

Project methodology

We discuss the activities undertaken within the project under the headings listed in the brief in order to illustrate their relationship to the goals specified in the brief:

Evaluate the Report by Flinders Technologies Pty Ltd detailing the VGS with regard to refining the instrument for application in a population validation study;

We have reviewed this report and the work reported within it. We have examined the literature analysis, the empirical and development work and the conclusions and outcomes detailed in the report for validity and feasibility with respect to a population validation study. We have used several conceptual and theoretical frameworks, described in the following sections, in performing this evaluation including De Vellis' scale development protocols and conceptual and a theoretical models of problem gambling and gambling uptake developed by us.

Evaluate the VGS against other available instruments including SOGS, the CPGI and other instruments and research in relevant international and Australian studies and assess whether the VGS overcomes the perceived shortcomings of these instruments;

We have collated the relevant literature and have conducted a detailed content analysis of the similarity and differences between the VGS and the other instruments. We have examined the reliability, validity, applicability and practicability of each of the tools and their application to specific study populations. A detailed content analysis has been conducted using a conceptual model developed by the authors of problem gambling antecedents, actions and consequences.

Assess the extent to which there are unique features related to problem gambling in Australia and the extent to which these are/could be adequately catered for in the VGS or a modified form of the VGS;

We have reviewed the evidence for such differences and provided a detailed account of them.

Review the VGS study with regard to dimensions such as: validity and reliability of scale items, methodology, scope, the test re-test reliability of the instrument over time and application to the Australian context;

We have examined the psychometric properties of the VGS including the following standard criteria:

- Item difficulty;
- Item scale correlations;
- Coefficient alpha;
- Criterion-related validity correlations;
- Factor analysis.

We examined these properties by running analyses of the data collected in the original validation exercise performed by the Flinders Group in their development studies.

Deliver a research design for a large scale (a) Victorian and (b) national validation survey that would have the dual purpose of validating the VGS and obtaining some useful information on characteristics of problem and potential problem gamblers; and Include in the research design details of appropriate survey questions, sampling, telephone survey and other techniques of data collection, as appropriate, to chosen sub populations that will cross validate the VGS with other instruments, and that will allow comparisons of a Victorian population study with other relevant, recent research in other States

We have developed and documented a research design for this purpose including consideration of:

- Confidentiality and anonymity issues;

- Recruitment methodologies with respect to sample bias;
- Issues in reaching all study segments and sub-populations especially for groups from CALD backgrounds and those who may wish to 'hide' their gambling activities;
- Response bias and validity;
- The virtues and problems of different survey response methods;
- How to compare VGS results with the results of other tools;
- A national study.

Outcomes of the literature analysis

Our initial task in the literature analysis was to find measures of problem gambling that ought be included in the present study. The ones that we selected were:

- The South Oaks Gambling Screens;
- The Canadian Problem Gambling Index;
- The Victorian Gambling Screen Content Analysis;
- The DSM–IV diagnostic criteria;
- The GA 20 Questions;
- Life Area Measures.

These tools are the ones that have been most frequently used in local and international studies of gambling and problem gambling. They are in a real sense, the industry standards. The detailed content of each of these measures is presented in a later section of this report.

What is the current knowledge about rates of problem gambling in Victoria?

A prior question that needs to be answered is how problem gambling is defined. Of course rates of a condition are inextricably bound up with how it is defined. There are many definitions that have been offered in the literature and by government. Some important examples follow:

‘Problem gambling refers to the situation when a person’s gambling activity gives rise to harm to the individual player, and/or to his family, and may extend into the community ... ’ (Australian Institute for Gambling Research, 1997);

‘Problem gambling is any pattern of gambling behaviour that negatively affects other important areas of an individual’s life, such as relationships, finances or vocation. The mental disorder of “pathological” gambling lies at one end of a broad continuum of problem gambling behaviour ... ’ (Volberg, Moore, Christiansen, Cummings and Banks 1998);

‘Problem gambling is defined as a chronic failure to resist gambling impulses that results in disruption or damage to several areas of a person’s social, vocational, familial or financial functioning ... Excessive gambling is used to describe a level of gambling expenditure that is considered to be higher than can be reasonably afforded relative to the individual’s available disposable income and as a result produces financial strain ... ’ (Blaszczynski, Walker, Sagris and Dickerson, 1997).

As we shall discuss further later, Blaszczynski’s definition is one of the few to include explicit mention of both an underlying condition as well as its symptoms and consequences.

Although there is now a substantial international literature on the prevalence of problem and pathological gambling within the community, there remains considerable uncertainty as to the actual rates of problem gambling within different communities and jurisdictions. This is in no small part due to variations in definitions of problem gambling as well as methodological issues and problems in the conduct of the survey research.

In our view, the construct and dimensions of problem gambling is currently ill-defined as reflected in the diffuse array of terminology and criteria used to describe and define the condition. We consider that this situation arises out of the lack of conceptual clarity and

agreement as to whether problem/pathological gambling is best construed as a dimensional behaviour (i.e. something that is a continuum along which people vary in extent) or a categorical disorder (i.e. something that you have or do not have). This conceptualisation is inextricably bound up with the positions of those attempting to define it.

Consequently, tools that engender definitions of problem gambling that are focused on screening and diagnostic purposes may assign greater importance to items relating to impaired control rather than items that are concerned with the presence of some form of harm. Items assessing impaired control include the failure to resist the urge to commence gambling, repeated unsuccessful attempts to cease episodes of gambling and gambling more time and money than intended. Harm is determined according to manifest deleterious consequences associated with gambling although the nature, extent and severity of such harm are often not specified (Australian Institute for Gambling Research, 1997; Ferris, Wynne & Single, 1999). This has led to a situation where a heterogeneous group of gamblers are included in samples making cross-study comparisons difficult.

It is argued that greater attention needs to be paid to clarifying and differentiating the various terms used interchangeably in the field. There is an apparent tendency in the literature to assume that terms such as gambling problems, problem gambling and problem gambler are synonymous and/or can be used interchangeably without regard to the subtle but often important nuances contained within the meaning of each descriptor.

