$10 maximum bet. The reason why players prefer the \$10 game to the \$1 game may not be straightforward. Superficially, it may appear that players reject the \$1 machine because they cannot make bets larger than \$1. However, since study 2 informs us that the large majority of bets made by players are less than \$1 in the majority of cases, it is unlikely that the prohibition of bets larger than \$1 is the main and only motivation for not selecting these machines. When the \$10 machines and \$1 machines are compared structurally, they are not equivalent. A \$10 bet on a 1c 'Pirates' machine is obtained by a player selecting a bet involving 20 lines and 50c per line. Since playing maximum lines is a preference for many players, the \$1 maximum bet was achieved by omitting the 10c and higher bets per line. Thus, a \$1 maximum bet permits up to 20 lines and 5c per line. The remaining buttons, while still physically present, were inoperable. Thus, players may have avoided these machines since they may have appeared to be defective with some buttons not operating.

Both the slower game speed and the limiting of note acceptors to \$20 notes also led to players avoiding modified machines where there was a choice of machine. However, there was one major difference between these two modifications: where players on the modified note acceptor machines persisted in playing the machines in a similar way to the standard machines, once they had started, players on the slower game speed machines did not persist in playing as much as on the standard machines (as measured by cash – cash out).

A player confronted with two identical machines side-by-side may elect to play either. However, if the note that the player wishes to insert is greater than \$20, the standard machine will accept it whereas the modified machine will not. The simple solution, for a player faced with the note acceptor that refuses to accept the \$50 note is to move to the next unmodified 'Pirate' machine alongside. For players with \$5 to \$20 notes, the two machines are identical. Thus, it is not surprising that the persistence in playing, once started, is equivalent.

By contrast, players avoid the slower machines as they avoid the limited note acceptors. But once started, players do not persist in playing the slower game for as long as the standard (faster) game when faster game options are available.

Given that players, on the whole, prefer the standard 'Pirates' machines to the modified ones, the important question to answer is whether problem gamblers differ from social gamblers by avoiding the modified machines more. Unfortunately, the sample of problem gamblers with SOGS scores of 10 or more was too small to allow this question to be answered directly. The 18 problem gamblers in the study did, however, avoid playing 'Pirates' machines altogether during the week in which they were placed side by side. Among social gamblers (SOGS score of 0), the limited evidence available suggested that there is a trend to spend less time on the modified machines compared to the standard machines.

Problem gamblers spend more time playing poker machines each week than do recreational gamblers. Serious problem gamblers (SOGS score of 10 or more) spend on average, five hours per week playing the games. Given that a large percentage of bets are less than \$1 per game, it is likely that the problems caused by gambling losses result not so much from excessive bet size over shorter periods, but relatively standard bet sizes for longer periods of time in play. The implication is that serious problem gamblers bet in such a way that they stay in play for longer.

If this assumption is correct then the three harm minimisation modifications proposed can be expected to have relatively little impact on the expenditure of problem gamblers. A player who is willing to play the machines on average for five hours each week, is likely to be willing to play for relatively small periods in addition if the money is available. Thus, limiting bets to \$1 may enable some serious problem gamblers to play for a further period of time before their money dissipates. However, if all machines are modified and there is no choice remaining, a small proportion of problem gamblers may elect to substitute other forms of gambling that enable the placement of large bets. To answer this question requires further research.

Limiting bill acceptors to \$20 notes is likely to be an inconvenience that has no impact on length of time spent playing.

Slowing the game may have some impact on players who play games rapidly. However, the evidence available is that problem gamblers and recreational gamblers spend much more time in the venue than they spend actually playing the machines. A player may play for two hours in total but spend five hours playing various machines, relaxing between sessions and so on. The extra time on slower machines could be easily accommodated by the total time at the venue for some but this may not apply necessarily all players.

STUDY 4 FOCUS GROUP

10 Focus group

10.1 Introduction

The fourth study in the project was designed to explore the attitudes and level of acceptance of problem gamblers to the proposed changes to gaming machines, and their perceptions of the effect that such changes would have on their actual behaviour and level of enjoyment.

