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## **DOES SIZE REALLY MATTER? A REVIEW OF THE ROLE OF STAKE AND PRIZE LEVELS IN RELATION TO GAMBLING-RELATED HARM**

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### **ABSTRACT**

Regulatory and industry decisions influencing commercial gambling activities require clear understanding of the role that stakes and prizes play in the development and facilitation of gambling-related harm. Although industry proponents argue for increases in stakes and prizes to meet market demands, regulators remain cautious about the potential implication for gambling-related harm, while industry opponents generally condemn relaxing aspects of gambling policies. To inform this debate, this paper provides a critical examination of the relevant literature. From the review, it is concluded that limitations of the existing literature restrict our ability to draw definitive conclusions regarding the effects of stake and prize variables. Most studies contain multiple, methodological limitations, the most significant of which are diluted risk and reward scenarios used in analogue research settings not reflective of real gambling situations. In addition, there is a lack of conceptual clarity regarding many constructs, particularly the parameters defining jackpots, and the interactive nature and effect of the differing configurations of game parameters and environments are often not taken into consideration when investigating changes to one or more variables. Notwithstanding these limitations, there is sufficient evidence to suggest that stake and prize levels merit consideration in relation to harm minimisation efforts. However, substantial knowledge gaps currently exist, particularly in relation to understanding staking and prize thresholds for risky behaviour, how the impact of stakes and prizes change depending on the configuration and interaction of other game characteristics, and the role of individual and situational determinants. Based on the potential risk factors and the implications for commercial appeal, a player-focussed harm minimisation response may hold the most promise for future research and evaluation in jurisdictions where gambling is a legal and legitimate leisure activity.

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## 1 INTRODUCTION

This review aims to examine the empirical evidence, theory and relevant literature describing relationships between stake size, maximum prize and gambling-related harms. Increasingly, regulators and researchers are examining options for game modification to minimize harms, while concurrently, gambling operators and manufacturers seek increases to stakes and prizes to enhance the attractiveness of games and generate more revenue and/or maintain market share. While the main focus of this review is on the implications held for gaming machines, we shall be covering literature in relation to stakes and prizes for all forms of gambling, appropriately caveated in order to comprehensively inform the debate.

Increasingly, and with specific relation to gaming machines, there are regulatory and commercial imperatives for a better understanding of the impacts of stakes and prizes on gambling-related harm. Although stakes and prizes have understandably been a key consideration in the provision of commercial gambling globally, to date there has been limited empirical research investigating its impact on attitudes and behaviour, particularly in the context of problem gambling and social responsibility.

Technological advances and industry creativity in an increasingly competitive market are driving new media and forms of gambling. These evolving innovations in products and their delivery brings with it fresh commercial, regulatory, and political challenges. This in turn prompts stakeholders interested in harm minimisation to consider the characteristics of gambling games and their impact on commercial growth and adverse consumer consequences. Unfortunately, the impact of the product and its characteristics in determining gambling and problem gambling behaviour has received limited academic attention relative to other topics over the last 50 years. The documented understanding of how game characteristics impact consumer behaviour remains underdeveloped and insufficient for informing regulatory policy.

### *1.1 Structural Characteristics in Gambling*

Parke and Griffiths (2007) classified gambling-specific product characteristics that partly determine gambling behaviour and related harms. These are:

- ‘*Payment-related factors*’ which relate to how one pays to gamble (e.g., stake size, deposit methods, security, note acceptors, betting lines, pre-commitment);

- ‘*Playability factors*’ that make gambling fun, interactive, and/or engaging (e.g., near miss, feature or bonus games, specialist play features, provision for social interaction, theme, familiarity, graphics, performance reliability etc.);
- ‘*Reward-related factors*’ relating to how one receives financial rewards or winnings (e.g., payback percentage, hit rate, schedules of reinforcement, immediacy, withdrawal speed and effectiveness, pay table, jackpot size);
- ‘*Speed-related factors*’ relating to the frequency, duration, and expediency of the game or reward (e.g., event frequency and duration, autoplay, timeouts and cooling-off periods etc.);
- ‘*Protective factors*’ which may have the potential to protect, enable, educate or provide information to players (e.g., player activity and financial transaction histories, clocks and time awareness, limiting setting options, self-exclusion options) and;
- ‘*Ambient or sensory factors*’ which may influence the immediate situation of the game or may contribute to other factors already mentioned (e.g., the use of colour, sound, music and light).

For a detailed overview of this taxonomy and its component factors see Parke and Griffiths (2007).

There is a significant risk in evaluating the impact of gambling characteristics on behaviour and not differentiating between specific games and betting formats. Each activity will have an individual matrix of specific structural and situational characteristics influencing both gambling cognitions and behaviours. Indeed, it is probable that the amalgamation of gambling research studies, in an attempt to produce a general understanding of gambling behaviour, is a primary reason for a fundamental lack of theoretical clarity. Because each gambling activity has a unique matrix of characteristics, the observed impact of a specific characteristic on one activity (e.g., maximum prize in gaming machines on the high street) is unlikely to be directly applicable to a different gambling activity (e.g., maximum prize in draw lotteries). Consequently, it is reasonable to suggest that when applying research data to inform regulatory policy, it is important to use caution in extrapolating findings to other gambling activities.

Despite the limitations in application, the assimilation of research under the broad scope rather than specific forms of *gambling* is somewhat understandable considering the relative paucity of research within the field. Ultimately, there is currently an insufficient research base to observe the impact of a specific structural characteristic across specific gambling activities. Essentially, theorists and policy makers must decide between either extrapolating hypotheses and theory from existing generalist research or limiting the scope of any review to a handful of studies.

This review is concerned with the relevant research in relation to two specific game characteristics: the payment-related ‘*stake*’, and the reward-related ‘*prize*’ parameters.

### 1.2 *Conceptual challenges in researching structural characteristics in gambling*

The inability, or limited validity, of integrating research findings in evaluating the probable impact of a structural characteristic across a range of gambling activities is complicated further by the absence of a clear definition of the parameters defining that structural characteristic. *Prima facie*, defining stakes and prizes would seem relatively straightforward, particularly compared to some other characteristics such as volatility. In fact, stakes and prizes are rarely given any operational definition. Yet arguably they represent the most basic features of gambling: winning (prizes) and losing (stakes). However, as we shall see, the nature of these two structural characteristics are not that straightforward.

There is also a lack of consensus regarding the nature of specific concepts and variables used in different research designs. For example, with reference to a *big win* there is a large variance in how different authors interpret this concept. In many experimental designs, because of ethical considerations, a *big win* equates to relatively modest sums (e.g., less than \$2 in Weatherly, Sauter & King, 2004) whereas other researchers have equated a big win to approximately one month’s salary (Custer & Milt, 1985). Such wide variation in interpretation of what constitutes a variable will limit the possibility of identifying clear patterns when integrating research findings.

### 1.3 *Prize: Definitions and Concepts*

There is substantial variance in the types and structure of prizes available not only across but within gambling activities. For example, for gaming machines, maximum prize level can vary enormously from a few pounds to several million<sup>1</sup> depending on the jurisdiction, venue or medium of delivery and category of machine. When reviewing the research literature on the impact of prize level on gambling behaviour, one must take into account the lack of adequate operational definitions defining prizes or *jackpots*. For the purposes of this review, we interpret the meaning of ‘maximum prize’ and ‘jackpot’ to be the same – ‘*the highest value of a winning outcome of any one gambling event*’.

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<sup>1</sup> Megabucks has awarded a jackpot of \$39.7M in Las Vegas, 2003.

#### 1.4 Stake: Definitions and Concepts

In this review, we define stakes as ‘*something of value (usually money) which is put at risk to initiate a gamble*’. Depending on the jurisdiction, game type and stakeholder usage, stake can also be referred to as ‘bet size’, ‘price point’ ‘ante’ or ‘wager size’.