'Problem gambling' can be used to describe both the behavioural characteristics and the outcome of a style of gambling including the use of excessive amounts of time and/or money and poor decision-making strategies.

'Gambling problems', on the other hand, relates only to the negative outcome of gambling without necessarily implying excessive levels of expenditure or patterns of 'problem gambling', that is, a problem gambler ('a case'). To illustrate, marital discord may arise from a spouse having strong religious sentiments surrounding gambling as inherently 'sinful' (e.g. the Seventh Day Adventist, Mormon or Muslim religions) that come into conflict with his/her partner's regular but minimal gambling behaviour. This may lead to recurrent arguments and marital discord, that is, harm is produced by gambling behaviour. However, such a gambler would not normally be considered to engage in problem gambling behaviours or to be a problem gambler. Yet, under the VCGA and CPGI such an individual would be classified within its boundaries.

The core component defining a 'problem gambler' is impaired control although there is some level of circularity in argument inherent in these definitions. The problem gambler develops negative consequences because of an inability to control behaviour, and negative consequences arise because the gambler has no control over behaviour.

There is a further group of gambling problems that has sometimes escaped attention. This is the situation where existing non-gambling related problems or conditions are aggravated by gambling behaviours. In illustration, a situation of marital disharmony and conflict may lead a partner to seek solace at a local gaming venue. Although the gambling may be contained within limits, the fact that the partner had gambled is in itself, raised by the other partner in criticism.

A focus on harm as the foundation of a measure is appropriate for the purpose of determining the socio-economic impact of gambling and excessive gambling within a community. It may also be useful in screening for individuals who have or may be at risk for developing into a problem gambler. The original purpose of the SOGS was to develop an instrument to identify possible problem gamblers attending a drug and alcohol facility, and select these out for further diagnostic testing. In this regard, half of the SOGS items are directed to the presence of harm as manifested by the need to borrow money. However, its use as a diagnostic tool to identify a

'case' of a problem gambler is of questionable validity and its use in surveys has only served to overestimate prevalence rates. This point is well exemplified in the study conducted by Stinchfield (2002). In a comparative study of reliability, validity and classification accuracy of the SOGS, Stinchfield found that the instrument had good to excellent classification accuracy in gambling treatment samples but poor accuracy in general population samples with an 50 per cent false-positive rate.

Yet few studies or measures have attempted to distinguish between the above concepts in prevalence surveys showing a tendency to confuse 'cases' of problem gamblers (diagnostic) with the impact of gambling (harm).

The Productivity Commission (1999) estimated that 2.1 per cent of Australians had 'significant problems with their gambling' and that 2.0 per cent of Victorians fell in this category. The sixth and seventh Community Gambling Patterns and Perceptions Surveys conducted for the VCGA in 1998 and 1999 showed quite divergent rates of gamblers 'at risk' with rates of 1.5 per cent and 0.8 per cent respectively in the two studies. However, as Thomas and Yamine (2000) noted, these surveys seriously under-represented the numbers of people from different cultural backgrounds for whom it was expected that there might be higher rates of problem gambling than in the general community. These expectations were fulfilled when the Thomas and Yamine's study analysed of answers to the SOGS from respondents of Greek, Vietnamese, Chinese and Arabic cultural background found rates of problem gambling broadly five-times greater than in the general community. Their study also demonstrated the importance of survey methodology upon the obtained rates. They used interpreters and a targeted random sampling methodology that was different from previous studies where insufficient effort was made to engage people from different cultural backgrounds. The lack of recruitment of people from different cultural backgrounds into the study samples has compromised the representativeness of the survey sample.

There has been a wealth of relevant international studies, a selection of which are listed below:

- Abbott and Cramer (1993) performed a study involving the telephone interview of 420 randomly selected adult Nebraskans concerning their gambling activities. While the authors did not report rates of 'compulsive' gambling in their sample, 10 per cent of the 62 per cent of people who reported that they had gambled in the past year indicated they had experienced negative effects of gambling;
- Buhringer and Konstanty (1992) studied the prevalence of users of slot machines in the Federal Republic of Germany in a face-to-face interview study of 7,643 respondents. They found that 10.2 per cent of the population were active gamblers and that 0.7 per cent were 'intensive' gamblers who had used slot machines for five hours or more per week in the previous three months;
- Emmerson and Laundergan (1996) studied the changes in prevalence of gambling and problem gambling over a four-year period in the State of Minnesota. The 1990 sample consisted of 1251 respondents and the 1994 survey consisted of 1028 telephone interviews using randomly selected numbers. The SOGS-M modification of the SOGS was employed where the questions are re-phrased to reflect a time period of the last year over which the target behaviours are exhibited rather than the lifetime of the respondents. In 1990, the percentages of gamblers 'with some difficulties' were 11.3 per cent, gamblers with 'increasing negative consequences' (often the term 'problem gambler' is applied to this group) were 1.6 per cent and probable 'pathological' gamblers were 0.8 per cent. In 1994, the figures were 15.8, 3.2 and 1.2 per cent respectively for each group, suggesting growth in the sizes of these groups over the time period of the study;

- Ladouceur (1991) studied the prevalence of pathological gambling in a telephone survey of 1,002 randomly selected residents of Quebec using the standard lifetime prevalence version of the SOGS. This uses questions phrased to assess lifetime prevalence i.e. (Have you ever?). Ladouceur found what he terms the 'current' prevalence of pathological gamblers to be 1.2 per cent with another 2.6 per cent to be problem gamblers. In a questionnaire study of 1471 Quebec college students, Ladouceur, Dube and Bujold (1994), once again using the standard SOGS instrument, found that 2.8 per cent of the students were pathological gamblers and that 5.8 per cent were problem gamblers. Large sex differences were found with men more likely to be problem or pathological gamblers;
- Volberg and Steadman (1988, 1989) have studied a range of samples of United States communities over a period of years, using the standard lifetime prevalence form of the SOGS. Their 1988 study, involving the telephone interview of 1,000 randomly selected New York respondents, found problem gamblers made up 2.8 per cent of the sample and that a further 1.4 per cent was pathological gamblers. Their 1989 study of 1,750 New Jersey and Maryland residents, again using a randomly selected telephone interview methodology, found problem gambling rates of 2.8 per cent in New Jersey, 2.4 per cent in Maryland and pathological gambling rates of 1.4 per cent in New Jersey and 1.5 per cent in Maryland.

