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The development of a multi-dimensional gambling accessibility scale

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Abstract

The aim of the current study was to develop a scale of gambling accessibility that would have theoretical significance to exposure theory and also serve to highlight the accessibility risk factors for problem gambling. Scale items were generated from the Productivity Commission's (1999) recommendations and tested on a group with high exposure to the gambling environment. In total, 533 gaming venue employees (aged 18 – 70 years; 67% women) completed a questionnaire that included six 13-item scales measuring accessibility across a range of gambling forms (gaming machines, keno, casino table games, lotteries, horse and dog racing, sports betting). Also included in the questionnaire was the Problem Gambling Severity Index (PGSI) along with measures of gambling frequency and expenditure. Principal components analysis indicated that a common three factor structure existed across all forms of gambling and these were labelled Social Accessibility, Physical Accessibility and Cognitive Accessibility. However, convergent validity was not demonstrated with inconsistent correlations between each subscale and measures of gambling behaviour. These results are discussed in light of exposure theory and the further development of a multi-dimensional measure of gambling accessibility.

In recent years there has been a large increase in the number of studies utilising a public health framework to assess the role of gambling accessibility in the prevalence of problem gambling. At the core of this model is a focus on the interaction between the host, the agent and the environment (Shaffer & Korn, 2002). However, within this framework it has been the role of the environment that has dominated research, particularly in terms of the location and proximity of gambling venues. With regard to the agent (the gambling activity), it has largely remained constant with studies primarily focussed on one form of gambling, electronic gaming machines (EGM's). The role of the host in this research (the individual gambler) has been somewhat diluted by the use of population-level data and hence, the interaction amongst the host, agent and environment has not properly been evaluated. One reason for this is the lack of a multi-dimensional measure of gambling accessibility that is sensitive to the host (the individual gambler), and is also sufficiently broad to encapsulate a range of agents along with being relevant to the number of environmental issues related to accessibility. The present study aims to address this via the construction of a multi-dimensional gambling accessibility measure.

Numerous studies have examined the relationship between gambling venue accessibility and gambling behaviour. In the Australian context, the seminal study into accessibility is the Productivity Commission's (1999) report. This report highlighted the complexity of understanding accessibility due to its multi-dimensional nature. The Productivity Commission identified nine dimensions of accessibility that comprised (1) the number of opportunities to gamble, (2) opportunities to gamble per venue, (3) the number of venues, (4) the opening hours of the gambling venue, (5) conditions of entry, (6) location of venues, (7) social accessibility, (8) cost of initial outlay and (9) ease of use. Most of the relevant research has broadly focused on the

first six of these by examining opportunities to gamble, particularly with regard to EGM density (Clarke, Tse, Abbott, Townsend, Kingi & Manaia, 2006; Delfabbro, 2002; Ladouceur, Jacques, Ferland & Giroux, 1999; Ladouceur, Jacques, Sevigny & Cantionotti, 2005; Livingstone, 2001; Marshall, 2005; Marshall & Baker, 2002) and venue proximity to home, work or other convenient locations (Adams, Sullivan, Horton, Menna & Guilmette, 2007; Barron, Staton & Wilshusen, 2002; Boardman & Perry, 2007; Chhabra, 2007; Doran, McMillen & Marshall, 2007; Hinch & Walker, 2005; Marshall, McMillen, Niemeyer & Doran, 2004; McMillan & Doran, 2006; Pearce, Mason, Hiscock & Day, 2008; Perese, Bellringer & Abbott, 2005; Shaffer, LaBrie, LaPlante, Nelson & Stanton, 2004b; Walker & Hinch, 2006; Welte, Wieczorek, Barnes, Tidwell & Hoffman 2004).

Adding further complexity to the multi-dimensional structure of accessibility is the range of different gambling behaviours that have been associated with it. These include problem gambling, bankruptcy, gambling expenditure, frequency and length of gambling session, venue choice, crime, family problems and suicide.

Most of this recent research has taken an epidemiological approach to the accessibility issue and has attempted to determine if a community's exposure to gambling is a risk factor for problem gambling. Exposure is a concept that has been operationally defined and is considered a quantifiable construct comprised of the number of gambling opportunities within a community, the potency or number of different gambling forms available and the duration of the exposure (Shaffer, LaBrie & LaPlante, 2004a). The evidence for exposure theory is mixed, with some studies finding that communities eventually adapt to increased exposure over time, thereby making conclusion about the relationship between accessibility and problem gambling difficult (Abbott, 2006; Shaffer, LaBrie, LaPlante, Nelson & Stanton, 2004b).