A fundamental misunderstanding is that ‘high stakes’ can often be inappropriately taken to mean ‘high prize’. Although, it is true that higher prizes rely on higher stakes contributing to a larger overall prize pool, the number of participants and odds of winning usually moderate this relationship. For example, for the UK national lottery, the usual stake size for one lottery ticket is £2.00 but with a very low probability of winning the top prize which is usually in excess of £1m. Conversely, for a sports bet a very high stake could be placed on a particular bet that is considered to have a high probability of occurring, perhaps attracting odds of only around 1/100, where a winning outcome would mean that, for example, the amount actually won from a £1000 stake, would only be £10 (£1010 in total including the return of the initial stake). So the relationship between stakes and prizes is not a direct linear relationship.

## 2 REVIEW APPROACH

The comprehensive literature for this paper was carried out in three concurrent phases:

- A search of online electronic databases;
- Grey literature accessed through web-based searches, personal knowledge and professional contacts and;
- ‘Snowballing’ where references of references are pursued (Greenhalgh & Peacock, 2005).

Searches were undertaken using the following terms; *gambling, gaming, wagering, betting, problem gambling, pathological gambling, compulsive gambling, slots, electronic gaming machines, bingo, lottery, casino, internet*, in combination with each of the following ones relevant to ‘prize’; *jackpot, size, prize, win, reward, reinforcement*, and again for ‘stake’; *stake, ante, size, magnitude, risk, deposit*. Academic databases searched included: Academic Search Elite, Business Source Complete, PsychArticles, PsychInfo, Science Direct and Scopus. In addition, generalist web search engines (Google, and subsequently Google Scholar) were also used to identify relevant grey literature or technical reports not subject to traditional peer-review processes. Other relevant literature has also been considered using a similar approach where an appropriate link has been made with stakes and prizes.

### **3 METHODOLOGICAL LIMITATIONS OF EXISTING STUDIES**

Perhaps the most critical limitation in experimental studies on stakes and prize levels stems from ethical limitations restricting the ability of participants to risk losing their own money or retaining significant monetary prizes. Combined with analogue laboratory and ecological settings and experimentally constrained gambling tasks, the vast majority of experimental studies can be seen as having limited external validity.

Although such restrictions are ethically imposed experimental limitations, it can be argued that findings from such non-representative conditions have limited value to policy making. While such a lack of ecological validity is a concern generally, such constraints directly affect emotional and motivational factors highly relevant in studying the variables of interest: stakes (participants cannot lose their own money) and prizes (participants cannot win monetary prizes or if they can, these are negligible in value). The behaviour being measured within such designs could be more appropriately defined as decision-making. As such, these research methodologies do not resemble actual gambling situations making it reasonable to conclude that experimental tasks are non-representative of commercial gambling thus voiding the validity of extrapolated findings.

Another recurring methodological limitation of studies on the impact of stakes and prizes include using samples of inexperienced, irregular or non-gamblers. Experimental samples are largely recruited from undergraduate student populations. Immediately, there are concerns regarding the representativeness of student samples with specific reference to demographic variables such as educational attainment, age and cultural factors, and therefore a lack of generalisability of findings to the wider population.

More importantly, by sampling non-gamblers to observe the impact of a structural characteristic on gambling behaviour, one ignores the role of learning in response to repeated exposure and experience in shaping gambling behaviour. Demaree, Burns, DeDonno, Agarwala and Everhart (2012) are critical of methodological designs investigating risk-taking behaviour from a cross-sectional 'one-shot' that ignore risk-taking preferences and decisions influenced by previous learning and conditioning experiences. For example, an experienced gambler risking a very large prize levels may experience reduced arousal in terms of modified expectation, in contrast to a non-gambler, because given the former's experience repeatedly demonstrating the remote possibility of winning large prizes. Accordingly, it is reasonable to propose that the influence of stake and prize levels on risk-taking in inexperienced gamblers may not be representative of that observed in commercial gambling environments.

## 4 PRIZE LEVELS: REVIEW OF THE RELEVANT LITERATURE

As noted by Crewe-Brown, Blaszczynski and Russell (2013), only a handful of studies have specifically studied the impact of prize level on patterns of gambling behaviour. In relative terms, the impact of other structural factors and individual differences has been given research priority, a curious situation considering that it is widely accepted that winning (not necessarily making a profit) is a primary reinforcer for gambling (Neighbors, Lostutter, Cronce & Larimer, 2002). Although gambling can be positively reinforcing independent of winning money through the effect of excitement and anticipation of winning, even when losing (Meyer, Schwertfeger, Exton, Janssen, Knapp, Stadler et al., 2004), prize levels remain a fundamental factor in terms of behavioural reinforcement. This is because the arousal experienced is influenced by the possibility of winning money (Goudriaan, Oosterlaan, de Beurs & van den Brink, 2004; Ladouceur, Sevigny, Blaszczynski, O'Connor & Lavoie, 2003; Roby & Lumley, 1995; Wulfert, Roland, Hartley, Wang & Franco, 2005).

Developing an understanding of motivational factors is key to gaining a fuller understanding of problem gambling (Currie, Hodgins, Wang, el-Guebaly, Wynne & Chen, 2006; Currie, Hodgins, Wang, el-Guebaly, Wynne & Miller, 2008). Ultimately, primary concern amongst regulators in attempting to determine limits on prize levels is the potential for players to spend more time and money than they can afford (Delfabbro, 2008) and the possibility of individuals taking more risk in the presence of higher jackpot prizes (Productivity Commission, 2010).

### 4.1 *Prize Levels and Decision Making*

Developing the concept of rational gambling motivation in the context of negative economic utility further, higher prize levels may affect an individual's evaluation of the event. Kahneman and Tversky (1979) proposed that expected utility is an over-simplistic understanding of risk-taking decision making, and contended that in response to potentially highly desirable rewards, individuals are inclined to employ biases and heuristics to assist evaluating one's prospects. In simple terms, human cognition and decision-making is not determined via objective evaluation of potential outcomes. For example, Cumulative Prospect Theory (Tversky & Kahneman, 1992) proposes that individuals will over-weigh the value or probability of a specific outcome, leading to non-rational behaviour. Put simply, the potential to win a prize of substantial value may stimulate more risk-taking than would be warranted in objective terms i.e., in terms of expected utility (Friedman & Savage, 1948; Robson, 1996; Sadler, 2000). An example of this phenomenon is provided by Cook and Clotfelter (1993) who identified the disproportional

increase in lottery ticket purchases during rollover weeks where the jackpot increases dramatically and yet probability remains constant.

Kahneman and Tversky (1979) proposed multiple commonly applied erroneous heuristics that promote risk-taking in gambling including the representativeness, availability and anchoring biases, which represent the individual over-weighting the probability of success. Therefore, from a risk-taking and decision-making perspective, there is scope to propose that an increase in prize levels may lead to an increase in cognitive biases enhancing vulnerability to problem gambling. However, findings from this literature must be applied with caution, as contextual factors such as changes in stake size and/or probability are likely to moderate the impact of prize level. For example, *ceteris paribus*, if maximum prize is increased then by default less money is available to be redistributed as lower level wins, and motivation and behavioural patterns may alter depending on whether the individual is aware of this mechanism (Productivity Commission, 2010). Consequently, without the provision of ecologically valid empirical data on the relevant gambling activities, it is difficult to establish the probable impact of prize levels on problem gambling in relation to gaming machines through biased and irrational cognition.

#### 4.2 *Expert Panels, Game Design Protocols and Maximum Prize*

Eleven international researchers on gaming machine behaviour were recruited as key informants on the impact on gambling related-harms and harm minimisation of various game parameters (including stake and maximum prize) on problem gambling relative to gaming machines in Great Britain (Parke, 2009).