In a later paper Volberg (1994) reviewed the public health implications of her findings. She noted that:

'In states where legal gambling has been available for less than 10 years, less than 0.5 per cent of the adult population were classified as probable pathological gamblers. In states where legal gambling has been available for more than 20 years, approximately 1.5 per cent of the adult population was classified as probable pathological gamblers. Together these data support the long-standing contention of treatment professionals and researchers that increasing the availability of gambling will contribute to an increase in the prevalence of gambling related problems in the general population. ...' (1994, p.239).

Thus according to Volberg, problem and pathological gambling prevalence rates are affected in quite important ways by systemic variables including the time period since the introduction of widespread legalisation of new gambling modes. This situation may apply to the context for the present study, the state of Victoria, where there has been strong growth in gambling opportunities following the Victorian government's liberalisation of gambling laws. But some caution is necessary in the application of Volberg's findings to the present context. Victoria seems to have a higher availability of Electronic Gaming Machines than the jurisdictions studied by Volberg and the spatial distribution of gambling services in Victoria may be more widespread. This may mean that that the pattern of slow growth in the prevalence of pathological gamblers described by Volberg may not be seen in Victoria but then again it may. Notwithstanding these various caveats, we consider that Volberg's work is of great importance in the debate concerning future trends in the rate of problem gambling within the community.

It is important to note that the validity of comparison of prevalence estimates cited in the above papers are affected by the type of prevalence estimate used and the definitions adopted to define problem and/or pathological gambling. In other words, in many instances, apples may be being compared with oranges and pears.

We also found within the literature several other issues that are pertinent to the present project. These include the issues of whether problem gambling is best conceptualised as a dichotomy or continuum and the purposes of problem gambling measures and tools. We now discuss these issues.

Is problem gambling a dichotomy or a continuum?

This is a fundamental design decision in the development of a problem gambling measurement scale.

The Productivity Commission report provides an especially clear discussion of this issue:

'The difficulty of identifying the "right" threshold for problem gambling stems from the fact that cases are only defined fuzzily when the severity of the problems varies along a continuum. In some areas of public health it is easy to define a case. For instance, someone either has HIV or they do not. But in problem gambling (and a range of other possible areas, such as obesity or diabetes) it is not clear where along the continuum people can be said categorically to have a problem. If the threshold is set low then obviously a lot of people are said to be "problem" gamblers ... ' (p 6.18–19).

In our opinion, this discussion in part originates from imprecision and ambiguity as to the conceptualisation of problem gambling and gambling problems and the purposes of problem gambling measurement tools within the literature. As we shall argue in the next section, measurement tools may have a range of purposes and the design of the tool needs to reflect that purpose or purposes.

Purposes of problem gambling measurement tools

Essentially we are of the view that such tools may be categorised as having five different purposes:

- A current diagnostic purpose (who currently has the problem?);
- A current severity classification purpose (how severe is the problem and what is the extent of its harmful consequences?);
- A predictive diagnostic purpose (who is at risk of developing the problem in the future?);
- An intervention design purpose (what is needed to treat the problem and ameliorate it?);
- A triage or screening purpose to refer the person for further assessment or action (what further assessment or action is required?).

It is important to note the distinction between diagnostic purposes and epidemiological purposes of tests. Frequently it is desired to assess the extent of a problem or condition within the community or population (i.e. the prevalence of the problem). This is the case in the present assignment where the primary purpose of the community prevalence study to follow on from this study will be to determine the prevalence of problem gambling within the Victorian community. However while the goal of this subsequent study may be to make assessments of prevalence issues, this does not sidestep the universal requirement for tests with a diagnostic purpose to be used to measure and classify ('diagnose') people so that sample surveys may then be used to determine prevalence of the target 'condition' within the community. Prevalence concepts can only make sense if there is a reliable and valid method of diagnosing or classifying cases into the target groups to be used in the prevalence studies. This is why when we refer to this purpose of problem gambling measurement tools to classify people into the appropriate categories as being 'diagnostic'. Prevalence is determined by doing a study of a population using classifications engendered within the diagnostic or classification measurement tools.

It is interesting and instructive to compare this range of purposes with the standard use of tests in conventional clinical domains. For example, in the case of a diagnosis of glandular fever, a Paul Brunel test may be applied to determine whether there is evidence of Epstein Barr virus infection in the patient. The diagnostic test which has the goal of determining whether the

condition is present or not has very little to do with determining the plan for therapeutic intervention and also has little value for assessing the functional impact of the virus upon the patient. This is also a completely separate venture from the use of predictive measures to determine the likelihood of contracting the virus. Yet our analysis reported in this document of measures of problem gambling shows that we frequently find many or all of these quite divergent purposes bundled into the one tool. This is not sound design.

We are strongly of the view that measures of problem gambling and the evaluation of their utility need to be directly aligned to their stated purposes and that they also need to derive from a conceptual or theoretical account of problem gambling and its components. While there is imprecision in the basic structure of this framework, we are doomed to ongoing pointless debate about whether one tool is 'better' than another or whether it over or under estimates the 'true' rates of the problem. This type of discussion is misguided and unhelpful as the GRP has correctly identified in the design of its research program.

In frameworks such as De Vellis' measurement tool development framework, the first step in tool development and validation is specified as 'Determine clearly what it is you want to measure'. This is good advice indeed.