Despite the construct of gambling accessibility appearing to not lend itself well to rigorous empirical evaluation, the current body of research suggests that the accessibility and convenience of some forms of gambling (primarily EGM's and North American casinos) is associated with increased involvement in gambling and/or rates of problem gambling, at least in the short term. Accessibility to gambling is considered in most models of problem gambling (e.g., Blaszczynski & Nower, 2002; Thomas, Sullivan & Allen, 2008) and it is an important construct as there has generally been a global increase in gambling access over the past two decades.

Most authors researching accessibility have acknowledged the shortcomings of their studies and have interpreted any resulting associations with caution. A common problem with these studies is their use of broad population variables, limiting conclusions that can be drawn at the individual level. It also leaves open a range of other factors that may explain any observed relationship (e.g., the possibility that people may choose to live near to where they spend their recreational time).

Other domains of the Productivity Commission's (1999) accessibility concept that have received some research attention include social accessibility, conditions of entry and ease of use. These may be seen as related concepts within the Productivity Commission's definition of social accessibility being "*the sense in which a venue provides a non-threatening and attractive environment to groups who might otherwise feel excluded*" (p.C8.6). Increases in the social accessibility of gambling have been linked to increases in women participating in gambling, while gambling products that have a low initial outlay and are easy for novices to engage in have been suggested to increase the social accessibility of gambling (Abbott, 2001; Delfabbro, 2008; Potenza, Maciejewski & Mazure, 2006; Volberg, 2003). Again, EGM's have been targeted due to their high accessibility and prevalence of use among problem gamblers.

Furthermore, two recent Australian studies have highlighted the importance of social accessibility as a venue characteristic that may attract and maintain gamblers (Moore, Thomas, Kyrios, Bates & Meredyth, 2008; Thomas, Sullivan & Allen, 2008). Both of these studies used a self-report method and framed social accessibility more in terms of the emotional/motivational characteristics of the gambler who find comfort in gambling venues.

Despite the large number of studies examining the relationship between accessibility and problem gambling, no study has attempted to measure accessibility in a way that incorporates all nine dimensions suggested by the Productivity Commission (1999). Most have assessed the first six dimensions in various combinations and these tend to reflect the physical aspects of exposure and gambling opportunities (e.g., location, proximity). These studies have also tended to use an epidemiological framework based on secondary, population data. Furthermore, the two studies by Moore et al. (2008) and Thomas et al. (2008) have focused on the three social accessibility dimensions of gambling using a self-report technique that has more relevance to the accessibility construct at the individual-level.

The aim of the current study is to assess the construct of accessibility in a group that has high exposure to various forms of gambling and in particular EGM's. Gambling venue staff have been suggested to be a group with a heightened risk for problem gambling due to their increased exposure (Hing & Been, 2006, Hing & Breen, 2007, Hing & Breen, 2008a, 2008b, 2008c) and can be considered an appropriate sample for the initial development of a gambling accessibility scale.

Method

Participants

A total of 533 venue employees completed a questionnaire distributed via 243 hotels and 279 clubs with EGM's in Victoria, Australia. Table 1 provides the age and gender distribution of the sample, with 12 cases of missing datum. As can be seen, the respondent sample was predominated by women (67.2%) which was higher than the proportion of women employed across all Australian gambling industries (53%; Australian Bureau of Statistics, 2006a, 2006b). The ages ranged from 18 to 70 years with a median of 40 years.

Table 1: Age and sex categories of respondents

	Men		Women		Total	
Age category	N	%	N	%	N	%
18-24 years	23	34.3	44	65.7	67	12.9
25-34 years	45	36.3	79	63.7	124	23.8
35-44 years	29	23.8	93	76.2	122	23.4
45-54 years	44	33.1	89	66.9	133	25.5
55 years and over	30	4.0	45	6.0	75	14.4
Total	171	32.8	350	67.2	521	10.0

Most of the participants were employed in a permanent full-time capacity (n = 262) with 183 and 84 participants working in the venue on a casual or permanent part-time basis, respectively. Reported roles were classified into operational (n = 214), supervisory (n = 159) and management (n = 154).