Inconsistencies were found in informant views relating to the nature and extent of the impact of maximum prize with both small and large wins deemed important in determining or facilitating harm. Lower prizes were argued to offer frequent and consistent entertaining rewards, but larger prizes, facilitating chasing, offering 'walk-away wins', or delivering early-career 'big wins'. There was consensus that restriction on maximum prize as a harm minimisation strategy would be effective. A limitation of the study, however, is the lack of clarity on the importance and ranking place by informants on each parameter.

Similarly, White et al. (2006) elicited the opinions from 69 national and international 'key informants' on similar parameters. Although restrictions on maximum prize were not considered, items on the promotion of large prizes were included. Mixed support for the presence/absence of such promotion on harm and reducing harm were found (see Table 1 for informant rankings). Of interest, a high 'hit rate' (necessarily implying smaller prizes for any given payback percentage) was considered to be more harmful than a lower 'hit rate' (necessarily implying larger prizes for any given payback percentage). Furthermore, problem gambler informants were strongly in favour of delaying



immediate access to large wins (ranking 3<sup>rd</sup> out of 40 possible approaches) while other key informants remained less convinced. Removing facilities to pay by debit card, permitting limit-setting and note acceptors were seen as most likely to have an impact on reducing harm. These approaches arguably help to facilitate player control rather than impact the fundamental parameters of the game (such as stakes and prizes).

**Table 1. Key Informant Views on Prize Level, Problem Gambling, and Harm Reduction (White et al., 2006).**

Key informant group	Perceived Contribution of Parameters to Problem Gambling			Modifications to Parameters to Reduce Problem Gambling Risk out of a total of 40	
	"Prominent big prize advertising on machines"	"Offering winning outcomes more frequently through a higher hit rate"	"Offering winning outcomes less frequently through a lower hit rate"	"Eliminating advertising of big prizes on machines"	"Delaying immediate access to large wins (i.e., paying out large wins in the form of cheques)"
<b>Researchers (N=13)</b>	*Ranked 8 of 27	*Ranked 16 of 27	*Ranked 26 of 27	*Ranked 19 of 40	*Ranked 15 of 40
<b>Specialists (N=12)</b>	*Ranked 15 of 27	*Ranked 11 of 28	*Ranked 22 of 27	*Ranked 27 of 40	*Ranked 24 of 40
<b>Counsellors (N=5)</b>	*Not considered	*Not considered	*Not considered	*Ranked 27 of 40	*Ranked 10.5 of 40
<b>Problem Gamblers (N= 12)</b>	*Not considered	*Not considered	*Not considered	*Ranked 12 of 40	*Ranked 3 of 40

It is relevant to note that informant views are not necessarily based on robust empirical evidence but can reflect opinion or conventional wisdom (potentially informed by flawed research). Thus, while restrictions on maximum prize have been suggested, possible impacts and mechanisms remain unclear.

Game design protocols are used to systematically evaluate and categorise potential risks of a gambling. Griffiths, Wood and Parke's (2008) Guidance about Responsible Design (GAM-GaRD) risk assessment tool was developed from the findings of their critical review of the literature combined with Delphi derived expert opinion. Another measure, the Assessment Tool to Measure and Evaluate the Risk Potential of Gambling Products (AsTERIG: Blanco, Blaszczynski, Clement, Derevensky et al., 2013) was constructed using similar methodological approaches. Both tools incorporate the notion that size of jackpot is associated with a propensity to facilitate harm. In particular, under both measures, the maximum prizes currently on offer on

category B machines in Great Britain would not be considered to be high risk, and Category B jackpots would be significantly below the cut-off point.

Critically, expert and clinical consensus rather than conclusive and robust empirical research established decisions regarding scoring and cut-off points for risk levels for both measures. For this reason, it remains unclear just how useful such information is in contributing to the debate on the role of stakes and prizes in gambling-related harm.

#### 4.3 *Impact of 'Early Big Win'*

A review of the clinical research literature reveals that an identified risk factor for problem gambling is experiencing a *big win* early in one's gambling career (Custer & Milt, 1985; Turner, Sharp, Zangeneh & Spencer, 2003). It is argued that an early big win will precipitate an erroneous positive expectancy of gambling being a harmless and economically profitable leisure pursuit. Therefore, such gamblers are more resistant to behavioural extinction in response to repeated gambling losses. However, there are substantial question marks in relation to the ostensible validity of such claims, in that, rather than being demonstrated by robust, objective clinical data, support comes from observation of general clinical trends. This is not to say that such propositions are ungrounded, but rather further empirical research is required before it can be concluded with confidence.

Furthermore, in contrast, there are also a number of experimental studies indicating that experiencing a large win early is linked to being less inclined to take risks and gamble further (Demaree et al., 2012; Kassinove & Schare, 2001; Weatherly, Sauter & King, 2004). Kassinove and Schare (2001) observed that a 'big win' early in the experiment did not demonstrate any significant difference in risk taking or gambling persistence in comparison to participants who did not experience a large win. Weatherly et al. (2004) argued that those individuals who experienced a big win early should be able to better discriminate the punishment cues from reward in the face of persistent losses than participants that did not experience a large win, because of the more pronounced contrast in outcomes. Demaree et al. (2012) observed that participants that experienced an unlikely large win subsequently demonstrated less risk-taking preferences. It was interpreted that in the face of surprising events such as improbably winning a large jackpot, participants became more vigilant and attenuated to the event, while processing the win and actively updating existing schemas related to the activity (Demaree et al., 2012).

However, significant methodological limitations warrant caution in applying findings to policy decision-making. For example, none of the participants in the above studies were risking anything of monetary value with the reported large win stimuli in both Kassinove and Schare (2001) and Weatherly et al. (2004) studies being comparatively low i.e. less than \$10. Finally, the impact of a 'big win', whether protective or risky, is likely to be

the product of a longer-term developmental process unlikely to be captured in a single brief experiment. Fundamentally, given the limited research, substantial methodological flaws, and lack of conceptual clarity, insufficient evidence exists to offer conclusions regarding the impact of early career large jackpot wins.

#### 4.4 *Impact of Prize Levels in the Context of Prize Structure*

In evaluating increased prize levels on gambling behaviour it may be more valuable to consider the impact within the context of the composite prize structures. In the vast majority of gambling activities provided, the jackpot operates as a maximum reward along a spectrum of rewards, where the values of prizes are inversely related to the probability of winning such prizes. In simple terms, jackpots represent prizes of higher value that are provided infrequently, and these jackpots are provided amongst an array of more frequent prizes of significantly lower value.

It is argued that the provision of a multitude of prizes within a specific gambling activity affects gamblers' sensitivity to punishment in terms of experienced losses. Turner (2011, page 620) identified gamblers as being unable to learn from the punishment cues in gaming machine gambling because they "*are lost in a forest of [low level] wins.*" With respect to multi-level prize structures on continuous and problem gambling behaviours, Haruvy, Erev and Sonsino (2001) argue that this insensitivity to punishment cues prolongs the learning process regarding negative outcomes. As a result, rather than infrequent large jackpots being a risk factor for continuous gambling, it may be the provision of frequent low level wins that promotes increased gambling expenditure. Therefore, rather than evaluating the impact of large prizes, it is more appropriate to evaluate how the provision of increased maximum prizes in the context of a varied prize structure alongside the provision of frequent small wins affects behaviour.