To return to the issue of conceptualising problem gambling as a dichotomy or a continuum, we contend that it can be both depending upon the purpose of the measurement tool. Many clinical diagnostic measures with continuous distributions have points at which the value of a parameter is considered to be abnormal or problematic. The underlying parameter is a continuum but a cut-off point is chosen and assigned the purpose of categorising cases into 'normal' or 'abnormal'. The cut-off point is typically chosen on the basis of the underlying distribution of the parameter within the population and/or its relationship to known problems or conditions. In the gambling research context, scores on tools such as the SOGS have been used to categorise gamblers into groups such as pathological gamblers with a serious set of problems and problem gamblers with severe problems and lower scores. Such classifications are essentially arbitrary but they enable us to simplify our presentation of the issue and act appropriately. A further example of such a classification with which many are familiar is the serum cholesterol ratio measurement of 5.5, above which dietary or other interventions may be recommended. Of course there is no particular magic about the number 5.5, it is simply a convenient standard that has been found to be clinically useful. Such a cut-off point may simply reflect a level that is known associated with or is predictive of, the likely development of a problem. For example, such a ratio is associated with future harmful consequences such that an individual manifesting such a level can be considered at-risk even though he/she may be asymptomatic. In gambling, there is no agreed to level of expenditure of time or money that can be used as a cut-off point without including the presence of harm, that is, measures cannot predict at-risk gamblers who are currently asymptomatic.

Later in this report we discuss in more detail the issue of the determination of cut-off scores in problem gambling measures. We note that there are essentially four different methods of determining cut-off scores including:

- Relative frequency approach;
- Absolute value criterion approach;
- Expert judgment approach;
- Frequency distribution shape approach.

We provide advice as to the application of these approaches to the survey data to be collected in subsequent studies.

In addition to the conceptual underpinnings of problem gambling measures, there is also the issue of how should the tools be developed. There are, in fact, quite specific protocols that can and ought be applied to this task. Unfortunately many of the tools used to measure problem gambling have not been developed using systematic scale development approaches and their performance has suffered as a result of this issue.

How should problem gambling measurement tools be developed?

It is widely acknowledged that measurement tools need to have four desirable properties (see, for example, Polgar & Thomas, 2000):

- Reliability;
- Validity;
- Applicability;
- Practicability.

Reliability refers to the need for a test or measure to give the same result consistently. There are several different ways of measuring reliability including test retest reliability, inter-rater reliability and internal consistency.

Validity refers to the accuracy of the result. In clinical contexts, validity is frequently measured by specificity and sensitivity, referring to a test's capacity to correctly detect those with the target attribute and to correctly filter out those who do not have it.

Applicability refers to the ability to the test to be applied to the particular target group. For example, a test of suicide risk for young people may not be applicable to older people.

Practicability refers to the ability of a test to be practically applied in given contexts. For example, if the test requires two hours to be administered and high expense then it may not be suitable for a widely dispersed field administration context.

While there is a large literature on the desirable properties of measurement tools there is a much smaller literature on how to develop them. Protocols and standards for the development of measurement tools are much less common than the exhortations about what the outcomes should look like.

De Vellis' Tool Development Protocol

De Vellis (1991) advocates an eight-step process of measurement scale development. These are:

- 'Determine clearly what it is you want to measure';
- 'Generate an item pool';
- 'Determine the format for measurement';
- 'Have initial item pool reviewed by experts';
- 'Consider inclusion of validation items';
- 'Administer the items to a development sample';
- 'Evaluate the items';
- 'Optimise scale length'.

We have found De Vellis' protocol to be particularly useful and have used it in several previous major tool development projects including the development of the Work Ability Tables, the Post Acute Care Risk Screen, the RACGP National Patient Satisfaction questionnaire, and in the development of the gambling-specific measures — the Counsellor Task Analysis (Problem

Gambling) and the Victorian Problem Gambling Family Impact Scale. The Work Ability Tables are a key element of the determination of the eligibility of applicants for the Australian Disability Support Pension. They are intended to measure the ability of people to work. To date, some AUD\$40 billion of expenditure has been allocated using this tool. The Post Acute Care Risk Screen was developed to screen patients being discharged from acute care facilities into the community to determine their need for post discharge services. The Screen is now used throughout Australia. The RACGP National Patient Satisfaction questionnaire was developed to measure the satisfaction of patients with the services provided by general medical practitioners. It is used as a routine part of the quality programs for vocationally registered General Practitioners throughout Australia. We consider that the widespread uptake of these measurement tools and their robustness is directly attributable to the robustness of the De Vellis tool development protocol used in their development. This is why we advocate De Vellis' framework for the present study.

Let us now discuss each of the steps proposed by De Vellis:

1. 'Determine clearly what it is you want to measure'

Prior to the development of any tools, it is necessary to clarify exactly what it is that is going to be measured. In the present problem gambling context, we argue in this report that this is an area that has not received sufficient attention in the development of several of the major existing tools. We consider that the purposes of these tools have not been clearly specified and in some cases the breadth of the specified measurement goals is so large as to be difficult to see how such disparate goals could be achieved in the one tool.

2. 'Generate an item pool'

The generation of an item pool can occur in a variety of ways, essentially corresponding to inductive or deductive methods. The deductive method involves the derivation of the items from a theoretical model of the phenomenon being measured and from a stated measurement model. The inductive method involves a detailed examination of the content of current tools and research concerning the phenomenon. This process can also be very usefully informed by analysis of the literature surrounding the target concepts.

3. 'Determine the format for measurement'

An important design decision is the scale format of the items in the tool under development. As discussed in Polgar and Thomas (2000), there are virtues associated with different types of response categories. The types of scale formats that are usually considered for use with measurement tool items are: (i) Likert type (ii) Forced choice (iii) Dichotomous (iv) Numerical rating scale.

4. 'Have initial item pool reviewed by experts'

Review of the item pool that has been generated using the previous steps in the process is a particularly useful procedure. By 'experts' we not only mean academic experts but also those who are 'expert' in the phenomenon being measured. In the present context this includes people with gambling problems. We have found the conduct of focus groups involving members of the target measurement population to be a particularly effective method of item review. Equally, those who are to administer and use the outcomes of the measurement tool should be involved in focus discussions about it. While it is common practice to provide exposure drafts of tools to prospective users and 'experts' for individual comment, the stimulation of a focus group discussion can provide a much richer review than individual commentary.