Despite a similar number of surveys distributed to clubs and hotels (53% and 47% respectively), participants were predominantly (66%) employed in clubs. The venues varied in size, measured by the number of gaming machines, with 54%

operating more than 40 machines, indicating that the participants' workplaces were reasonably equally divided between small venues (40 EGMs or less) and large venues (more than 40 EGMs). As well as EGM facilities, 60% of the respondents' workplaces operated club keno facilities and 51% operated TAB facilities. It should also be noted that 50.6% indicated that they were not allowed to gamble in their workplace and of the remainder the largest group (42.2%) were only allowed to do so on days off work.

Materials

A questionnaire was developed as part of a larger study assessing gambling among venue staff in Victoria. Related to the current study, 13 items were generated based on previous research into venue staff gambling (Hing & Breen, 2006) and the Productivity Commission's (1999) dimensions of accessibility. One notable exception was with regard to the definition of social accessibility. The Productivity Commission's (1999) definition seemed to automatically apply to people who worked in gambling venues. That is, this cohort of gamblers clearly did not find gambling venues threatening and it is difficult to imagine them feeling excluded from gambling venues. Hence, one item was created that directly assessed social accessibility/comfort within the venue and other items were included that related to social approval from family, friends and colleagues. Social approval can be considered a broader aspect of social accessibility, but it is an aspect that was not included in the original Productivity Commission definition.

All 13 items were phrased in terms of ease/difficulty and were worded slightly differently to accommodate six different forms of gambling (lotteries, EGM's, casino table games, racing, club keno, sporting events). Thus, there were six 13-item scales

of accessibility and participants were asked to rate each item on a 4-point Likert scale. For example, the club keno scale commenced with:

"*If you wanted to play club keno, how easy or difficult would it be for you to……*"

1. Find an outlet for Club keno that is convenient to go to or use?

Participants were presented with the response options: extremely easy, quite easy, quite difficult, extremely difficult. Additional questions were included related to demographic variables and measures of gambling behaviour. Frequency of play was measured with one item asking the number of times participants engaged in each type of gambling over the past 12 months. Expenditure was measured with a single item asking participants to estimate their average weekly, monthly or yearly expenditure over the past 12 months, for each type of gambling. These were standardised to a yearly expenditure figure.

Problem gambling was measured using the PGSI subscale of the Canadian Problem Gambling Index (CPGI; Ferris & Wynne, 2001). For the current sample, the inter-item reliability coefficient was .90.

The questionnaire was reviewed by responsible gambling managers from the three major EGM providers in Victoria, Australia; Tattersall's, TABcorp and the Crown Casino. This was followed with a pilot test of ex-gaming venue staff working in the offices of Tattersall's and TABcorp. This resulted in some minor wording changes but the core element of the 13 items remained for each form of gambling.

Procedure

A total of 1566 surveys were mailed to the managers of 522 venues. Each package contained three questionnaires along with a request to the venue manager to

ask three staff to complete and return it to the researchers in the anonymous reply-paid envelope. It was also requested that the manager ask one employee working directly with gaming, one front-of-house employee and one back-of-house employee to generate a range of employees. A $20 gift voucher was offered as an incentive for each returned questionnaire and this was organised via a separate envelope to ensure anonymity.

The response rate for the questionnaire was 33% which may be considered low given the use of an incentive. Although postal questionnaires typically have low response rates (Robson, 2002), two other factors in the present study may have contributed to this. First, the overall length of the questionnaire was approximately 30 – 35 minutes and this may have deterred participants. Additionally, the study relied on the venue managers to forward the survey to the appropriate staff and this may not have occurred in all instances.

Results

Scores from all 533 returned questionnaires were entered into SPSS. To assess whether the sample was derived from an 'at-risk' population, gambling behaviour was compared between the present sample and results from the 2003 Victorian Longitudinal Community Attitudes Survey (Centre for Gambling Research, 2004), Unfortunately, not all gambling behaviours could be compared due to differences in measurement and reporting. These include expenditure and duration of gambling session. However, participation rates and levels of problem gambling were comparable.

For the current sample, 95.9 per cent per cent of the 533 staff reported participating in at least one of the gambling activities surveyed during the preceding 12 months, compared to 77.4 per cent in the Victorian survey. Similarly, the average number of different gambling activities undertaken by those who gambled in the preceding 12 months was 4.4, compared to the Victorian survey figure of 2.3 activities. The gambling participation rates amongst the surveyed staff were higher than for the general population of Victoria for all types of gambling for which comparisons could be made.

