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The Victorian Gambling Screen: Validity and Reliability in an Adolescent Population

B. Tolchard · P. Delfabbro

Abstract Although many attempts have been made to assess problem or pathological gambling in adolescents, concerns have been raised about whether existing measures are ideally suited for this purpose. Such measures are heavily influenced by traditional addiction models common to the study of substance use. In contrast, more recent public health approaches to gambling place a greater emphasis on the role of behavior and its harmful consequences and this is implicit in many currently accepted definitions of problem gambling. This paper reports on the use of one such a measure (Victorian Gambling Screen), with 926 grade 7–12 adolescents surveyed in the Australian Capital Territory. The VGS was shown to correlate well with the gold standard Diagnostic & Statistical Manual-IV-Juvenile Screen (DSM-IV-J) for problem gamblers producing similar prevalence estimates. The measure also has sound internal reliability and concurrent validity. The findings suggest that harm-based measures such as the VGS are credible with adolescent populations in Australia and that various forms of harm observed in adult populations can also be observed in adolescent problem gamblers.

Keywords Adolescence · Measurement · Problem gambling · Australia · Addiction

Introduction

Several screening tools have been generated which attempt to identify problem gambling with adolescents. The South Oaks Gambling Screen—SOGS (Lesieur and Blume 1987) and the Diagnostic & Statistical Manual-IV for pathological gambling—DSM-IV (American Psychiatric Association (APA), 1994) criteria have been utilized and tested in adolescent groups with mixed results. Such variants include the SOGS-Revised for Adolescents (SOGS-RA; Chiesi et

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al. 2012; Winters et al. 1993), DSM-IV-Juvenile criteria (DSM-J; Fisher 1992), and DSM-IV-Multiple Response-Junior (DSM- MR-J; Fisher 2000). More recently an adolescent specific tool—the Canadian Adolescent Gambling Inventory (CAGI)—has been developed which shows promise (Tremblay et al. 2010; Stinchfield 2010).

The first of these, the SOGS-RA is a revised version specifically for adolescents (Winters, et al. 1993), and generates four classification levels from no gambling and non-problem through to risk and problem gambling where a score of 4 (out of a possible 12) or more denotes the highest severity. The SOGS-RA was developed largely through the modification of the wording in the original SOGs instrument (Lesieur and Blume 1987) and reduced scoring range reflected the removal of the majority of the expenditure source questions that were less likely to be applicable to adolescents (e.g., use of loan sharks, pawn brokers). The SOGS-RA has been shown to yield relatively consistent results across different studies, but concerns have been raised about detection rates (Derevensky and Gupta 2000; Poulin 2002). It is suggested the SOGS-RA over-inflates detections rates and there is a problem of understanding of the items by respondents (Pelletier et al. 2004). I has also been noted the SOGS-RA cut-off scores that have been applied incorrectly (Poulin 2002).

The DSM-IV-J and the DSM- MR-J tools (see, Derevensky and Gupta 2000; Derevensky et al. 2003) were developed by Fisher (1992, 1999, 2000) and involved rewording the adult DSM-IV criteria to make them relevant to adolescents. The DSM-IV-J is a 12 item measure where two approaches to classifying young people as pathological gamblers have been used. One method, suggested by Fisher (1999), involves a score of four out of nine, whereas another involves scoring all 12 items. Although analyses by Derevensky and colleagues (2003) showed that different scoring methods probably make little difference to prevalence rates because the extra items tend to have a low base-rate, studies involving the DSM-IV criteria still raise some questions about the validity of adolescent measures. One of the principal concerns is that the prevalence rates of problem gambling obtained using these criteria have tended to be two or three times higher than in adult populations (Shaffer and Hall 2001), despite the fact that few adolescents seek assistance for gambling-related problems (Delfabbro et al. 2005; Derevensky & Gupta, 2004; Vachon et al. 2004). Q3

Derevensky et al. (2003) and Hardoon et al. (2002) have advanced a variety of explanations for this discrepancy. For example, young people may be more likely to be bailed out by friends and family, experience greater natural recovery, or may be more reluctant to access services. However, concerns remain about the existing DSM criteria, and whether the meaning of items remains the same when reworded into an adolescent form. For example, it may be that adolescents display many of the same behaviours and emotions as adults, but these occur to different degrees, or that the consequences of gambling (e.g., effects on school-work and friends) differ in severity because adolescents do not have the same life commitments as adults (e.g., spouses or families to support). Nonetheless, Derevensky et al. (2003) remain confident, based on a substantial number of studies that these apparent anomalies or controversies do not diminish the importance of adolescent gambling as a significant public health issue and one with potentially undesirable consequences for a significant number of young people. They suggest that further refinement of instrumentation and measurement tools will lead to a better understanding of the factors that best identify adolescents most affected by gambling.