The data derived from this phase of the project is subjective in nature and derived from a relatively small number of problem gamblers. The conclusions drawn, while informative, should not be interpreted as being as robust as the empirical data obtained from the experimental studies rather, it should be viewed as hypothesis generating and conclusions should be the subject of further confirmatory research.

It is often assumed that there are certain inherent characteristics of gaming machines that are particularly attractive to problem gamblers and through their qualities, responsible for causing addictive patterns of play. From the principles of learning theory, it is known that variable schedules of reinforcement are powerful in maintaining persistent rates of play and are also associated with a strong resistance to the process of extinction. Dickerson (1979) demonstrated the importance of fixed and variable schedules of reinforcement in the production of problem gambling behaviours. However, only a proportion of people develop problem gambling behaviours while playing gaming machines. Clearly, there are important player-machine interactions that differentially cause some but not the majority of players to lose control over their gaming. It is important to identify, from the player's perspective, which electronic gaming machine design or performance features are considered the main factors that are responsible for causing loss of control among players.

One of the main objectives underlying the proposed changes to electronic gambling machines is to minimise the risk of those vulnerable to problems with gambling, while at the same time retaining a good level of enjoyment for recreational players. To achieve this end, it was considered important to elicit the views on the perceived effectiveness of the proposed changes from a group of known problem gamblers.

Ethical considerations prevent the prospect of asking identified pathological gamblers to describe their reaction to playing modified machines. Consequently, this phase of the research project was limited to interviewing pathological gamblers individually and in focus groups and asking them to respond by describing how they considered the proposed changes might affect their behaviour and level of satisfaction.

Focus groups are essentially semi-structured group discussions where the facilitator asks relevant prompt questions focussing on the topic of interests and then records the major common themes that emerge. Participants are free to talk freely and spontaneously allowing for a broad range of information to be extracted. There are no right or wrong answers, only opinions and beliefs regarding how people may think or act under defined circumstances. The qualitative data that is obtained provides important information that may be useful to gauge the effects of proposed changes on a group of individuals and for the development of further enquiry and hypothesis building.

10.2 Methodology

A series of instructions and prompt questions were developed to elicit the views of a series of problem gamblers on the effectiveness of the proposed changes to the design of gaming machines to player behaviour and enjoyment.

Invitations to participate in the qualitative interviews were extended through advertisements in two local newspapers and copies of these to various gambling counselling services to bring to the attention of their clients. Respondents willing to participate were interviewed in individual or group settings. Responses were obtained from a total of 15 participants. Data collection ceased after this number given that the same recurrent themes were consistently being elicited from group members. Participants were informed of the nature and rationale underlying the proposed changes to the design of gaming machines and the purpose of the study. A participant information sheet was also distributed to all respondents. To facilitate open and frank discussion to cover a diverse range of views, it was emphasised that there were no right or wrong answers and that each member of the group should respect the comments and opinions expressed by others without criticism.

The following standard instructions were read out to participants:

Instructions

A focus group is another name for a group discussion where the focus is on the views and opinions people may have on particular topics of interest. We are conducting this focus group to understand how you think a number of proposed changes to the design of gaming machines might influence your gambling behavior and enjoyment or excitement in playing such machines. We would also like to find out if you have any other ideas that may be helpful in preventing people from gambling excessively or minimize harm.

We are also interested in finding out from you what characteristics of electronic gaming machines you feel may have contributed to the loss of control that you experienced with your gambling. We are particularly interested in the aspects of machines that might encourage persistent and uncontrollable play amongst players.

We will ask you a number of questions on these topics and we would like you to answer them as openly and with as much information as you can. Remember that we are interested in your opinions as to how proposed changes may affect you and therefore it is important to emphasize that there are no right or wrong answers.

We will tape record the session so that we may accurately record what has been said. The tape will be erased once it is transcribed. We will not record names or other information that may identify you.