According to the PGSI categories, the problem gambling prevalence rate (score 8+) was 5.6% amongst respondents to the staff survey. This was nearly six times higher than that identified for the Victorian population, using the same instrument. The moderate risk gambling rate of 13.7% amongst respondents to the staff survey is around 15 times higher than that identified for the Victorian population. No separate comparisons for low risk gamblers and non-problem gamblers can be made, as the Victorian survey did not report these data. Overall, the present survey of 533 staff who work in Victorian hotels and clubs revealed a group who were more actively engaged with gambling than the general Victorian population

For the accessibility items, the 4-point Likert scale used for this measure was coded as 1 (extremely easy), 2 (quite easy), 3 (quite difficult) and 4 (extremely difficult). Principal components analysis, using varimax rotation, was performed for each set of 13 items based on the six forms of gambling. However, for each form of gambling the same, common component structure emerged. Table 2 shows the component structure for the individual items using the EGM scale. As can be seen, a clear three factor structure emerged with the first six items loading onto one structure with little cross loading. The next five items loaded onto a second factor and the final

two items loaded onto a third factor. Tables 3 and 4 display the essential results for the other five forms of gambling and show the same core items loading onto the same components.

Table 2: Rotated component matrix: Electronic gaming machines.

Item	Component		
	1	2	3
Feel comfortable that your friends would approve of you playing gaming machines	**.93**	.09	.06
Feel comfortable that your family would approve of you playing gaming machines	**.92**	.09	.05
Feel comfortable that your work colleagues would approve of you playing gaming machines	**.88**	.11	.20
Feel comfortable within yourself about playing gaming machines	**.88**	.10	.16
Feel socially accepted/at ease in a venue with gaming machines	**.83**	.20	.25
Afford the cost of playing gaming machines	**.73**	.21	.07
Find a convenient venue with a choice of gaming machines to play	.14	**.89**	.11
Find a venue with gaming machines that is convenient to go to or use	.12	**.88**	.21
Get to a venue which has gaming machines	.11	**.87**	.13
Be able to play a gaming machine in convenient venue without waiting or queuing	.19	**.85**	.21
Find a convenient venue with gaming machines which is open when you have spare time	.13	**.83**	.30
Understand how to play gaming machines	.21	.33	**.87**
Feel familiar with how gaming machines work	.23	.35	**.86**
Variance explained % (VE)	36.01	31.41	14.15
Cronbach's Alpha (CA)	.94	.94	.91

Table 3: Rotated component matrix: club keno, lottery and casino games (item numbers match items from Table 2).

	Club Keno			Lottery-type Games			Casino Table Games		
Item	1	2	3	1	2	3	1	2	3
1	**.92**	.26	.17	**.92**	.18	.07	**.94**	.13	.07
2	**.91**	.27	.16	**.92**	.20	.07	**.92**	.15	.09
3	**.88**	.28	.18	**.89**	.20	.14	**.92**	.09	.12
4	**.85**	.24	.28	**.79**	.16	.33	**.86**	.14	.27
5	**.78**	.32	.36	**.69**	.22	.43	**.85**	.21	.26
6	**.63**	.26	.46	**.51**	.15	.41	**.65**	.20	.41
7	.24	**.88**	.15	.20	**.87**	.09	.17	**.92**	.14
8	.21	**.87**	.17	.17	**.87**	.05	.13	**.92**	.10
9	.30	**.80**	.21	.24	**.70**	.31	.16	**.86**	.24
10	.28	**.78**	.33	.12	**.63**	.33	.16	**.85**	.24
11	.29	**.76**	.32	.18	**.60**	.45	.12	**.85**	.20
12	.34	.31	**.84**	.19	.26	**.85**	.29	.33	**.86**
13	.29	.37	**.82**	.25	.24	**.85**	.29	.34	**.86**
VE%	36.40	31.11	16.87	31.56	23.78	18.15	36.31	32.60	15.42
CA	.96	.94	.93	.92	.85	.91	.95	.95	.95

Table 4: Rotated component matrix: Horse and dog racing, sporting events (item numbers match items from table 2).