In support of this contention, research demonstrates that individuals have a risk-taking preference for gambling activities that provide higher probability low level wins than a remote possibility of a large win (Dixon, Maclin & Daugherty, 2006; Griffiths, 1999). With respect to gaming machines, there has been a trend in the structural design to increase opportunity to bet on more win-lines (Dixon, Harrigan, Sandhu, Collins & Fugelsang, 2010). A commonly observed gaming research gambling strategy preference is to gamble on the maximum amount of win lines, at the lowest available stake size, often referred to as the Mini-Max strategy (Harrigan, Dixon, MacLaren, Collins & Fugelsang, 2011). Harrigan et al. (2011) argue that playing the Mini-Max strategy maximises ones opportunity to experience wins. However, Dixon et al. (2010) noted that, given that gaming machines operate at a negative expected utility, that despite the individual regularly experiencing wins by betting on the maximum amount of win-lines, they are still incurring a loss because the total amount won is less than the amount

risked (often referred to as a Loss Disguised as a Win or LDW, see Dixon et al., 2010, for full review).

From a rational perspective, it is difficult to comprehend player preference to experience wins that do not meet or exceed the amount risked or spent within a specific bet or gambling session. It is acknowledged that winning is a primary motivation because it leads to excitement, arousal and positive affect (Young, Wohl, Matheson, Baumann & Anisman, 2008). Harrigan et al. (2011) suggests that although LDW's may in absolute terms still objectively be considered losses, the participant still receives the pleasurable experience of exciting audiovisual events in comparison to consistent recurrence of single line losses. Research shows that even small and medium rewards reliably produce elevation in arousal (as measured by Skin Conductance Responses) in contrast to not winning or even experiencing a near-miss (Lole, Gonsalvez, Blaszczynski & Clarke, 2012; Wilkes, Gonsalvez & Blaszczynski, 2010). However, it is important to recognise that although there is significant arousal stimulation for all wins including LDWs, more arousal is observed as the size of win is increased (Wulfert et al., 2005; Wulfert et al., 2008). Furthermore, the observed significant higher arousal in response to low wins or even LDWs in contrast to non-wins or near-misses (Lole et al., 2012) may be a result of using non-experienced gamblers, and that this arousal may dissipate with repeated exposure and learning that low wins and LDWs equate to punishment over the long-term.

#### 4.5 *Prize Levels and Chasing Losses*

Gamblers may become motivated to continue gambling, despite repeated losses, in an attempt to recoup losses (Breen & Zuckerman, 1999; Corless & Dickerson, 1989; Lesieur, 1976). Turner (2011, p. 621) noted that multi-level prize structures enhance player appeal because they provide repeated, small rewards yet enable chasing through the possibility of large prizes that can make '*a miraculous recovery possible.*' As a result, one could apply these findings and speculate that prize levels represent opportunities to win back substantial losses (Productivity Commission, 2010).

Indeed, larger prizes, if won, would reduce net expenditure (i.e., would help recoup gambling losses) to a greater extent than smaller prizes – this point is clear, factually correct and logically irrefutable. However, exactly to what extent, and by what mechanism, it contributes to excessive play and gambling-related harm is unclear. A critical qualification of the latter explanation is: 'if won'. If players are motivated to continue gambling despite continued losses in order to make financial reparation, then the probability of winning will likely be a critical factor in their decision. This is perhaps why lottery draws are shown to be among the least problematic forms of gambling despite offering the largest prizes (Wardle et al., 2010). It is important to point out that increased sales during rollover jackpot for lotteries (e.g., Griffiths & Wood, 2001) is not evidence supporting the role for higher jackpots

promoting excessive play. Increased sales can be attributed increased number of new participants buying tickets or to existing participants buying more tickets but not necessarily to excess (e.g., buying 2 tickets rather 1 ticket).

For future research, it might be more appropriate to consider ‘thresholds’ rather than absolute maximum prize size as a determining factor of chasing. The relationship between prizes and chasing losses may actually be non-linear in that size may be important up to certain threshold that could provide financial relief. However, further increases in prize levels beyond that threshold may act as a disincentive if gamblers interpret this higher win to be less likely to occur. Another potentially important factor to consider is size of a maximum win relative to stake and cost of play. In other words, chasing while playing at higher stakes will require larger wins for financial reparation and vice versa for smaller stakes. Another area for future research is examining the role of prize levels in chasing within-sessions and between-sessions. Clearly, larger prizes are required for the latter and less so for the former. In the case of between-session chasing, are gamblers more likely to accept a lower probability of winning a large prize if it has the potential to provide financial relief for accumulated losses over numerous sessions. It is proposed that these are all areas worthy of further investigation.

## **5 STAKE SIZE: REVIEW OF THE RELEVANT LITERATURE**

Cornish (1979, p.168) was one of the first to speculate on the potential relationship between stake size and problem gambling in one the first thorough overviews of gambling from an academic perspective:

“The opportunity which a wide range of odds or stakes gives people to exercise skilful regulation of their play according to patterns of previous losses and wins is offset by the dangers this facility may provide in some circumstances. When the opportunity to use longer-odds bets or higher stakes in order to multiply winnings or recoup losses rapidly is combined with a high event frequency and short payout interval, participants may be tempted to gamble longer than they might otherwise do.”

Cornish’s assessment, despite being nearly 35 years old, provides a useful starting point for examining the potential role for stake in facilitating gambling-related harm: it typifies the kind of speculation in the absence of evidence that has characterised academic literature on structural characteristics and, perhaps more importantly, it highlights that the impact of any gambling game is likely to be based on a combination of characteristics rather than any one characteristic individually. It is with this mind, that the following propositions are considered.

### 5.1 *Stake Size as a Determinant of Cost and Duration of Play*

Problem gambling behaviours and gambling-related harm have been argued to develop from spending more money and/or time than is affordable to the player which can then have negative implications for the gambler's family life, career, health and well-being and community (Blaszczynski, Sharpe & Walker, 2004; Delfabbro, 2013; Korn & Shaffer, 1998; Neal, Delfabbro & O'Neil, 2005; Productivity Commission, 2012). For this reason, it is important to examine the potential relationship between stake size and harm by considering the influence of stake on cost and duration of gaming machine play.

It is important to acknowledge that while stake levels determine cost of play, the two elements are distinct. Cost of play (often referred to as net expenditure) over a specific period of time is the product of a variety of structural characteristics besides stake levels, namely, speed of play, payback percentage<sup>2</sup> and game volatility<sup>3</sup>. In simple terms, assessing the impact of each on cost of play (provided everything else remains constant) is as follows:

- **Stake size** - the higher the stakes, the higher cost of play per hour;
- **Speed of play** - the faster the game, the higher the cost of play per hour;
- **Payback percentage** – the lower the payback percentage, the higher the cost of play per hour and;
- **Game volatility** – the impact of game volatility is less straightforward and will arguably have the most significant impact on cost of play over the short run. However, for a game which is considered to be more volatile (offering less frequent but higher value wins), a majority will experience a faster rate of loss and a higher overall cost of play with the reverse being true for the minority who benefit from less frequent but higher value wins.

Of course, in reality, the exact parameters vary considerably from game to game driven both by consumer preferences and regulatory requirements. Such variation is what makes examining the impact of any one parameter on gambling-related harm so difficult.

The Responsible Gambling Strategy Board, in their advice to the Gambling Commission on the Triennial Consultation in June 2013, outline the potential relationship between stake and other key structural characteristics in

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<sup>2</sup>Payback percentage (or return to player) refers to the value of prizes redistributed to players of the same game as a proportion of the total amount wagered over the long-term – or the operator's margin

<sup>3</sup>Game volatility refers to the probability of winning different prizes (less frequent but higher value prizes usually means higher volatility; more frequent but lower value prizes usually means lower volatility).

determining cost of play on different categories of gaming machines (see Table 2). This table is useful in further illustrating the distinction between stake size and cost of play. For example, the expected average theoretical cost per hour of playing a Category C gaming machine with a maximum stake level of £1 is estimated to be nearly four times higher than playing a Category B2 roulette game when playing at a stake level of £20. This is a consequence of a slower game speed and higher payback percentage in the case of the category B2 machine. This further reinforces the point that the relationship between stake size and monetary loss is not a straightforward one.