Central to this debate is the extent to which gambling instruments can capture gambling-related harm. In Australia, discussions about the impacts of problem gambling are informed by a public health approach. The accepted national definition of problem gambling is that it "…involves difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community" (Neal et al. 2005; p.5).

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It follows therefore that attempts to capture the construct should involve measures that identify both the behaviors inherent in excessive gambling and the various forms of harm that result from the behavior.

Some recent attempts have been undertaken in Canada to develop instruments that provide a broader assessment of the harms potentially experienced by adolescents who gamble excessively. For example, the Canadian Adolescent Gambling Inventory (CAGI) contains a 24-item instrument that assesses harm using four subscales: psychological, social, financial and loss of control (Tremblay et al. 2010). Scores from these subscales can be combined to develop and overall problem score with a cut-off score that has been validated against clinical assessments. Although the CAGI is designed for wider international use, its validation has so far been confined to Canadian adolescent populations, so further research needs to be undertaken to determine how well it performs in other countries.

Irrespective of the potential merits of instruments such as the CAGI and others that are emerging, it remains the case that no similar research has been undertaken in Australia or with any reference to measures developed within the Australian context. Given that nearly all Australian prevalence research has been based on DSM-IV based measures, a question remains as to whether the figures reported in these studies (e.g., Delfabbro and Thrupp 2003; Delfabbro et al. 2005; Dowling et al. 2010) are indicative of higher levels of gambling-related harm especially in adolescent populations.

In Australia, there is one instrument with evidence of validity that has been developed specifically to focus on gambling-related harms of a similar nature to those identified in the CAGI. The Victorian Gambling Screen (VGS) is such an instrument and was specifically designed for use in Australia (Ben-Tovim et al. 2001). The relevance of being a test in the Australian context is related to possible wording or language differences reflecting particular characteristics of the Australian population. This is not to say it or other tools developed outside of Australia would not be valid. It is necessary for scientific rigor not to sit on ones laurels by establishing the best possible instruments for use in any circumstance. The reliability and validity data available for the VGS suggests it is a strong as other emerging tools and as such warrants further analysis with different populations. The VGS consists of three sub-scales of which the Harm to Self (HS) is used to determine problem gambling levels. As part of its development, the VGS drew upon information obtained from focus groups that included Australian adolescents. The VGS also uses very generic language and makes few references to behaviors, people or concepts that are particular to adults. Only one item *'Have you hidden betting slips…or any other signs of gambling from [your spouse, partner, children or] other important people in your life'* had to be reworded to make it relevant to adolescents (Delfabbro et al. 2006) by substituting '*family and friends'* for children in place of '*partner and spouse'*. Such minor alterations mean that adolescent responses can be more easily compared to adult responses, and that the original items used in the validation were not compromised via substantial modifications. At the time of this study the CAGI was not available for cross validation purposes.

The aim of this study therefore was to establish the reliability and validity of the VGS Harm to Self (HS) in a sample of adolescents. It was hoped that these findings would provide insights into the relative value of the VGS (HS) as a measure of adolescent pathological gambling in an Australian context, while also contributing to broader international debates concerning the appropriate item context of the best design of an instrument for measuring adolescent pathological gambling. Moreover this study aims to assist in validating previous DSM-IV based studies by ascertaining to what extent the pathological gambling classifications covary with differences in self-reported harm.

Method

Sample and Procedures

The study involved 926 adolescents from grades 7–12 (approximate age 12–17 years) surveyed in a range of schools in the Australian Capital Territory (ACT) in Australia. (Delfabbro et al. 2005). Full details of the recruitment methodology are described in Delfabbro et al. (2006). The broader purpose of the study was to assess the prevalence of gambling in the ACT and its psychosocial correlates.