	Horse & Dog Racing			Sporting Events		
Item	1	2	3	1	2	3
1	**.91**	.22	.16	**.91**	.22	.16
2	**.90**	.26	.18	**.91**	.27	.12
3	**.85**	.34	.18	**.87**	.31	.12
4	**.75**	.23	.46	**.81**	.29	.34
5	**.67**	.27	.50	**.78**	.33	.35
6	**.59**	.32	.38	**.67**	.33	.30
7	.22	**.87**	.11	.29	**.89**	.19
8	.25	**.87**	.20	.29	**.87**	.16
9	.26	**.83**	.25	.27	**.85**	.25
10	.25	**.80**	.28	.30	**.83**	.27
11	.29	**.78**	.25	.31	**.83**	.24
12	.32	.27	**.88**	.30	.30	**.89**
13	.29	.33	**.85**	.28	.33	**.88**
VE%	32.47	31.49	18.76	36.26	33.63	16.94
CA	.94	.94	.96	.96	.96	.97

Component one consisted of items measuring personal, family and peer approval of gambling and was given the label *Social Accessibility*. Although these items represent a broader definition of social access than described by the Productivity Commission (1999), the social approval items may reflect the latter part of the definition regarding inclusiveness. Also, whilst being "able to afford the cost"

of gambling loaded onto this factor and was considered a separate dimension by the Productivity Commission (cost of initial outlay), it is feasible that this reflects social accessibility and that respondents felt that affordability was part of feeling personally comfortable about gambling on that activity.

A set of items measuring convenience, choice, being able to get to the venue or outlet, not having to wait or queue and being open when the respondent has spare time loaded on component two. This was labelled *Physical Accessibility* and appears to reflect the dimensions of accessibility related to opportunities to gamble, as outlined by the Productivity Commission (1999).

A pair of items measuring familiarity with and understanding of how the gambling product works loaded on component three. This was labelled *Cognitive Accessibility* and reflects the ease of use dimension suggested by the Productivity Commission (1999).

The minimum reliability coefficient for any subscale was .85 with the remainder all over .90. Components one and two consistently explained around one-third of the variance each, with component three around 16%.

In order to further evaluate the scales, convergent validity was assessed with gambling behaviour measures. In particular, under exposure theory, it would be hypothesised that the scales would positively correlate with measures of gambling expenditure and gambling frequency. It may also be expected that problem gambling (the PGSI) correlates with the subscales, particularly for the EGM players.

The subscales for each form of gambling were analysed separately, but the same procedure was undertaken to obtain relevant correlation coefficients. That is, the following procedure was undertaken six times. The first step was to screen out those participants who reported not engaging in a particular form of gambling. Prior to the

correlation analyses initial inspection of scatterplots revealed considerable heteroscedasticity between the PGSI, frequency, expenditure and the three accessibility subscales for all types of gambling.

Tests for normality confirmed significant skewness and kurtosis for the PGSI, frequency and expenditure data, however, the three accessibility subscales for all six forms of gambling were normally distributed with the exception of the Physical Accessibility and Cognitive Accessibility dimensions for EGM's. Both were moderately positively skewed, but given the sample size it was decided to retain these variables in their original scores. However, it was deemed necessary to log-transform the two variables frequency and expenditure for all six forms of gambling and to also log-transform the PGSI scores due to the severity of the skewness (a constant of 1 was added to all scores before transformation; Field, 2005). This improved the distribution for all variables with most reflecting a normal distribution. However, the PGSI still remained positively skewed and leptokurtic, due to the large number of participants who scored zero. The log-transformed PGSI remained in the subsequent correlation analyses, but results for this variable must be interpreted with caution due to violations of normality and the subsequent heteroscedasticity in the scatterplots.

The original coding for each item was reversed to aid interpretability. That is, high scores on the subscale now reflect higher social, physical and cognitive access. Table 5 presents the correlation coefficients between the accessibility subscales and the three measures of gambling behaviour.