5. *'Consider inclusion of validation items'*

In De Vellis' exposition, the inclusion of validation items may be achieved in several different ways. Some psychological tests such as the MMPI have truth sub-scales where items that are demonstrably true or false are scored to form a measure of the truth of the responses. Others include 'gold standard' measures where externally verifiable measures of the phenomenon are included to validate responses to other items.

In many circumstances, including the problem gambling context there is no gold standard measure of the attributes in question. Therefore, this step is not especially useful in this context.

6. *'Administer the items to a development sample'*

It should be accepted that the first run or first few runs of the scale is a development exercise. No matter how carefully the earlier steps have been implemented, there are statistical and logistic issues that cannot always be predicted at the early design stages. It is sometimes useful to use a pilot with a small group of people drawn from the target population to pilot the tool, prior to larger trial with a development sample. The tool is administered to a pilot sample and they are then interviewed about ease of completion, understanding or confusion about items and so on. These results then form the basis for changes to the tool. We strongly advocate a workshop or focus group format for this task.

7. *'Evaluate the items'*

Once the measurement tool has been administered to a reasonable development sample of respondents, there is a wide range of statistical techniques available to analyse the items of a scale. These are described below.

Item difficulty analyses

The patterns of responses to all items should be investigated with a view to identifying high and low difficulty items. Test discrimination performance is improved by a more equal distribution of responses over the response categories rather than highly skewed distributions.

Item scale correlations

All items should be correlated with their respective scale and sub-scale totals to examine the contribution of all items to scale variance. Low contribution is considered to be psychometrically undesirable.

Coefficient alpha

Alpha should be calculated for all scales and sub-scales in order to examine the dimensional structure of the items. High alpha indicates a high degree of communality between like items, a psychometrically desirable phenomenon.

Criterion related validity correlations

Each scale should be correlated with each other to examine the patterns of associations between them. Other key criterion variables should be entered into these analyses as a validation check; e.g. ever having sought assistance for gambling problems.

Factor analysis

Factor analysis should be conducted for all tools to examine the internal structure of each.

Cluster analysis

Cluster analysis can be used to examine whether there are identifiable clusters or groups of respondents with similar characteristics that are identifiable from common patterns of responses to the measurement tools; e.g. problem gamblers, attendees at problem gambling services, non gamblers and so on. The use of cluster analysis is a useful tool to examine the validity of typologies such as those proposed by the CPGI.

8. 'Optimise scale length'

There are competing requirements for scale length. Long scales (i.e. scales with many items) sample a wide range of aspects of the attribute(s) being measured (i.e. may have higher validity). It is also known that in psychometric theory that scale length promotes greater reliability. The Spearman Brown formula is a means of actually estimating the effects of lengthening or shortening a scale upon its reliability. All other things being equal a longer scale may have higher validity and reliability than a shorter version of the same scale. However, this is by no means a certain outcome.

On the other hand, short scales have high practicability and the loss of reliability and validity may be negligible if the attribute being measured by the scale is tightly defined. In clinical settings, provided reliability and validity are not sacrificed, short scale length is very useful indeed, because of the very tight timelines that now operate in most clinical settings. In fact, the choice in these settings may not be between the use of a short scale and a long one but a short one and the abandonment of its use altogether. Most health and human service practitioners are busy people, so short scales are desirable without sacrifice of scale validity and reliability.

The shortening of scale length is achieved by deletion of poorly performing items. Poor performance of an item can be detected and defined by the following attributes:

- Very low or very high item difficulty. If everyone passes or fails an item, then it is not useful as a means of discriminating between different target groups because it adds little discriminating information. Items with extreme difficulties also have low variances and co-variances that means that their ability to predict or correlate with other variables is reduced;
- Items that correlate poorly with a criterion variable should be deleted from the scale as little or nothing is to be gained by collecting this information.

Another method of selection of items for deletion is low correlation with other items. In classical test theory, it is desirable that items correlate highly with each other in order that they are measuring the same attribute. In this study, the target attribute is whether the person has or has had a problem with gambling. Thus items with low correlations with other items are marked for deletion under this approach.

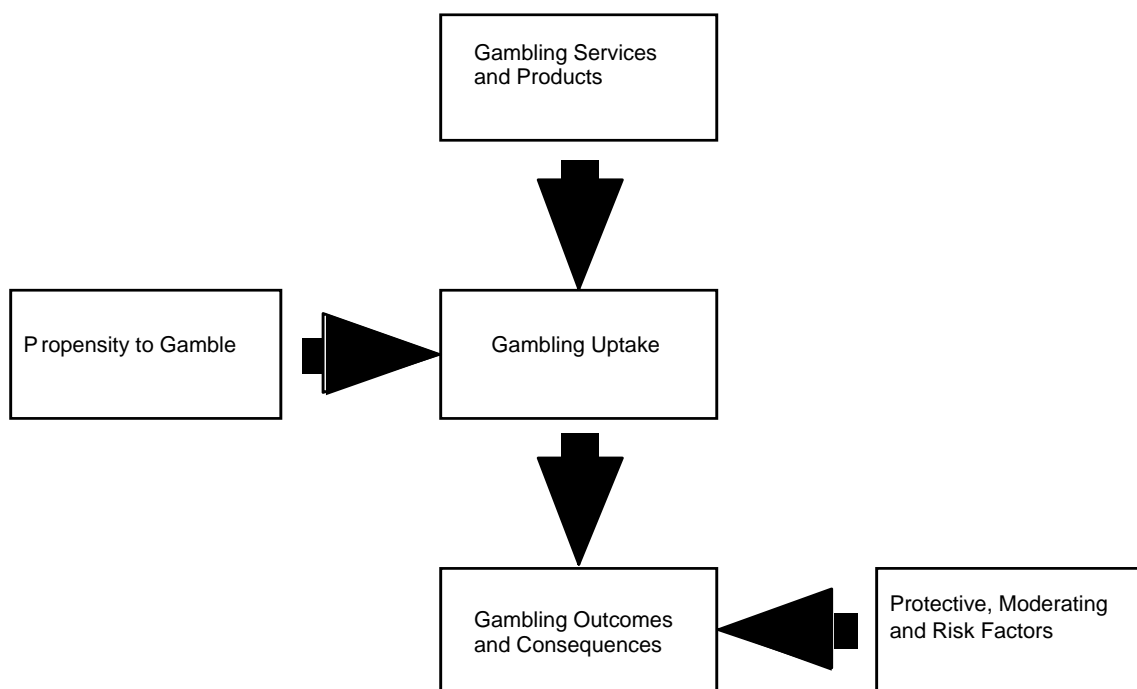
A variant of the above approaches is to conduct a factor analysis of the tool in order to see whether items tend to cluster together. In simple terms, the purpose of factor analysis is to determine whether there are factors or clusters of variables that are correlated with each other. In a situation where all items correlate highly, it is usual that the factor analysis yields a one-factor solution meaning that the items are broadly measuring the same quality or attribute. However, other outcomes are possible. There may be several factors or latent variables that underlie the screening tool items. The items with high loadings on the main factor would be retained and those with low loadings would be deleted. This is a more sophisticated version of selection of items with high inter-correlations and high co-variances for inclusion in the scale and deletion of other items.