Measures

(a) DSM-IV-J (Fisher 2000)

Respondents completed the 12-item DSM-IV-J. The DSM-IV-J measures 9 of the ten DSM diagnostic criteria for pathological gambling. This asks for endorsement of a series of statements (Yes/ No) and the extent to which they had applied in the previous 12 months. Scores of 4 or higher indicate pathological gambling.

(b) VGS-Harm to Self-Scale (Ben-Tovim et al. 2001)

The VGS (HS) scale comprises 15 items each scored on 5-point scale, where 0=Never, 1= Rarely, 2=Sometimes, 3=Often and 4=Always. It has a previous 12-month time-frame and scores can range from 0 (no problems) to 60 (very severe problems). The VGS (HS) subscale was highly reliable with a Chronbach's alpha of .96. Logistic regression revealed the HS subscale to be the best method of locating an individual gambler in relation to non-problem, borderline or problem gambling (B=16; p<.001). A Receiver Operating Curve (ROC) identified problem gambling at the 21+ cut-off with an accuracy of .98. Similar accuracy was determined for non-problem and borderline gamblers. As there have been no previous studies using the VGS with an adolescent population, the adult cut-off scores were applied. Therefore a score of 21+signifies problem gambling, 8–20 borderline problem gambling and below eight non-problem gambling. There was only one minor wording change to make it suitable for adolescents where *'spouse, partner, children'* was removed and replaced with *'other important people in your life'* on the item related to hiding signs of gambling. It should be noted that in the original development of the VGS it was found that taking a broader harm definition of gambling that pathological gamblers were identified at a lower score than problem gamblers. The argument used was that pathological gambling as measured by the DSM-IV is a narrow definition and does not capture the wider experience of gamblers experiencing a problem. The development of the VGS was unique in that a bottom up approach to item development occurred. The VGS was not based on existing measures such as the DSM-IV as there were no preconceived ideas regarding which items were to be used. This has been described in full by Ben-Tovim et al. (2001)

(c) Measures of Gambling Participation

Young people were asked to indicate the type of gambling they had participated in during the previous 12 months, the frequency of participation and the social context of the gambling,

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including with parents and peers. A full description of these measures have been reported elsewhere (Delfabbro et al. 2006).

(d) Psychosocial Measures

A range of psychosocial measures were also administered and referred to in the present paper (see Delfabbro et al. 2006). The reliability and validity of each measure was discussed in the original study of Delfabbro et al. (2006). These included: A *Mood Checklist* (5 items) that asked participants to indicate how they felt currently (bored, lonely, angry with self, happy (reversed scored), helpless and depressed, where scores were rated on a 4-point scale, 1=almost never to 4=almost always (Tiggemann and Winefield 1984); The *Rosenberg Self-esteem Scale*—a 10 item measure with items scored 1=Strongly agree to 4=Strongly disagree (Rosenberg 1965); The *General Health Questionnaire (GHQ-12)* which is used to establish general psychological health (Goldberg and Williams 1988); The *Social Alienation Scale*—9 questions on issues such as their perception of disengagement with society. A low score on this measure indicated a higher level of isolation (Dodder and Astle 1980),

(e) Gambling Attitudes Scale—GAS (Delfabbro and Thrupp 2003)

This 6-item scale measures the extent to which young people regard gambling positively as a financial venture. High scores indicate a belief that gambling is less risky and a potentially useful way to make money. The scale has been found to have very good psychometric properties in previous studies with alpha coefficients between .86–.90. (Delfabbro et al. 2005).