This illustration is important as it serves to emphasise that, as a result of the significant variation in game characteristics which also determine cost of play, higher stakes do not necessarily equate to higher rates of spending.

Similarly, the Productivity Commission (2010, p.11.3-11.8) in their review of gambling and problem gambling identify stake size a key determinant of ‘gambling intensity’ (used to express cost of play) along with game speed and various other game features.

**Table 2. Cost of play on categories of gaming machines in Great Britain as a function of stake size, game speed and payback percentage (adapted from Responsible Gambling Strategy Board, 2013).**

Category	Stake	Game speed (seconds)	Payback percentage	Expected average theoretical cost per hour
B1 (slot)	£2	2.5	94	£173
B2 (roulette)	£100	20	97.3	£486
B2 (roulette)	£20	20	97.3	£97
B3 (slot)	£2	2.5	92	£230
B4 (slot)	£1	2.5	80	£288
C (slot)	£1	2.5	75	£360

Notes: Average cost per game is per single reel spin or roulette wheel spin) at maximum stake a.k.a the average machine hold or loss to player per spin, at max stake; The example of a £20 stake is given for comparative purposes only. We understand that this figure is close to the average stake on a single spin on a B2 roulette game. But the distribution around the average could be highly skewed.

18; The game speeds used in the table above are the minimum game cycle lengths i.e. the ‘fastest’ that each game can run at. Category C games speeds can be 1.5 seconds but the average game speed over an hour must be 2.5 seconds. It may be the case that game play is actually slower than these minimums across all categories, and so the maximum theoretical cost per hour figures would be lower in each case; B2 roulette is shown as an example, but B2 slot games are also available on the market. The games speed (cycle length) of 20 must be adhered to but the RTP would vary from that for roulette.

In summarising how stake is conceptualised, it is important to note that it is only one contributing factor to how much the gambler will spend. However, as a final point, it should also be acknowledged that stake size is the primary mechanism by which the player themselves can modify the cost of play or ‘gambling intensity’. With only a few exceptions, payback percentage and

game volatility are set by the manufacturer and operators within parameters set by the regulator. Game speed would also be unlikely to vary much between players in the case of most gaming machines. Hence, although stake size is only one component of cost of play, it is the principal means by which players modify cost of play and level of risk within the same game.

Finally, it is also important to consider gambling-related harm also originates from loss of time, particularly that which exceeds discretionary leisure time (Blaszczynski, Ladouceur & Moodie, 2008). In this respect, higher stakes will reduce the time available for play for any given sum of money and therefore may pose less risk regarding the time-component of gambling-related harm. The relationship regarding time spent and stake size is likely to be more complex than this. Nevertheless, it is noteworthy, and may be particularly relevant for some consumer segments that have high levels of disposable income but low levels of disposable leisure time.

### *5.2 Losing, Negative Affect and Impaired Control*

From the prize level literature, a more pertinent risk factor for problem gambling can be construed as the gambler's response to losses rather than motivation to win large prizes. Kahneman and Tversky (1979; 1984; Tversky & Kahneman, 1991) present the dictum '*losses loom larger than gains*' to indicate that a loss of a specific amount is more significant than a reward of a similar magnitude. This has been explored through the 'model of risky choice' where risky choices are considered to be more likely to be taken to avoid monetary losses than to seek monetary gain (Kahneman & Tversky, 1979; 1984).

As discussed, stake size is one key determinant of a player's experience of 'losing'. Individual differences between gamblers will likely mean that a losing experience may be interpreted in different ways with the majority of consumers seeing this as simply the cost of this particular leisure choice. In fact, there is empirical support for the claim that when consumers spend money to purchase a good or service they will not experience loss aversion provided that they have appropriately budgeted for that amount (Novemsky & Kahneman, 2005; Tversky & Kahneman, 1991). Loss aversion is more likely when there is a perceived 'wealth effect' where there are negative implications for future consumption as a consequence of the loss, particularly when that loss is unplanned or unexpected (Novemsky & Kahneman, 2005).

Consistent with this proposition, it has been demonstrated that emotional reactions to losses are more immediate and significant than emotional reactions to positive events (Cacioppo & Gardner, 1999; Taylor, 1991). From this, it is possible to conclude that the experience of loss will be an undesirable state, and one from which the gambler will be motivated to transition. Demaree et al. (2012) contend that in general when in a positive mood people are less inclined to take risks for fear of decreasing positive experience, whereas conversely, when individuals are in a negative mood



state they are more willing to take risks in an attempt to return to equilibrium. Gehring and Willoughby (2002) in a series of gambling experiments observed that participants attempted to preserve gains but that the accumulation of losses was directly related to increased risk-taking; and furthermore, the larger the loss experienced the greater the subsequent risk-taking. Further support for the role of negative emotions was also found in a questionnaire which explored gamblers' self-perceptions of the determinants of impaired control (Corless & Dickerson, 1989) where negative affective states such as a frustration and depression were perceived to be the most significant determinants for impaired control among problem gamblers. Fundamentally, as Anderson (2012) suggests, there is consistent support for a skewness towards risk-taking in negative situations.

It is interesting to note that, in an experiment which examined the impact of reducing stake size from \$10AUS to \$1AUS as a harm minimisation strategy, there was a reduction in alcohol use and smoking among gamblers (Sharpe, Walker, Coughlan, Enersen & Blaszczyński 2005). While the authors acknowledge that this may have been artefact of spending less time overall on the modified machine, they also speculate that it could also have been related to reduced negative arousal as a result of lower stake size and a lower intensity of losing.

This section serves to highlight that the opportunity to spend more money does not necessarily, in and of itself, cause harm – opportunities to spend large sums of money on any number of goods and services permeate our immediate environments now more than ever. Rather it may be the negative impact of losing more than one can afford on mood and decision making that is of principal concern. Negative emotions leading to poor decision-making, which may in turn lead to persistence in within-session gambling, is something which should be further explored empirically, particularly in the specific context of gambling where both planning and affordability (Kahneman & Tversky, 1979; 1984) must also be factored in.

### 5.3 *Expert Panels, Game Design Protocols and Stake Size*

Both expert panels described above (Parke, 2009; White et al., 2006) also considered stake size. In the Gambling Commission expert panel (Parke, 2009) there was broad support for the proposition that high-stake machines would be more appealing to problem gamblers, or that higher stake machines would be more likely to be associated with harm. However, accompanying explanations were limited, and to some extent, inconsistent. The potential relationship between stake size and harm was further complicated in that some panellists suggested that lower stakes could widen participation or prolong gambling sessions as a result of the lower cost of play involved. While there was agreement among panellists that the impact of higher stakes on increasing the financial costs per hour of playing a gaming machine was an important determinant of harm, there was considerably less agreement

regarding a potential link between higher stakes and chasing. While some thought that chasing occurs regardless of stake size, others disagreed stating that chasing is facilitated by a broad range of stake sizes (i.e., permitting staking increases within the same game to recoup past losses faster and without the need to bet at longer odds).

In the Responsible Gambling Council expert panel (White et al., 2006) propositions relating to staking levels, much like prize levels, were not ranked among the most important factors contributing to gambling-related harm (see Table 3). There was mixed support for the proposition that a large range of stakes contributes to harm while there was consensus that having a lower limit on stake size would not be an appropriate harm minimisation approach. The latter view contradicts suggestions from the other panel that lower staking levels encourage wider participation and longer playing times.