The following focus group prompt questions were asked:

Prompt Questions

- 1). What effect do you think slowing down how fast the reels on a machine spin will have on the amount of money you spend gambling?
 - (Prompt) Do you think it would encourage or discourage your gambling if the reel spins were slower?

- (Prompt) Do you think it will affect the level of enjoyment or excitement you have playing the machines?
 - (Prompt) What about the effect it might have on how long you continue playing?
 - (Prompt) Do you think this will help players to control how much they gamble?
- 2). How do you think you will react to the bill acceptors being removed from machines so that you can only play with coins?
- (Prompt) I wonder whether you felt that the availability of bill acceptors affected your gambling? In what ways?
 - (Prompt) Do you think it would have changed your gambling if the bill acceptors only took smaller denominations (e.g. \$10 and \$20)?
 - (Prompt) Do you think it will affect the level of enjoyment or excitement that you experience playing the machines?
 - (Prompt) What about the effect it might have on how long you continue playing?
 - (Prompt) Do you think this will help players to control how much they gamble?
- 3). What effect might the limiting of bill acceptors to accept only low denomination notes have on you?
- (Prompt) Do you think it will affect the level of enjoyment or excitement you have playing the machines?
 - (Prompt) What about the effect it might have on how long you continue playing?
 - (Prompt) Do you think this will help players to control how much they gamble?
- 4) What do you think might be the impact of limiting the maximum bet size to \$1.00 (one dollar) on you?
- (Prompt) I wonder whether you felt that the upper limit of individual bets affected your gambling? In what ways?
 - (Prompt) Do you think it would have encouraged or discouraged your gambling if the size of wagers was more limited?
 - (Prompt) Do you think it will affect the level of enjoyment or excitement you have playing the machines?
 - (Prompt) What about the effect it might have on how long you continue playing?
 - (Prompt) Do you think this will help players to control how much they gamble?
- 5) What features of the machines did you feel contributed to your difficulties with gambling?
- Can you describe how this feature influenced your behaviour?
 - Can you describe how this feature influenced your mood?
 - Can you describe how this feature influenced the amount that you wagered?
 - Can you describe how this feature affected the amount of time that you spent gambling?
- If the following characteristics are not mentioned, they will be prompted, as follows:
- 6) I wonder whether you felt that the high frequency of ‘near miss’ combinations affected your gambling? In what way?
- Do you think it would have encouraged or discouraged your gambling if there were fewer combinations that were ‘near misses’?
- 7). Are there any other ideas or topics that people would like to raise or discuss?

10.3 Definition of problem gambler

For purposes of this study, a broad definition of problem gambler was used to include any individual who currently, or had in the past, sought treatment from a gambling counsellor or specialist gambling treatment program. It was considered important to solicit views from people who were actively in treatment and from those who had either successfully or unsuccessfully completed a course of treatment in the past.

10.4 Responses from Problem Gamblers

It was instructive to note that the information obtained from problem gamblers regarding the effects of each proposed change ranged from those that endorsed a commonly accepted view to those that expressed contradictory or conflicting views.

The following key points with illustrative examples of responses to each of the prompt questions are listed below:

10.5 Reel spin

A wide range of views describing the potential impacts that slowing the reel spin would have on expenditure and enjoyment was expressed. A number of problem gamblers considered that reducing the reel spin would have either no affect or would lead to an increase in duration of play while a smaller number suggested this strategy would be effective to some extent in reducing overall expenditure.

One of the primary findings emerging and consistent with clinical observations and theoretical models was that responses suggested that problem gamblers were motivated by needs other than to win money as the motivating factor causing persistence in play. As a result, the majority expressed the view that gambling was intrinsically exciting and that wins allowed the duration of a session to be extended for longer periods.

It should be noted that several gamblers changed their initial opinion in the course of discussions. For example, one person initially stated that he would lose interest and walk away or play longer but use less money. But on reflection, stated that this was not true since he actually played slowly anyway and the length of sessions really depended upon how long his money lasted. Nevertheless, he stated that it would probably help others by allowing them to “*use their brains*” and think of what they were doing.