Results

Gambling Attitudes and Skill

When establishing the cut-off for problem gambling it was noted that the problem gambler (PG) group had lower insight into the potential harms from gambling. When asked if they thought 'Gambling is a risky business' 76 % (PG) versus 97 % (Non-Problem Gambler; NPG), thought this was so. Similarly, the answers to 'Gambling is a waste of money' and 'Gamblers usually lose in the long-term' yielded very similar endorsements. There was an even greater variation with the statements 'To gamble is to throw away money' (NPG=89.0 % vs. 45.0 (PG)). In contrast, despite appearing to being unaware as to the potential risks, the PGs (55.0 %) had lower agreement than NPGs (83.0 %) on the statement 'You can make a living from gambling' and 'Gambling is a good way to get rich quick' (NPG=87.0 % vs. 57.0 (PG)). There was little variation between PGs and NPGs on the level of skill they considered having in any form of gambling. In each case the PGs believed themselves to have a higher level of skill on a scale 0–10 where 10 was highest level of skill. Most notably the variation was greatest in Electronic Gambling Machines (EGMs or slots—NPGs=1.3/10 vs. PGs=2.9/10), lottery (NPG=1.4 vs. PG=3.5) and bingo (NPG=1.2 vs. PG=3.8). Such forms of gambling have in fact no possibility of being influenced by the player no matter how long the individual has played.

Pathological and Problem Gambling

Using the 21 point cut-off on the VGS, 31 and 4+ on the DSM-IV-J, 41were individuals were classified as problem gamblers. Scores on these two measures were moderately correlated, $r(926)=.65$, $p<0.001$, although it was noted that nine participants whom scored in the problematic range for the VGS, were not similarly classified pathological gamblers on DSM-IV-J, whereas 19 scoring positively on the DSM-IV-J, were not on the VGS. In the original Delfabbro et al. (2005) study, young people who were classified as problem and/or pathological on at least one measure were compared with the rest of the sample (Table 1).

Those adolescents identified as having problems or pathologies were more likely to be male and to have both parents unemployed. There was also a trend for this group to come from Aboriginal and Torres Strait Island backgrounds. More problems were also likely to be observed in the middle years (Grades 9–10) than in the other years.

Internal Reliability

The VGS (HS) sub-scale proved to have a very high internal reliability, $\alpha=.95$. On split half analysis the resulting statistic was, $\alpha=.92$ and $\alpha=.88$. The DSM-IV-J was also high, $\alpha=.92$ with split half scores, $\alpha=.84$ and $\alpha=.90$. It would appear that both scales have good internal reliability in adolescent samples.

Q5 **Table 1** Demographic characteristics of sample by gambling severity

	VGS (21 +)			
	NPG		PG	
	n	(%)	*n*	(%)
Gender				
Male	260	(48.5)	26	(81.3)
Female	276	(51.5)	6	(18.8)
Mother employed				
Yes	56	(10.6)	4	(12.5)
No	471	(89.4)	28	(87.5)
Father employed				
Yes	33	(6.4)	3	(9.7)
No	483	(93.6)	28	(90.3)
Aboriginal				
Yes	19	(3.6)	6	(18.8)
No	513	(96.4)	26	(81.3)
Year				
7	64	(11.9)	3	(9.4)
8	110	(20.4)	9	(28.1)
9	138	(25.7)	11	(34.4)
10	92	(17.1)	2	(6.3)
11	77	(14.3)	5	(15.6)
12	57	(10.6)	2	(6.3)

NPG Non-Problem Gambler, *PG* Problem Gambler

Item Endorsement

When comparing overall mean and standard deviations the VGS (HS) was found to have good item endorsement. Item endorsement helps establish the reliability of a measure with those experiencing the higher levels of underlying latent trait. This ensures the measure can be used in the target population with greater confidence (Weiss and Yoes 1991).

The problem gambling group endorsed items related to worry for example *'thoughts of gambling constantly on my mind'* and *'thought shouldn't gamble…'*. A level of desperation by the pathological gambling group was more likely to be endorsed. Examples of this are *'hiding evidence of [gambling]…'* and *'spent more time than intended gambling'* (VGS). Within the non-problem gambling group there is an obvious endorsement of less extreme participation on both measures (see Tables 2 in bold). This confirms that those at the higher level of the underlying trait are more likely to endorse the items accurately, whereas those with little or no underlying trait the endorsement is more varied.

Construct Validity

Correlation analyses were conducted to determine the extent to which the VGS (HS) correlated with other measures likely to be associated with problem gambling. This helps to determine if the measures are identifying possible harmful behavior (see Table 3). The VGS (HS) showed a small correlation with all measures and showed evidence that scores on these instruments were reflective of broader problems of psychosocial adjustment, as previously identified by Delfabbro et al. (2006) in the original study from which this date is drawn.