**Table 3. Key Informant Views on Stake Size, Problem Gambling, and Harm Reduction (White et al., 2006).**

<i>Key informant group</i>	Perceived Contribution of Parameters to Problem Gambling out of a total of 27 EGM parameters		Modifications to Parameters to Reduce Problem Gambling Risk out of a total of 40 possible parameter modifications	
	"Large denomination maximum betting amounts"	"Large range between minimum and maximum betting amounts"	"Reducing maximum bet size"	"Increasing maximum bet size"
<b>Researchers (N=13)</b>	*Ranked 12 out of 27	*Ranked 17.5 out of 27	*Ranked 11.5 out of 40	*Ranked 39 out of 40
<b>Specialists (N=12)</b>	*Ranked 7 out of 27	*Ranked 13 out of 27	*Ranked 18 out of 40	*Ranked 39.5 out of 40
<b>Counsellors (N=5)</b>	*Not considered	*Not considered	*Ranked 19.5 out of 40	*Ranked 36.5 out of 40
<b>Problem Gamblers (N= 12)</b>	*Not considered	*Not considered	*Ranked 9 out of 40	*Ranked 40 out of 40

In terms of the game design protocols described previously: ASTERIG (Blanco, Blaszczynski, Clement, Derevensky et al., 2013) and GAM-GaRD (Griffiths, Wood & Parke, 2009), both of which were also informed by input from expert panels, have identified stake size as a factor that should be considered when estimating the level of risk in a game. Importantly however, with both protocols, the size of the stake is not considered to be important but only whether the stake is variable (i.e., whether the player can determine size of stake within a particular game). Therefore, in terms of these two game design protocols, higher staking levels are not considered to contribute to the overall level of risk in a game.

The same limitations in using expert panels apply here as discussed previously under prize levels: even consensual, expert opinions, have limited value in unpacking the very complex issue of the impact of structural and situational characteristics in problem gambling. This is particularly applicable in such exercises where little attention has been given to exploring the precise mechanism for how stake actually impacts gambling behaviour and any potential for consequential harm.

#### 5.4 *Staking Levels as an Indicator of Problem Gambling*

There is evidence across a range of gambling formats that suggests that higher levels of staking may be indicative of problem gambling (Blaszczynski, Sharpe & Walker, 2001; Sharpe, Walker, Coughlan, Enersen & Blaszczynski 2005), chasing loses by placing higher bets at shorter odds (Xuan & Shaffer, 2009) or self-exclusion or account-closing behavior (Braverman & Shaffer, 2010; LaBrie & Shaffer, 2011; Xuan & Shaffer, 2009). High variability in staking behaviour has also been shown to characterise ‘high-risk’ internet gambling (Braverman & Shaffer, 2010).

Specifically in relation to gaming machines, Blaszczynski and colleagues, in an ecologically-valid experiment in real gaming venues, problem gamblers (those participants with a South Oaks Gambling Screen scores greater than 5) were more likely than non-problem gamblers to bet amounts greater than one dollar per spin (Blaszczynski, Sharpe & Walker, 2001; Sharpe, Walker, Coughlan, Enersen & Blaszczynski 2005).

While a significant link appears to exist between higher, more variable staking behaviour and gambling-related harm, an appropriate policy response remains unclear. Some might argue that income from higher stakes gambling should be considered to be inappropriate given that it is income derived in part from problem gamblers. It could also be argued that restrictions on stake will be less likely to adversely affect non-problem gamblers. Both claims however are only partially true, since higher staking levels will also characterise consumers with higher disposable income, lower disposable leisure time or those non-regular gamblers who may infrequently stake large amounts but do so in controlled and affordable way (e.g., an annual trip to Las Vegas). Restrictions on stake size are considered in more detail below.

#### 5.5 *Restrictions on Stake Size: Impacts on Gambling Behaviour*

One of the first studies to explore the impact of restrictions on stake size was a laboratory experiment that examined the impact of limited and unlimited stakes on risk-taking, illusion of control<sup>4</sup> and motivation to gamble

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<sup>4</sup>Illusion of control refers to a form of biased thinking where gamblers believe they have more control over a gambling event than probability or the structure would warrant

(Ladouceur & Gaboury, 1988). While no impact on illusion of control or motivation was observed, the authors noted that: “*Indeed, restricted to a fixed or constant number of tokens per trial, subjects increased their level of risk in the only possible way, i.e. placing riskier bets with a fixed amount of money*” (p. 125). In other words, it is suggested that where gamblers are restricted from gambling in their usual way (i.e., limits on stake size) they will adapt their play by manipulating other game parameters (e.g., placing bets at longer odds). However, participants did not lose their own money in the gambling experiment precluding generalisation to other populations.

Blaszczynski and colleagues (Blaszczynski, Sharpe & Walker, 2001; Sharpe, Walker, Coughlan Enersen & Blaszczynski 2005) examined the potential of various gaming machine modifications for harm minimisation across 7 hotels and 4 clubs in Australia. They found that just over a third of problem gamblers bet above the \$1 limit, and therefore, limits on bet size may be an effective harm minimization measure for these individuals, despite them making up a small proportion of players (7.5% of total sample). However, the authors caveat this important finding by pointing out that since most bets are under \$1, that it was likely that problems were coming from smaller bet sizes over longer periods of time rather than from excessive bet size over shorter periods. Therefore, limits to maximum bet size may be more useful as a harm minimization tool for a minority of gamblers either playing with higher stakes or playing with time constraints within a shorter session. It was also reported that changing maximum bet sizes from \$10 to \$1 had no significant effect on perceived enjoyment for either recreational or problem gamblers. The authors concluded that if modifications promoted harm minimization then this could be enjoyed with limited impact on the satisfaction of the majority of players who do not experience any harm.

While this study was the first of its kind in that it examined machine modification in real gambling environments there are some limitations that suggest that these results should be interpreted with caution. The authors acknowledge that participants were not likely to be representative of the broader playing population as more heavily-involved gamblers declined to participate in the experiment. The authors also acknowledge that identical machines with no modifications were also available in the same venue and therefore observed reductions in play among the experimental machines could simply reflect players migrating to unmodified machines rather than reducing or terminating overall levels of play in that particular session.

In Norway in 2007, in an attempt to minimise harm associated with gaming machines, existing categories of machine were banned and substituted for a new alternative of machine which had various game modifications and responsible gambling enhancements such as lower prize levels, mandatory spending and limits breaks in play, card-based cashless gambling and enhanced self-exclusion options (Engebo, 2010). Of particular interest, however, is that the new version of the machine presented a shift in stake size of 400% from NOK10 for the earlier banned, to NOK50 for the new,

modified machines (a change of around £1 to £5). There is some support for this initiative's effectiveness in reducing gambling participation rates, problem gambling, calls to treatment helplines and frequency of play (Engebo, 2010; Lund, 2009). Unfortunately, it is not possible to tease out which specific changes or combination of changes contributed to the reduction as the modifications were implemented at the same time in the form of a completely new terminal.

### 5.6 *Inducements for Higher Staking*

For some categories of gaming machine, betting at higher stakes can often entitle a player to a higher payback percentage or extra privileges in the form of additional game content or game features. For example, for a category B3 gaming machine in Great Britain, a payback percentage of 90% may be offered when staking £0.50 and compared to 92% or 94% when staking at £2.00. In terms of enriched content, extra free spin games or bonus features may only be available when playing at the maximum stake size (e.g., £2 for category B3 games). Such features have been identified as being particularly attractive to frequent gamblers (Moodie & Finnigan, 2005; Parke & Griffiths, 2007).

To the best of our knowledge this practice and its potential implications for gambling-related harm has not been examined empirically. However, like most other commercial transactions paying a higher price for a product or service usually implies greater entitlement, and prima facie, a gambling-related product or service is no exception. Notwithstanding this industry's entitlement to adopting their own preferred pricing strategy, however, consideration should be given to the potential risk of players staking beyond their means in order to get better game content or features. One option may be to make the same content available at all staking levels within the same game. Increasing payback percentage with increased staking levels may be less of a concern given that cost of play will be offset, to some extent, by the higher payback percentage.