Slowing the rate of play appeared not to have a significant on reducing net losses per session but for some, would lead to a significant reduction in levels of enjoyment.

- One group interviewed expressed the opinion that problem gamblers would rapidly adjust to slower reel spins if all machines were modified in the same manner. One problem gambler suggested that her response would be determined by how slow the reel spin was: “...*but not too slow, it would drive me nuts and I'd leave.*”
- Participants stated that they would continue gambling as long as they had access to money either through wins or further withdrawals from ATMs allowing them to continue playing. Slowing reels meant that they would stay there longer until all their money was lost. A recurrent concept that emerged across interviews was that problem gamblers are motivated by a desire to immerse themselves in gambling as a

means of escaping emotionally: *“I go there to get lost, I don’t go there to lose my money so the longer I play the better I feel. Of course I get upset when I lose all my money, I kick myself for being so stupid”*. One woman summarised the group’s view by stating that it was not how fast the machines were spinning but how much it was paying out that influenced length of sessions and level of enjoyment.

- Several participants stated that they hit the button as fast as they can and would become irritated and leave a machine for a faster one if the reel spin was too slow. The element of frustration emerged as a key determinant. Slowing the reel for some would engender a sense of impatience and irritation causing the gambler to leave the venue. In this regard, one respondent stated that part of the attraction of playing the machines was the hypnotic effect produced by the rapid reel spin. In this instance, she described her pattern of play as keeping her finger pressed on the button and watching the reel spin. If it were too slow *“I would need to re-hypnotize myself all the time. I would go home, wouldn’t stay longer”*. However, she then qualified her remark by saying *“Oh, I’m not sure now. It means it would take longer to lose my money. It would be good, I could stay longer”*.
- The mood state of the gambler when playing the machines was an important factor affecting the player’s reaction. It was suggested that a gambler in a mood of anger or emotional distress would find a slower spin rate frustrating resulting in the player leaving the venue quickly. If the player were in a calmer state of mind or bored and gambling to kill time, the spin rate would be of marginal importance. It was interesting to note that some respondents held the impression that the rate of reel spin varied across machines; some spinning at a slower rate than others or spinning at different times subject to frequency of payouts. Perceived reel spin was described by one respondent as a factor that determined selection of a machine: *“...slow machines are ready to pay so I tend to stick with it...”*
- In contrast, another participant stated that slowing the reel spin would add to the anticipation of an outcome and hence add to the excitement of play. This individual stated that he deliberately slowed the rate of play to prolong the session of gambling. His primary motivation was to play for as long as possible: *“If I lose over several hours I say to myself that it wasn’t too bad, at least I killed 20 hours playing the machines”*.
- Very few stated that they allocated a set time for each session. Most indicated that the primary determinant of the length of each session was available gambling funds. It was notable that while some initially stated that they intended playing for a set period of time, they consistently added that more often than not, the duration of each session was heavily influenced by how much money was still available to play. It was suggested that the modification would be effective only for those gamblers that were limited by time constraints and were forced to play slower over the same duration of sessions.
- It was consistently stated that problem gamblers would adjust to the reduction of reel spins by prolonging individual sessions: *“In reality, it would cause you to spend more time at the club. If you are going to gamble, you will, nothing will make a difference”* and *“no, you tend to play until your money is all gone anyway”*.
- One respondent suggested that he would probably smoke and drink a lot more with slower reel spins. *“Yeah, I guess I would probably drink more and then I would gamble more as well”*.
- There was no consistent view expressed regarding the ability of slowing reel spins to assist other problem gamblers in reducing losses. A number of participants stated that it might help to give an opportunity to some gamblers to think about what they

were doing but indicated that it would have a negligible impact on recreational gamblers.