De Vellis' protocol is a very useful one for the development of measurement tools and the evaluation of development processes. For this task in the present assignment where we have been asked to evaluate the development of the VGS measurement tool, we have elected to use De Vellis' protocol as the evaluation benchmark.

According to De Vellis' approach, a key feature of the design of any measurement tool is a clear definition of its intended purpose and the populations to which it can be reliably and validly applied.

The design of a measurement tool also includes, whether implicitly or explicitly, a model of the phenomenon being measured and how it has come about. That model is influential in how we decide which items to include and to not include. Unfortunately, most of the existing problem gambling measurement tools are neither informed by a detailed consideration nor exposition of the underlying model of problem gambling. Frequently, they have been developed using a panel nomination of inductive process, sometimes combined with an informal deductive method where their own personal and unstated model of problem gambling has been given free rein. In addition the measurement model and its assumptions are rarely stated. This complicates considerably the issue of determining tool content based upon a sound theoretical perspective. This is a most unsatisfactory arrangement. We therefore provide an explication of a useful problem gambling theoretical framework for the purposes of the present study.

The model of influences on gambling behaviours and outcomes



This model was first proposed by Thomas and Yamine (2000) and it was subsequently used as the conceptual underpinning of our evaluation of Victoria’s BreakEven Problem Gambling Counselling Program (now Gambler’s Help). The model asserts that the gambling uptake for individuals is influenced by varying intrinsic propensities to gamble and the availability of gambling products and services to that individual (Thomas & Jackson, 2002).

It is further asserted that the outcomes and consequences of gambling are influenced by gambling uptake and that various protective, moderating and risk factors impact upon propensity to gamble, the availability of gambling services and products and also the outcomes and consequences of gambling uptake upon gamblers, their families and the community.

Propensity to gamble

In the model it is assumed that people vary in their propensity and desire to gamble. The propensity to gamble may be influenced by a variety of factors. These factors have been shown to include personality factors such as impulsiveness/impulse control and risk-taking. It may also be affected by other behavioural propensities. A common finding amongst people with gambling problems is that they also have other behavioural problems (Spunt, Dupont, Lesieur, Liberty, Hunt, 1998). Black and Moyer's (1998) US study has shown that people with 'pathological gambling' frequently have substantial psychiatric co-morbidities. Of course this does not necessarily mean that people in the 'normal' gambling range also have addictive and psychiatric co-morbidities or that all people with gambling problems have other behavioural problems. However the associations are of considerable interest.

Evidence for intrinsic factors affecting gambling behaviour is also provided by a fascinating study of 3,359 twin pairs (Eisen, Lin, Lyons, Scherrer, Griffith, True, Goldberg, Tsuang, 1998). According to Eisen and colleagues, inherited factors explained 62 per cent of variation in the study sample in the diagnosis of pathological gambling disorder and lower amounts of variance in the elevated but 'normal' ranges of gambling behaviour. This study may provide some evidence for inherited factors influencing propensity to gamble.

Much of the research views the issues from a psychological and/or psychiatric framework, and thus focuses on the personal characteristics of the individual gambler. There is limited research from a sociological perspective on the social and contextual factors associated with the propensity to gamble; e.g. family or community factors. One factor that has been found in overseas studies to be predictive of propensity to gamble is the family environment and exposure to gambling activity within that environment. Women, particularly those living in isolated communities, have also been shown to take up gambling at a higher rate than might otherwise be expected (Brown, Johnson, Jackson, Fook, Wynn, Rooke, (2000); Crisp, Thomas, Jackson, Thomason, Smith, Borrell, Ho, Holt, (2000). Once having taken gambling up, women have also been demonstrated, in some studies, to progress to problematic levels of play at a rate faster than men (Grant & Kim, 2002).

In terms of the impact of cultural factors upon propensity to gamble, there is little published data concerning this issue, although some recent work addresses this issue (Thomas and Yamine, 2000). Thomas and Yamine found very high relative rates of problem gambling as determined by the SOGS within the Arabic, Greek, Chinese and Vietnamese speaking communities in Victoria. The relationship between cultural background and propensity to gamble is not well researched but it is assumed that common cultural values attitudes and beliefs concerning fate and luck may be influential. However, as pointed out by Thomas and Yamine, the high rates may be merely an artefact of the immigration experience. Further research is needed to examine the influences of these factors.

Gambling services and products

Gambling uptake and patterns are, of course, influenced by the availability of gambling products and services. In Victoria during the 1980s, for example, access to gambling was strictly limited. At that time there were no legal EGMs in clubs and hotels. During the 1990s there has been a widespread liberalisation of access to gambling products and services across the state, particularly EGMs in clubs and hotels (see McMillen, Jackson, Johnson, O'Hara, & Woolley, 1999 for a review of gambling history in Australia and Victoria). The use of any product or service is affected by its availability, marketing and how well it meets the needs or expectations of its consumers. Rachel Volberg (2001), the *British Medical Journal*, reviews the strong evidence for this link between gambling availability, gambling behaviour and problem gambling.