### 5.7 *Stake Size, Affordability, Participation and Time Loss*

There has been some suggestion that lower staking levels may be risk factor such that it encourages a broad level of gambling participation through increased affordability (Corney et al., Parke, 2009) or by players exceeding their disposable leisure time (Parke et al., 2009). Such concerns at present seem tentative and currently with limited empirical basis. As discussed above, the Responsible Gambling Council's expert panel (see Table 3) ranked placing a minimum limit as the least effective harm minimisation approach out of a total of 40 other possible approaches.

### 5.8 *Game Parameters Do Not Operate in Isolation: The Case of Stake Size and Game Speed in British Gaming Machines*

In introducing this review, the limitations of examining game parameters in isolations were described. In this respect, it may be helpful to consider the below example in relation to stake size, decision making and the temporal context. As noted, game speed (along with stake size) is as a key determinant of cost of play with faster rates of play increasing overall costs of play per hour (or minute). Thus, depending on the exact parameters of stake and game speed, it is possible that a faster game with lower stakes may result in a higher cost of play per hour than a slower game with higher stakes. This point of distinction is important particularly in the British context where some categories of gaming machine (e.g., roulette offered in a Category B2 machine in 20 second intervals) are slower than other categories (e.g., slot content offered in Category B1 or B3 machines in 2-4 second intervals).

Moreover, the importance of a temporal dimension to machine gambling and its implications for stake size may also extend beyond implications for cost of play. Urgency and time pressure as a threat to decision-making is not a new phenomenon (Howard & Sheth, 1969; Sieber, 1974; Wright, 1974) and has been found to extend to a variety of contexts in consumer behaviour (Howard & Sheth, 1969; Suri & Monroe, 2003). Negative impacts on decision-making are argued to be consequence of allocating insufficient time to the consideration of alternative choices (Janis, 1982; Keinan, 1987). While there may not be any formal pressure on time for machine gamblers, there may be an implicit recognition that the gambler cannot simply sit at a machine and not play. Through the player's own eagerness to continue, decision time between plays is unlikely to extend beyond a few seconds. The Productivity Commission (2010, p.11.17) make a similar point in their consideration of stakes and event frequency in the Australian context: "*A \$10 bet on an EGM<sup>5</sup> is not comparable with a \$10 bet on a horse race or on a lottery, which is typically made after at least some consideration and in a much more extended timeframe. By contrast, EGMs have the capacity for rapid repetition of game some hundreds per hour.*"

To the best of our knowledge, we are not aware of any research which examines the proposed temporal role in decision-making in relation to persistent or excessive gambling. Given the particular emphasis in the relevant research literature for the need to examine the process of decision-making and its relationship within the precise context to which they apply (Langely, Mintzberg, Pitcher, Posada & Saint-Macary, 1995; Perlow, Okhuysen & Repenning, 2002), we suggest that further research on a potential 'speed trap' in a gambling context is carried out before drawing firm conclusions on this point. What is quite clear however is that while game parameters should not be considered in isolation, it may be particularly

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<sup>5</sup> Electronic gaming machine

important to consider stake size in relation to game speed and event frequency.

## **6 STAKES AND PRIZES: THE CURIOUS CASE OF AROUSAL**

Arousal<sup>6</sup> has been reported as an important motivational factor (Lee, Chae, Lee & Kim, 2007; Lloyd et al., 2009; Parke et al., 2012; Platz & Miller, 2001; Wardle et al., 2010), and reinforcer of (Boyd, 1976; Brown, 1986, Lloyd et al., 2009; Rockloff & Dyer, 2006; Wulfert et al., 2005; Wulfert, Franco, Williams, Roland & Maxon, 2008) gambling participation. There is also evidence that the role of arousal may be moderated by individual differences (Anderson & Brown, 1984; Coventry & Brown, 1993; Seifert & Wulfert, 2011; Studer & Clarke, 2011) and player choice afforded in the gambling activity (Studer & Clarke, 2011).

Research has indicated that the arousal increases when there is an expectancy of winning money (Coventry & Constable, 1999; Ladouceur et al., 2002) and that the greater the magnitude of potential win, the greater the level of arousal (Wulfert et al., 2005; Wulfert, Franco, Williams, Roland & Maxon, 2008). These propositions are supported by recent findings from an fMRI study that observed that the greater the possible reward, the higher the level of activation in the nucleus accumbens (an area integral to reward and appetitive processes within the brain; Knutson, Taylor, Kaufman, Peterson & Glover, 2005). In effect, if larger prize levels stimulate heightened excitement, the individual may experience increased motivation to gamble in response.

There have been consistent reports that arousal is primarily associated with reward rather than risk. In studies examining the role of winning and losing in gaming machines arousal is more commonly associated winning (Coventry & Constable, 1999; Coventry & Hudson, 2001; Moodie & Finnigan, 2005). However, it is likely that no real loss or risk was simulated in experiments where participants are not losing their own money (e.g., Moodie & Finnigan, 2005) and therefore such ‘losing’ outcomes do not represent risk but only absence of reward. Even in situations where participants were gambling with their own money (e.g., Coventry & Constable, 1999) it is unlikely that observed play would be sustained long enough to pose significant financial risk in the research setting. Research that did successfully simulate risk did find that losing something of value in a gambling situation significantly increased heart rate (Siefert & Wulfert, 2011). Furthermore, increases in risk through increased stake sizes were associated with higher levels of arousal (Anderson & Brown, 1984; Studer & Clarke, 2011).

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<sup>6</sup> Arousal refers to a cognitive, emotional and physiological response to significant stimuli in one’s environment. Arousal can be exhibited in impact heart rate, blood pressure and skin conductance and can influence how we think, feel and perform on tasks.

Accordingly more research is needed to better understand the between risk of monetary loss, arousal and gambling-related harm, particularly given the political focus on costs of play for Category B gaming machines in Great Britain.

While there is some evidence for a link between arousal and stake and prize levels; the implications for the role of arousal in the development and maintenance of problem gambling remains unclear. Given that individuals differ in their optimal level of arousal (Schmidt, Mussel & Hewig, 2013) further research is needed to determine, to what extent, arousal represents a gambling-related harm, or a 'gambling-related benefit'.

## 7 SUMMARY AND IMPLICATIONS

### 7.1 *Impacts of Game Parameters Depend on Context*

Each gambling activity comprises a unique matrix of structural and situational characteristics that influences gambling behaviour. The impact of the size of stakes and prizes on gambling behaviour must be considered individually, in the context of each gambling activity's specific matrix in order to propose conclusions with any confidence. This highlights the importance of controlled experiments where the variables of interest are systematically manipulated and all other variables are held constant to identify causal impact.

### 7.2 *Lack of Conceptual Clarity*

There is a lack of conceptual clarity in relation to both game parameters, the notion of 'jackpot' in particular, and this restricts the ability to draw inferences from the research literature. The configurations of prize levels vary substantially across gambling activities in terms of relative probability. For example, 'maximum prize' may represent a massive sum that is vastly diverse to other potential prizes, or it may simply represent the largest in a series of low to moderate prizes. Therefore the concept of maximum prize or jackpot is not homogenous across research articles. There is no consensus within the research literature regarding what constitutes a *big win*. It is not possible to legitimately integrate the research findings to observe for trends because the size of a *big win* differs radically between research studies. Specific research within the British context would be useful here.

### 7.3 *Methodological Limitations*

The relevant research literature has multiple significant methodological flaws affecting the validity of conclusions proposed. Some limitations are the consequence of ethical restrictions in human research rather than a design



oversight. The following list identifies repeatedly observed methodological flaws that restrict ability to apply the findings to the regulatory debate on maximum prize.