- There was general agreement that slowing the reel spin would have a negligible impact on level of enjoyment: *“if the machines are all the same you wouldn’t notice and wouldn’t make much difference to enjoyment. Anyway, you play for enjoyment, you play to get away.”*

In summary, the consensus was that most problem gamblers would adjust to any reduction in reel spin and would simply lead to similar levels of expenditure but over longer sessions with the possible prospect of increasing behaviours such as smoking and drinking. Given the motivation was to gamble for as long as possible, it was suggested that the reduction of reel spins would not affect the majority of problem gamblers although a proportion may become irritated and select alternative machines if available. If all machines were similarly modified, gamblers would not notice the difference and therefore have marginal impact on levels of enjoyment.

It was generally contended that reducing reel spin would not produce any negative effects on recreational gamblers given that most played for enjoyment and the hope of winning. Speed of reel spins was an important consideration since it was considered that most recreational gamblers played at a consistently slow pace to draw out sessions with a set amount to be spent.

10.6 Bill Acceptors

Not all gamblers stated that they used large denomination bill acceptors but a recurrent theme was that removing or reconfiguring low denomination bill acceptors was considered to be a useful harm minimisation strategy.

Patterns of usage of bill denominators varied. For example, one gambler stated that he used only ten dollar notes to *‘warm the machine up and I’d only play one credit and nine lines until a feature came. Then I would raise it to two credits, nine lines and so on until I reached the maximum bet. But I would always use ten dollar notes’*. Another stated that she preferred using small denomination bills but if there were too many people at the change bar or cashier, she would insert any note in her purse. Her intent was to put in, for example, a \$50 note and take out \$20 but *“...of course I would never do that. Silly me would just keep playing until I lost the whole bag...”*

On the other hand, a number of respondents expressed a clear preference for the frequent use of large denomination notes because it allowed:

- Fewer interruptions to play
- Minimising the need to attend the cashier and thus avoiding the prospect of being identified as someone with a problem.

Another respondent stated that the removal or reconfiguration of bill acceptors would help him considerably because once he commenced gambling and became mesmerised, he would insert any note in his possession and only later realise the amount he had spent. Changing notes to coins, he stated, would force him to reconsider his decisions.

There were two predominant emerging themes regarding bill acceptors:

- The ease with which gamblers used large denominations without realising the true extent of their level of expenditure

- The ability to avoid having to return frequently to the cashier and therefore the potential embarrassment of being recognised or labelled as a loser or problem gambler.

For some problem gamblers, the reduction of bill acceptors was considered a ‘*top idea*’ as a strategy to limit losses. Several indicated that they would go to the club with a pocketful of fifty dollar notes and automatically feed the machine once existing credits were used up: “*I would just put my hand in the pocket and put it whatever came out. I really didn’t think about its value. If I had to go to the cashier, I probably would think about it, do I really want to change the fifty dollars*”?

The pattern of change in use is best exemplified by the comments of one gambler who described her behaviour before and after the introduction of bill acceptors. She stated that she used to play with a cup full of coins (valued at \$40 to \$50 on average) that she enjoyed carrying around from machine to machine: “*It made me feel special as I walked around with this plastic cup filled with coins.*” She would return to the cashier and convert a large amount into coins. This also meant that she did not have to return repeatedly to the cashier. With bill acceptors, she could withdraw notes from the ATM without consideration. As a result, her level of expenditure increased dramatically. However, it could be argued that it was the combination of bill acceptors and the availability of ATMs that was critical in causing her expenditure to escalate. In prompting further questions on this issue within this group, it became apparent that respondents were highly critical of the ATMs being located close to machines and identified this as one of the major factors contributing the level of their losses.

In illustration, one gambler stated that in desperation she placed her cardigan over the machine to reserve it while she left the club to withdraw money from an ATM located at a nearby bank. However, this was a one-off event and that most often she would leave the club and return home. With ATMs, she now remained at the club for longer periods and was losing more money.