Another way in which construct validity can be assessed is to examine whether the gambler classifications covary with indicators of gambling intensity. As shown in Table 4,

t2.1 **Table 2** Endorsement rates for VGS items in relation to gambler status

	Total		NPG		PG	
	Never	Always	Never	Always	Never	Always
Slippery slope…	82.2	1.3	86.7	0.2	34.7	12.2
Gamble too strong	**90.0**	1.6	**97.0**	0.2	14.6	18.8
More important	**90.4**	1.3	**97.1**	0.2	20.4	14.3
Return as soon as..	81.7	2.3	88.5	0.8	10.2	18.4
Constantly in mind	86.8	2.3	**94.1**	0.4	10.2	22.4
Lied to yourself	**90.5**	1.4	**96.4**	0.8	25.5	17.0
Escape worry	89.5	1.4	**96.1**	0.0	18.8	16.7
Bad or guilty	83.4	1.8	89.1	0.4	22.9	16.7
Shouldn't gamble	78.1	5.4	84.0	3.6	18.0	24.0
Anyone complained	88.8	2.0	**95.1**	0.8	24.0	14.0
Conceal the extent of	**91.9**	1.3	**98.4**	0.0	22.9	14.6
Hidden slips…from	**91.4**	2.5	**98.4**	0.0	18.4	28.6
Spent more money	**91.6**	2.3	**96.0**	0.0	46.0	26.0
Make money last	**90.8**	1.9	**97.3**	0.4	24.0	18.0
Borrow money	89.1	1.8	**94.0**	0.2	35.4	18.8

t3.1 **Table 3** Relationship between VGS (HS) and health measures

	VGS (HS)	
	N	*r*
Negative mood	563	0.18**
Self esteem	557	−0.17**
Family adjustment	531	0.18**
Social Alienation Scale	542	0.17**
Relative deprivation	527	0.09*
GHQ-12	547	0.13**

*$p<0.05$: **$p<0.01$; *NS* Not Significant

those classified as pathological or problem gamblers on VGS (HS) were clearly gambling more heavily and frequently than those classified as lower risk gamblers.

Discriminant analysis confirms that taken as a whole the combined items on VGS (HS) demonstrates a high degree of discrimination (Wilks Lambda=.25; χ^2 (15, N=566)=725.58, $p<.01$) between the non-problem and the problem gamblers. Table 5 provides a summary of item scores. Items that appear to clearly discriminate between the two groups include where there was an impact on the individual and significant interpersonal relationship problems. This suggests problem gamblers may begin to recognise their problem when they either resort to lying or hiding their gambling from others.

The use of the VGS is predicated on the assumption that the scale measures a unitary concept termed problem gambling. To confirm this, a principal component factor analysis was undertaken using an Oblimin rotation with Kaiser Normalization (Table 6). This analysis confirmed the unitary structure of the VGS (HS), although items one and nine did have low weightings and may need to be removed. However, both of these items when considered using a corrected item-to-total correlation analysis (Streiner and Norman 2003) scored above the recommended $r>.2$ (r=.48 and .49 respectively).

Discussion

In conclusion, this analysis confirms that the VGS Harm to Self sub-scale appears to show promise as an accurate and reliable scale for measuring problem gambling in adolescents, although there are a number of issues which need to be addressed when using the scale with this population. This is considered important in the stages of validation for any tool or measure (Gambino 2011). The first consideration is whether a lower cut-off should be used in order to detect problematic behaviors earlier. In the original development of the VGS with

t4.1 **Table 4** M (SD) VGS scores in relation to gambling frequency

	All	Gambling Frequency		
		Never	Infrequent	Weekly+
VGS	3.9(8.5)	0.91 (2.6)	3.24 (6.8)	12.06 (15.3)
	n=570	*n*=103	*n*=382	*n*=73

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t5.1 **Table 5** M (SD) item scores for non-pathological vs. pathological gamblers (VGS)