The impact of geographical distribution of EGMs upon gambling uptake and rates of problem gambling has been reported in the Productivity Commission's report on Australia's Gambling Industries. The report includes an analysis of data collected by the Problem Gambling Research Program that shows a strong linear link between distribution of EGMs and the rates of new problem gamblers in Victorian regions. The Productivity Commission's study hypothesised a positive and statistically significant relationship between gambling-related problems and:

- accessibility to gambling, particularly the number of gaming machines; and
- high average annual expenditure on gaming machines.

Government can impact upon the rates and distribution of gambling services uptake through regulating the distribution of gaming services and the nature of such services within its jurisdiction. The nature of the gambling services and products as well as their distribution can also have important influences upon gambling service uptake. The availability of high denomination note-feeding devices, for example, has been the subject of review within many jurisdictions and has been of considerable concern to both governments and gambling service providers because of its potential impact upon uptake of gambling services. Other contextual factors can impact upon uptake. For example, clock displays, the removal of ATMs from gaming areas, betting restrictions, the machine display of amounts wagered rather than units and enforced breaks in play are factors that have been hypothesised to impact upon rates of gambling uptake.

Gambling uptake

The model asserts that gambling uptake is influenced by both the personal characteristics of the gambler, i.e. propensity to gamble, and contextual factors such as the availability of services and products for them to exercise these propensities. Uptake can be modelled demographically and also spatially to examine uptake of different products and services by application of tools such as the Gambling Activity Index (GAI).

Protective and risk factors for gambling propensity, uptake and outcomes and consequences

Each of the major model elements — gambling propensity, uptake, and outcomes and consequences — has associated with it a set of related protective, moderating and risk factors. It is important to understand these factors in order to be able to design appropriate interventions at each level and also to be able to target services and assistance to those who most need them. The identification of risk and protective factors engenders the identification of potential interventions to modify those factors that are amenable to change.

Propensity risk and protective factors relate to the social and demographic characteristics of gamblers and problem gamblers and their previous experiences of gambling. We know from analysis of the research literature and analysis of records concerning community gambling patterns and the presenters to problem gambling counselling services, a considerable amount about people with high and low propensities to gamble and to progress to problem gambling status.

We can alter the propensity to gamble and to become a 'problem gambler' by targeting at-risk groups with appropriate communications in the community and in settings such as schools. These campaigns would attempt to moderate propensity to gamble.

The design of gambling services and their marketing and dissemination within the community have important impacts upon the uptake of gambling services. As previously discussed, government can regulate to change accessibility to services and the service design and

delivery. Venue caps or limits, the introduction of a gambling venue no smoking policy, play breaks, low-denomination note feeders and other interventions have all been trialled in an attempt to alter gambling uptake amongst targeted groups.

The outcomes and consequences of risk factors include the social and financial resources that the gambler brings to their gambling activity. While gambling problems have important psychosocial elements, a major cause of identification of 'problem' gambling is that of insufficient money to pay all debts and fund everyday activities and the consequences of this inability to pay. Of course, while there may be psychosocial consequences of problem gambling — e.g. poor interpersonal relationships with spouse and family, and preoccupation with gambling to the exclusion of other important issues — it is when the financial resources are insufficient to meet the requirements of the gambling activities that the major identifiable problems and consequences become apparent (McCormack, and Jackson, 2000).

If the person has low financial resources to meet the requirements of their gambling activities, this is a risk factor for negative consequences of the gambling. On the other hand, if the resources are substantial then this may be a protective factor. For example, it is noted that unemployed people appear at twice the expected rate in presentations to Victoria's BreakEven problem gambling services (Jackson, Thomas, Thomason, Holt, McCormack, 2000). While this may be a consequence of other factors, it is nevertheless the case that unemployed people do not have major resources to fall back upon to service their gambling requirements.

To develop a gambling problem and the associated potentially negative consequences of the problem takes place over time, perhaps a very extended time period. Volberg's (1994) findings that problem gambling rates increase steadily with time in new gambling jurisdictions are probably reflective of this fact as well as issues such as market uptake.

Social and family supports or the lack of them also appear to be important protective and risk factors for negative outcomes of gambling activity. It is noted from the BreakEven Client and Service Analysis studies conducted for the Victorian Department of Human Services, for example, that people who are divorced or separated appear at twice the expected rate in presentations to problem gambling services (Jackson, Thomas, Ross & Kearney, 2001). While this may be either a cause or a consequence of the problem gambling, it is very well known from other research literatures that social supports are a key protective factor for adversity (see, for example, Bowling's 1994 review).

Implications of the problem gambling model for measurement of problem gambling

The model presented above has important implications for the construction of problem gambling measures. It suggests that propensity to gamble, actual gambling behaviour and its consequences are all legitimate components of the problem gambling content domain. Depending upon the purpose of the measurement tool each domain could and should be represented in items that make up the tool. We present this in our conceptual model of components of problem gambling:

A conceptual model of the components of Problem Gambling

Propensity/Attitudes to gambling	Attitudes to gambling Ideation about gambling Beliefs about control of gambling
Gambling behaviour and activities	Frequency of gambling behaviour Spend on gambling activities Gambling patterns, loss chasing

Consequences of gambling activities	Impact on job, family and friends Criminal behaviour Deception
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We consider that the emphasis of the measurement tool on each of the components ought be linked to the purpose of the tool but also that each is a legitimate component of problem gambling in its own right.

Later in this report we apply the model to a detailed content analysis of each of the relevant problem gambling measurement tools.

There is also a very serious issue in the use of problem gambling measurement tools in assessing the prevalence of problem gambling within targeted groups and the community. As will be discussed below, there has often been considerable imprecision as to what is meant by the assessment of prevalence. There are in fact, three different types: period, point and lifetime prevalence and they have different measurement requirements. We now turn to a discussion of this issue.