Reducing the bill acceptors to twenty-dollar denominations appeared unlikely to exert any effect. Participants suggested that gamblers would merely withdraw cash from ATMs in twenty-dollar denominations without leading to too much inconvenience or disruption in enjoyment: “*Its still quicker than going to the change bar*”.

The impact of removing bill acceptors was not considered likely to have a major effect on recreational gamblers. It was estimated that most recreational gamblers would either prefer the use of coins (sound and slow play) or rarely use large denomination bills. Rather than perceiving themselves as risking large amounts, it was suggested that recreational gamblers would be hesitant in investing large amounts and would ‘limit’ their expenditure by repeatedly inserting five or ten dollar notes rather than single large denomination bills.

10.7 Maximum bet

The likely impact of reducing the maximum bet to \$1.00 were seen to be governed by the average bet size that a problem gambler typically played with.

- Problem gamblers who used single credit multiple lines to a maximum of 50 cents to \$1.00 did not consider this modification would make much difference. One respondent was emphatic that she only played one cent per line and was “*horrified*” and “*agitated*” when the player next to her would bet 500 credits. This respondent

recounted several instances where she commenced playing a machine and pressed the button assuming she was playing one credit one line. To her dismay, the previous player had played multiple coins per line and without realising, had gambled more than intended on that spin. Supported by others in the group, made the suggestion that machines should be automatically reset to single coin single line as soon as there is a collect or the machine is idle for several minutes. This would allow players to chose their bet size and minimise such errors when they first commence play on a machine.

- Those who exceeded this amount felt that it would affect their level of enjoyment but would adjust by playing the maximum bet size rather than not playing at all. A number stated that it would be annoying and frustrating because they were after the large win including the possibility of the \$5,000 and \$10,000 jackpots. Limiting the bet size was perceived as limiting the amount that could potentially be won using multi credit multi line strategies.
- It was not necessarily the bet size but how much the gambler had to take to the venue that determined whether or not they would attend the venue.
- A proportion of respondents stated that they would not consider entering the venue with less than \$50 to \$100.

The maximum bet size was then determined by the interaction of factors such as the intended duration of their session and the rate of early wins: *“...mostly I bet small but sometimes I have bet more than a dollar, but not often or frequently...only when I have a little up my sleeve...”* Maximum bet size appeared to be modulated according to how long the player considered they could draw out their session. For example, a number of respondents described a pattern of play in which they would commence with a set amount less than a dollar. The bet size would progressively adjusted subject to the credits won: *“If I win, I start to play more with their money”* and *“...if I have intermediate credits I’m more inclined to go to two credits per line”*.

10.8 Near Misses

It was consistently stated that near win combinations caused gamblers to continue playing in the expectation that a win is imminent” *“...makes you want to press the button and continue...you live in hope because you got close and you want to keep trying. You get to learn the pattern and just need to get it right”*.

10.9 Other Features that May Contribute to Loss of Control

Respondents were asked to describe any aspect of the design of gaming machine that they considered to be particularly addictive or contributed to the development or problem gambling behaviours.

- Free spins were consistently reported as the predominant element of current machines that was identified as addictive. The notion that one obtained a ‘free’ opportunity to multiply credits won represented an important psychological component that elevated mood and fostered continued play. It appeared that the pursuit of the free spins was a challenge to the player and on obtaining it, would make the player feel ‘special’. In the words of one female respondent, *“to get something you normally don’t get, you feel so special. I think, look what I have got, I’ve reached the ultimate. I know I should quit but I need to continue to get the next feature. I look on it as a challenge, it’s not winning that important, it’s getting that something for nothing.”* In reinforcing this perspective, others stated that it was the

bells ringing for the free spins that drew attention to them as winners, something they have achieved over and above other players in the club.