Table 5: Correlations between accessibility subscales and gambling behaviour

		Social	Physical	Cognitive
Lottery	PGSI (n = 441)	-.02	.02	.08
	Expenditure (n = 402)	.18**	**.20****	.18**
	Frequency (n = 441)	.10*	.11*	.13**
Keno	PGSI (n = 188)	.01	.02	.17*
	Expenditure (n = 146)	.07	.07	.16
	Frequency (n = 188)	.09	.10	.16*
EGM's	PGSI (n = 410)	-.18**	.04	.10
	Expenditure (n = 358)	.02	.08	**.20****
	Frequency (n = 410)	.13*	.12*	**.24****
Casino table	PGSI (n = 117)	-.13	.04	.18
games	Expenditure (n = 75)	.13	.12	**.26***
	Frequency (n = 118)	.18*	**.38****	**.39****
Horse and	PGSI (n = 314)	-.04	.07	.19**
greyhound	Expenditure (n = 272)	.19**	**.22****	**.37****
	Frequency (n =314)	**.30****	**.28****	**.47****
Sports	PGSI (n = 107)	-.14	**.24***	.08
	Expenditure (n= 87)	.01	.19	**.22***
	Frequency (n = 107)	-.08	.07	**.23***

*$p < .05$ **$p < .01$

Due to the large sample sizes, the significance of the reported correlations are not as important as the strength of the relationship. For example, the cognitive accessibility subscale was significantly, positively correlated with keno and

horse/greyhound betting. However, the strength of these were below $r = .20$ and suggest a very weak relationship at best. Only those significant correlations stronger than $r = .20$ will be interpreted as indicative of a meaningful relationship.

It was expected that the accessibility subscales would positively correlate with the three measures of gambling behaviour. However, for the social subscale, the only correlation of note was with frequency of horse and greyhound betting. Those scoring higher on social accessibility were also reporting greater frequency of horse and greyhound betting.

The physical subscale also positively correlated with frequency of horse and greyhound betting, along with expenditure on this form of gambling. It also correlated with frequency of playing casino table games and expenditure on lottery games. It was the only scale to correlate with the PGSI and this was for sports betting.

The cognitive subscale correlated with the greatest number of gambling behaviours. It did not correlate with the PGSI score for any form of gambling, but was positively correlated with frequency and expenditure for EGM's, casinos, horse and greyhound, and sports. Overall, tests for convergent validity were inconsistent and whilst many of the correlations were in the predicted direction, their strength failed to establish good convergent validity for the subscales.

Discussion

The aim of the current study was to assess the construct of accessibility with gambling venue employees. This group was chosen due to their high exposure to various forms of gambling and in particular EGM's. The results indicated that the 13-items constructed for six types of gambling all loaded onto three components which were defined as Social Accessibility, Physical Accessibility and Cognitive Accessibility. These subscales contained minimal cross loadings and strong reliability

coefficients for all forms of gambling. However, subsequent analyses indicated that each subscale possessed questionable convergent validity via inconsistent correlations with gambling expenditure, gambling frequency and problem gambling. There are possible alternate explanations for this including questionable assumptions of exposure theory along with the distributional properties of the data.

The present study represents the first attempt to measure all accessibility dimensions suggested by the Productivity Commission (1999) in the one scale with the same cohort. Previous studies had shown various levels of support for individual dimensions but none had attempted to test all dimensions on the same sample. It is also noteworthy that the nine dimensions suggested by the Productivity Commission were meaningfully reduced to three factors. Furthermore, these factors remained consistent across all forms of gambling and this suggests that a generic gambling accessibility scale may be developed from these items. That is, one 13-item scale that does not differentiate specific types of gambling may be a more efficient measure than the six created in the current study.

The creation of a multi-dimensional 13-item scale that measures gambling accessibility has the potential to assist researchers examining accessibility issues in relation to gambling venues. The results suggest that the individual facets of accessibility, such as physical access, are more complex concepts than just distance of venue from home or work. This facet is based on convenience for the individual, in terms of location, choice, travel, opening hours and access to gambling once at the venue.

The total scale, once refined, also has scientific merit in the testing of models of problem gambling. For example, Blaszczynski and Nower's (2002) model is often cited in the gambling literature but there has been little empirical investigation of this

model. Most factors in their pathways model have well developed scales to assist in the measurement part of this model, including variables such as depression, impulsivity, irrational beliefs, chasing and problem gambling. However, the first factor in this model (availability and accessibility) has no demonstrated valid and reliable measure. Indeed, most research examining the accessibility issue has had a one-dimensional view of the concept (typically physical access) without considering social and cognitive access.