Period, point and lifetime prevalence measurement considerations

When we talk about measuring how many problem gamblers there are in the community or the 'prevalence' of the problem, some care is needed in the use of terminology. In discussion of the prevalence of problem gambling in many of the published studies, there is sometimes considerable imprecision as to what is meant by 'prevalence' and the type of prevalence being described. In standard epidemiological terminology (see for example Christie, Gordon & Heller, 1997), the incidence of a condition within a population is defined as the number of new cases occurring within a specified time interval. Point prevalence is the number of cases that have the condition within the population at a specified point in time. Period prevalence is the number of cases that have the condition over a specified period of time. Lifetime prevalence, for example, is the number of cases within a population that will have the condition over the lifetimes of the individuals comprising the population. These prevalence definitions and their associated values within populations are quite different and it is important that the quotations of prevalence data include a clear specification of which type of prevalence is being quoted. For example, lifetime prevalence for serious back injury may be 90 per cent within the general population but the point prevalence may be only two per cent at any one time.

In the context of tools designed to measure the prevalence of problem gambling, the use of terminology such as 'Have you ever' performed the target behaviour is assessing a period prevalence over the person's lifetime to date. The use of terminology such as 'Have you in the last six months' performed the target behaviour is attempting to assess the period prevalence over six months. The use of terminology such as 'Are you currently' or 'have you recently' is assessing point prevalence for the particular moment at which the question is being asked. Of course, these different terminologies will yield widely different prevalence results. The SOGS-M where the respondent is quizzed about target behaviours over a 12-month period should yield quite different results from the standard SOGS where lifetime 'Have you ever' questions are asked. If however, problem and pathological gambling is a lifelong affliction, that when obtained is never shaken, then the questions may well yield the same results for point, period and life time prevalences, except where a young population, in which lifetime rates would be lower, is sampled.

Knowing the point prevalence or the 12-month period prevalence of problem and pathological gambling is very important for problem gambling service planning and for assessing the true impact of problem gambling upon the community. Problem and pathological gambling services

based on the assumption that life time rates of problem and pathological gambling somehow represent the numbers of people that currently require services may have vast over capacity. This is because lifetime prevalences are generally substantially greater than point or period prevalences. A knowledge of the prospective pool of people who require services is informed by the incidence data (i.e. new cases) and period prevalence data where the period corresponds to the planning period for the service. Thus, in most instances, 12-month period prevalence and 12-month incidence data would provide a sound basis for service planning and estimation of prospective client numbers as well as estimating the impact of problem gambling upon the community.

Of course, we must also note that not all prospective clients turn into actual clients. Lifetime prevalence data, which are yielded by tools such as the standard SOGS, do not provide a sound basis for service planning where the point or 12-month period prevalences are the required data unless we happen to know the relationship between the different rates.

In addition to concerns about the imprecise quotation of prevalence data without clearly specifying the type of prevalence being quoted, there is a further issue in the use of epidemiological principles and terminology in the problem gambling literature. In medical epidemiology, in many instances there is an incontrovertible test for the presence of the condition for which the prevalence is being estimated. Thus with discussions of conditions such as HIV, while there may be some uncertainty concerning population prevalence because of sampling difficulties, the existence of the target condition in individuals in principle can be readily determined by the application of the appropriate gold standard test. However, problem gambling measures involve the use of social constructs and self-reports by the target population with the 'condition'. The use of HIV as an analogous example for the 'diagnosis' of problem gambling is flawed, as there is no incontestable definition of what problem gambling is and how it should be measured in the sense that one can detect the presence of a problem gambling virus. The medical condition analogy is flawed. However, even within the medical literature, social constructs such as 'disability' are widely used to describe socially constructed conditions. And just as in problem gambling, disability can have profound negative effects upon the well being of the people with it.

There may be substantial measurement error in these self-reports induced through, for example, incentive to conceal problems. Walker (1992) has issued a number of warnings about the use of instruments such as the SOGS to measure the prevalence of problem and pathological gambling based on concerns about the accuracy of self-report data. However, it must be noted that the implementation of 'objective' measures would be very hard to implement and would likely involve violations of privacy.

The use of self-report measures to determine, for example, disability status would be seen in mainstream medical epidemiology as quite odd, whereas in the problem gambling literature, the use of self-report measures is quite routine and unchallenged. The use of prevalence rates and other quantitative estimates should not mask the fact that problem gambling is a social construct that does not have the same tightness of definition nor gold standard tests that the occurrence of conventional diseases or conditions may have. This means that measurement error and erroneous classification decisions may affect prevalence estimations of rates of problem and pathological gambling in ways not represented in conditions with tighter tests and criteria.

Thus, the estimates of the prevalence of problem and pathological gambling need to be considered carefully in the context of exactly what type of prevalence is being quoted. There has been, in our opinion, some considerable laxity in the use of different types of prevalence

without appropriate consideration of what these differences mean for planning services and assessing community impact. In the development of tools and measures of rates of or prevalence of problem gambling within the community, the type of prevalence being measured must be clearly specified.

This takes us to the issue of cut-off points for the different measures. How do researchers determine when one is classified as a problem gambler or not? Or disabled or not? There are several different approaches. One can use a relative frequency approach. For example, it might be decided that the purpose of the tool is to detect aberrant or extreme or statistically rare cases. So the cut-off might be set at the point where the top five per cent of cases fall. This is a relative frequency approach, where the scale points are assigned no particular credence other than relative to one another. Another approach might be to ascribe meaning to the scores and to adopt an absolute value criterion approach. So if for example, you spent 110 per cent of your disposable income on gambling, this might be set as a standard at which problem gambling is assumed to occur. Another approach would be to use an expert judgment approach where you asked experts to decide whether a particular pattern of scores represented 'problem' gambling and to then use that criterion. Another approach is to examine the shape of the frequency distribution of the scale scores and select a point on that distribution.

The process of setting of cut-off points for gambling measurement tools has been quite lax. The description of the setting of cut-off points within most of the tools has been described poorly and has been the focus of considerable disagreement. In order to set appropriate cut-off points for gambling measurement tools within the Victorian community, we need a robust large scale study to implement the various approaches available to us in setting cut-off points and to arrive at a common approach and outcome. The methodology for development of cut-off points is described in the chapter entitled 'The design of the forthcoming validation study' later in this report.