- The majority of gambling tasks used in research studies are not representative of commercial gambling, in the sense that personal money is not at risk therefore removing a fundamental element of a gambling situation. The fact that research participants are not staking their own money is particularly problematic in studies where stake is the variable of primary interest. Learning implications in relation to stake relate to monetary risk and loss and pursuant implications for the consumer.
- The potential to win money is also restricted in contrast to real commercial gambling situations. Both ethical restrictions and research budgets restrict how much a research participant can win. The opportunity to win course credit<sup>7</sup>, book tokens, snacks or even \$20 tells us little about the behavioural implications of having the opportunity of winning a jackpot of thousands or even millions of pounds.
- Some research studies utilised samples of college students rather than general populations, therefore the sample will be biased towards a specific demographic and will not be representative.
- Moreover, some of the samples are non-regular gamblers which will negate the impact of repeated exposure and learning, which is a crucial variable to consider in relation to evaluating the impact of reinforcement, money and prize levels on gambling behaviour.

#### 7.4 *Maximum Prize*

While acknowledging the fundamental limitations of the available literature, general trends were observed in relation to stake and prize levels. In terms of prize levels, the following concepts are tentatively proposed as hypotheses to further explore empirically rather than being presented as bona-fide conclusions.

Larger prizes may create more excitement and arousal in individuals, and therefore it is possible that increasing jackpot size may motivate more participation in gambling, as individuals perceive the activity as having increased utility.

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<sup>7</sup> Course credit can be made a course requirement for some programmes of study such as psychology and is often used as an incentive for under-graduate students to participate in research.

Larger potential wins will naturally be more desirable to individuals, and increased desirability of rewards is proposed to reduce rational decision-making ability in terms of overweighting either the probability of winning or the utility of a potential jackpot. The overweighting of the probability of winning a potential jackpot may increase motivation to gamble and potential lead to increased monetary losses. However, evidence pointing to this relates to jackpots much in excess of those currently being offered on category B machines in Great Britain.

The role of a *big win* as a risk factor for problem gambling appears to be overstated in terms of available empirical support. There are sound hypothetical arguments both for and against a *big win* as a risk factor for problem gambling, but fundamentally neither claim has been supported convincingly with empirical evidence.

The role of increasing maximum prize in influencing gambling behaviour appears to be less important than the provision of substantially more frequent low and moderate level wins. The literature suggests that even low level wins, or LDWs, are more arousing than not winning at all, and therefore may increase reinforcement for continuous gambling which may lead to gambling-related harm. Importantly, however, this finding may be an artefact of using non-gambling samples in the experimental designs, as it is probable that over time participants will gradually learn that low level wins may not constitute a positive reward in the context of accumulated losses.

The role of increasing maximum prize in facilitating problem gambling appears to be further reduced when considering that incurred losses have a greater impact on subsequent gambling behaviour than proportional wins. It is proposed that individuals are more risk averse in response to winning and more willing to take risks when incurring losses and experiencing negative affect within this context.

There is also scope to propose that given the implications of incurring monetary losses in facilitating gambling-related harm, and the propensity to chase losses, that larger jackpots may enable further rationalisation to chase losses at least within-session in order to make a full or at least partial financial recovery. However, probability (i.e., odds of winning) is normally factored into this decision and for any given matrix of game features, usually probability of winning is inversely related to size of the prize. For this reason, the relationship between chasing and jackpot size is not straightforward and therefore this should be a priority for further research.

### 7.5 Stake Size

Stake size is one of four principal determining factors of cost of play; the others being game speed, payback percentage and volatility. A higher stakes game may have a lower cost per hour if it is slower, offers a higher payback percentage and is less volatile. However, stake size remains the main mechanism by which players modify cost of play, and therefore how much

money they can lose. Spending in excess of one's disposable income constitutes the basis from which many aspects of gambling-related harm may emanate.

Gambling-related harm may also emanate from losing excessive amounts of time from playing gaming machines. For any given matrix of structural characteristics, a higher stake size implies less time available for gambling. Higher stakes may therefore limit the time component of gambling-related harm or potentially act as a deterrent to some gamblers who have social, experiential or avoidance-based motivations for participation.

Spending more money on a product or service from which you derive benefit is not alone sufficient to be considered a primary risk factor for problem gambling. As suggested, other game characteristics will also play an important role. However, it may also be the interaction with individual differences (e.g., sensation-seeking, extraversion, inhibitory control, motivation), and situational factors (e.g., affordability, accessibility, negative life-events leading to avoidance-seeking behaviours) that combine to create greater risk. This suggests that a player-focussed policy response that requires appropriate action from both players and operators may hold most promise for future research and evaluation.

Restrictions on stake size as a harm minimisation strategy has been trialled in some jurisdictions, and in some cases, actually been implemented as a regulatory response. However empirical evidence for its effectiveness remains inconclusive. Various sources suggest that harm may be done at low to moderate staking levels (Blaszczynski, Sharpe & Walker, 2001; Sharpe, Walker, Coughlan Enersen & Blaszczynski, 2005) which would negate the value of stake restrictions unless enacted at very low levels.

There is some evidence to suggest that higher, more variable staking behaviours are more indicative of problem gambling than lower, more consistent staking behaviours. (Blaszczynski, Sharpe & Walker, 2001; Braverman & Shaffer, 2010; Sharpe, Walker, Coughlan Enersen & Blaszczynski, 2005) More research is required to better understand this relationship in order to formulate an appropriate policy response. Further research should also consider to what extent restrictions on stake would negatively affect the majority of players who do not experience problems.

### *7.6 Role for Arousal?*

Higher stakes and prizes may potentially be associated with greater levels of arousal (i.e., excitement) which may have implications for impaired control and problem gambling. However, fun and excitement are also important motivations for gambling and represent potential benefits from the gambling experience. This adds support for prioritising player-focussed harm minimisation (e.g., limits, pre-commitment) over modifying or restricting core aspects of the game (e.g., stakes and prizes).

## 8 CONCLUSIONS

Critical examination of the evidence suggests that stake and prize levels merit consideration in relation to clinical, commercial and regulatory efforts to minimise gambling-related harm. However, substantial knowledge gaps currently exist which need to be filled before knowing their precise impact on gambling behaviour and identifying the most appropriate harm minimisation response.

If a relationship with gambling-related harm exists in relation to stakes or prizes it may not necessarily be linear. For example, a low or moderately sized prize may alone be sufficient to provide optimal conditions for within-session chasing. It is also possible that excessive monetary loss may be possible at low to moderate staking levels even in the absence of high stakes gambling. For these reasons, depending on where such thresholds exist, restrictions on stakes and prizes may be less meaningful. Again a complicating factor is likely to be that such thresholds may vary across consumers according to individual (e.g., risk preferences, or trait-based arousal) and situational differences (e.g., disposable income, social support, state-based arousal). This should invoke due consideration from policy makers and guard against making simplistic harm minimisation decisions which potentially wrongly assume that increases will necessarily increase risk and/or reductions will necessarily reduce risk.

Both maximum stake size and maximum prize are game parameters that exist within a wider configuration of game characteristics, and it is this configuration that represents the essential context in which empirical research needs to be carried out. Real world studies must systematically examine different game parameters within different game configurations while maintaining experimental control of the variables under investigation. Given the number of potential limitations of learning about the impact of stakes and prizes in the laboratory, it is suggested real learning is more likely to be attained using data from real gaming machines in real environments.

Potential harm minimisation responses to address the potential impact of stakes and prizes might include: i) product-based restrictions and modifications (e.g., restrictions on size of stakes, prizes or slowing game speed); ii) operator-led, player-focussed initiatives that restrict access (e.g., self-exclusion), facilitate awareness (e.g., statements and player analytics) and facilitate control (e.g., limit-setting). Player-focussed initiatives have the advantage of retaining core properties of the gambling game that make it an attractive proposition as a leisure activity. However, in order to have less reliance on product-based restrictions, a step change in the provision of player-focussed harm minimisation approaches will be required.

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