Other models, such as the Thomas et al. (2008) model of problem EGM play, include social accessibility as a risk factor, but again, do not address the measurement issue in testing the model. The proposed multi-dimensional accessibility scale allows for both the Blaszczynski and Nower (2002) and Thomas et al. models to be evaluated as well as providing a tool for further investigation into the role of accessibility and gambling behaviours.

Of the three common components that emerged, it was Social Accessibility that consistently accounted for the greatest amount of variance, followed closely by Physical Access. However, it is Physical Accessibility which has dominated the research literature assessing accessibility (e.g., Adams et al., 2007; Delfabbro, 2002) and the present result suggests that future research should more closely examine the social accessibility issue when investigating gambling behaviour.

With regard to the Social Accessibility construct, the results of the present study indicated that the social approval items, particularly related to friends and family, more strongly loaded on this concept than the item directly assessing social accessibility. As mentioned earlier, the definition of social accessibility was broadened for the current study beyond that provided by the Productivity Commission due to the nature of the sample obtained. Furthermore, the majority of the sample was

female and the dominance of social accessibility may be related to this. There is some support for this (Abbott, 2001; Delfabbro, 2008; Potenza, Maciejewski & Mazure, 2006; Volberg, 2003), however, it is not well established in the literature particularly with regard to social approval. Future studies should examine social accessibility in more detail by including items related to feeling of inclusion/exclusion at the venue along with social approval items. This should be undertaken with a more gender balanced, community sample.

This sample obtained in the present study represented gambling venue employees, who are a group that have not been extensively studied before (Hing & Been, 2006, Hing & Breen, 2007, Hing & Breen, 2008a, 2008b, 2008c). The results of the present study not only contribute to the development of a measure of gambling accessibility but also contribute to an understanding of risk factors associated with employment in gambling venues. Future research on accessibility and exposure needs to be conducted with this group as part of effective harm minimisation program related to occupational health and safety.

The results of this study should be read with several limitations in mind. First, non-random sampling and the non-inclusion of casino employees mean the results apply only to the, predominantly female, hotel and club staff who responded to the survey and this limits the generalisability of the findings. The sample's high exposure to many forms of gambling was considered a strength, but it may have also been responsible for the weak correlations in the tests for convergent validity. That is, the homogeneity of this group may have had the effect of reducing the variance and deflating the strength of the correlations. Support for this can be found with the moderate, significant correlation between Physical Accessibility and frequency of casino gambling. It could be argued that this form of gambling has the greatest

variability in accessibility compared to the other forms, particularly for venue staff. Thus, it was the lack of this variability that partly contributed to the low correlations in the other forms. It is therefore suggested that the scale be tested on a community sample with a greater variability in gambling accessibility.

Another limitation is the issue of causality. The study was cross-sectional and it is not known, for example, if greater levels of cognitive accessibility lead to greater involvement in gambling or if greater involvement heightens cognitive access. This needs to be assessed via a longitudinal study.

The convergent validity of the scales was not demonstrated with the subsequent correlations with gambling behaviour. There are two possible explanations for this. First, the relationships were hypothesised under the assumptions of exposure theory. If these assumptions are incorrect, and accessibility is not related to the gambling behaviours of frequency, expenditure and problem gambling, then this could explain the absence of correlations. Most of the significant correlations were weak or moderate at best and these could be considered as spurious or chance outcomes. However, this does contradict a good body of empirical evidence suggesting a relationship between accessibility and gambling behaviour and the levels of participation and problem gambling for this sample were much higher than that found in the general population

Second, it could be argued that exposure theory holds true and that the subscale items are not valid measures of accessibility. This may be particularly true for the relationships with frequency and expenditure as problem gambling tends to be associated more with EGM's and to a lesser extent horse betting (Delfabbro, 2008). However, there does appear to be good face validity between the items and the Productivity Commission's (1999) accessibility constructs, with the possible

exception of Social Accessibility. This subscale performed the weakest across all behavioural measures for all forms and may need to be refined with regard to the wording and possibly include more items. This subscale can be contrasted with the Cognitive Accessibility scale which performed best across the behavioural measures. Cognitive Accessibility appears a much narrower concept that lends itself more readily to self-report measurement than both social and physical accessibility.

Nonetheless, the current study has provided strong initial support for the development of a Gambling Accessibility Scale. Further refinement is necessary, particularly with a community sample, but this scale may assist with the identification of accessibility issues with problem gamblers and can also be used to test exposure and accessibility factors in models of problem gambling.

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