- One respondent stated that she did not like playing the machines before the introduction of free spins but since then, had developed a severe gambling addiction.
- ATMs and easy access to money was another element considered of comparable importance in precipitating loss of control. Comments were offered that, “*it was the worse thing they ever did...with EFTPOS and ATMs it's [losses] 400 times worse*”. Previously respondents would use all their available cash and occasionally leave to obtain more money from the bank but since the availability of ATMs, impulsive decisions to withdraw money was a frequent occurrence.
- One group ranked the importance of those elements that contributed to loss of control and/or compounded losses and should be addressed in any harm minimisation policy: Removal of ATMs from close proximity to gaming machines, eliminating free spins, reducing bet size to \$1.00 and removing or limiting bill acceptors to low denomination notes. Reduction of reel spin was seen as ineffective given that the likely response of players would be to become used to the rate of spinning and/or play multiple machines simultaneously, or alternatively, aggravate the problem in that players would increase the bet size to compensate for the slower speed in maintaining excitement.

10.10 Discussion

Information obtained from the focus groups and interviews provides an understanding how problem gamblers might respond to the proposed changes to the design of gaming machines. The data is based on subjective beliefs and therefore should be interpreted with caution but such qualitative data does provide a breadth of important insights that may be missed using direct questionnaires.

Problem gamblers expressed the notion that the primary motivation of play was to win money in order to extend the duration of a session rather than play in order to derive an income from the gaming machines.

There was a consistent view expressed that reducing the reel spin would provide a minimal impact on problem gamblers. The consensus was that most problem gamblers would adjust their play and remain longer in the venue to lose the same amount of money. This observation is consistent with the clinical research evidence that suggests many problem gamblers are motivated to use gambling as a means of dealing with external emotional stresses.

The responses regarding bill acceptors was varied but it appears that for a number of gamblers, it is the combination of bill acceptors and the close proximity of ATMs that pose a hazard for controlled gambling. It was noted that the presence of ATMs meant easy access to cash on an impulsive decision coupled with the fact that ATMs dispense \$20 or \$50 note denominations. This meant that gamblers followed a tendency to insert the large denomination note with the intention of gambling only a portion of this amount. Once inserted, impulsive decisions were made to continue gambling with the remainder in the hope of achieving a win or free spin.

Balanced against this was the number of pathological gamblers who were averse to gambling with high denomination notes. Further research is needed to determine the

relative proportion of problem gamblers who use large denomination notes exclusively, frequently or not at all in comparison to recreational gamblers.

The issue of maximum bet size remained unclear. A proportion of gamblers do not gamble more than \$1 as a standard strategy. For these pathological gamblers, it appears that problems arise as a result of a steady drain of small amounts of money from a relatively low level of disposable income over a period of regular gambling. That is to say, that a group of pathological gamblers do not have much money, and although they gamble in small amounts, they sustain consistent losses that they can ill afford.

In contrast, other pathological gamblers modulate the level of bets according to win/lose sequences to prolong play. If they win, bet placed increase in amount and, conversely, are reduced following sustained losses to prolong sessions of play. Finally, some gamblers expressed the notion that they would not consider entering a venue unless they had a substantial stake. Again, little empirical evidence is available describing the relative proportion and typical patterns of play across pathological gamblers.

Poker machines appear to be inherently attractive by virtue of the inherent nature of the game. Indeed, the early liberty bell three-reeler was regarded as a highly popular game when first introduced. Superimposed on this intrinsic quality of attractiveness, are certain features that add to the allure of the game. It was notable that among all the pathological gamblers interviewed, the notion of near misses were identified as prolonging play through the concept of the gambler's fallacy, that is, that a win is imminent. More notable however, were the consistent spontaneous statements made regarding the attractive quality of the free spin feature. This free spin feature was described by some as the predominant reason contributing to their loss of control. Pursuit of the free spin appears to be one primary factor contributing to persistence in play. Unfortunately, the issue of free spins emerged in the context of the focus group and was not systematically evaluated in the course of the empirical and observational studies. Nevertheless, there is sufficient indications that warrant further detailed study on the impact of free spins as a variable contributing to persistence in play and ultimately, to the development of problem gambling. It is recommended that further research on this topic be carried out to clarify the validity and reliability of the anecdotal self-reports emerging from focus groups.

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