			NPG		PG	
			n	*M* (*SD*)	*n*	*M* (*SD*)
t5.4	1.	…. On a slippery slope…	508	0.21 (.60)	7	1.40 (1.35)
t5.5	2.	… Need to gamble been too strong to control	512	0.04 (.26)	46	1.81 (1.34)
t5.6	3.	… More important than anything else you	513	0.04 (.26)	47	1.75 (1.30)
t5.7	4.	…. Must return as soon as possible to win	510	0.19 (.60)	47	2.00 (1.25)
t5.8	5.	… Been constantly in your mind	512	0.08 (.36)	49	2.04 (1.34)
t5.9	6.	… Lied to yourself about your gambling	508	0.04 (.24)	47	1.66 (1.40)
t5.10	7.	… Escape from worry or trouble	513	0.05 (.26)	48	1.83 (1.34)
t5.11	8.	… Bad or guilty about your gambling	507	0.18 (.57)	46	1.75 (1.37)
t5.12	9.	… Shouldn't gamble or should gamble less	509	0.36 (.94)	48	2.16 (1.41)
t5.13	10.	… Anyone close to you complained about	513	0.08 (.41)	48	1.62 (1.37)
t5.14	11.	… Conceal the extent of your involvement in	510	0.02 (0.14)	46	1.65 (1.31)
t5.15	12.	… Hidden betting slips…from important	511	0.02 (.12)	47	2.20 (1.49)
t5.16	13.	… Spent more money on gambling than you	523	0.06 (.30)	49	1.58 (1.71)
t5.17	14.	… Harder to make money last from one pay	518	0.05 (.34)	49	1.60 (1.40)
t5.18	15.	… Borrow money to gamble with	520	0.09 (.42)	7	1.63 (1.54)

adults it was noted there was a disparity between problem gamblers (cut-off 21) and DSM pathological gamblers (cut-off 14). This variation is likely to be due to the VGS measuring a much broader spectrum of gambling than the narrow criteria of the DSM-IV. It may also be necessary to consider the removal of some items or if not removal then exclusion from the

t6.1 **Table 6** Component structure of the VGS (HS) Scale

			Factor
t6.3	VGS (HS)Scale		
t6.4	1.	…. On a slippery slope…	0.52*
t6.5	2.	… Need to gamble been too strong to control	0.84
t6.6	3.	… More important than anything else you might do	0.88
t6.7	4.	…. Must return as soon as possible to win back any losses	0.77
t6.8	5.	… Been constantly in your mind	0.87
t6.9	6.	… Lied to yourself about your gambling	0.86
t6.10	7.	… Escape from worry or trouble	0.89
t6.11	8.	… Bad or guilty about your gambling	0.70
t6.12	9.	… Shouldn't gamble or should gamble less	0.52*
t6.13	10.	… Anyone close to you complained about your gambling	0.82
t6.14	11.	… Conceal the extent of your involvement in gambling	0.86
t6.15	12.	… Hidden betting slips…from important people in your life	0.86
t6.16	13.	… Spent more money on gambling than you could afford	0.75
t6.17	14.	… Harder to make money last from one pay day to the next	0.80
t6.18	15.	… Borrow money to gamble with	0.72

*items with lower factor loadings

scoring of the items. More also needs to be done to look closely at the impact of the items and perhaps the wording. For example, the *'...slippery slope...'* item may not translate into all cultures. However, the corrected item-to-total analysis of these items strongly suggests they remain in the scale. Some items also have very low base rates or variability which suggests that they may not be as useful in detecting differences between individuals (e.g. *'gambling being more important than anything else'*—VGS (HS)). Only those young people with very severe problems may score on this item. This paper provided an analysis of the reliability and validity of the VGS (HS) sub-scale in an adolescent population. On the whole, the results showed that the scale performed comparably well with a more well-established DSM-IV based measure. The VGS has excellent internal consistency when used in adolescent populations (.95) and, as with the DSM-IV-J, was successful in distinguishing between adolescent gamblers at different levels of severity. The VGS (HS) appears to have reasonably good construct validity as confirmed by the principal components analysis. Thus, while the VGS (HS) Scale did not out-perform the DSM-IV-J, there were some areas where the VGS appeared to yield advantages. Apart from providing the capacity for a wider assessment of scores across the severity continuum, problem gamblers identified by the VGS (HS) Scale showed more subtlety in the negative consequences of their gambling compared with the PG group in the DSM-IV-J. Both scales correlated with other measures that one would expect to be correlates of gambling-related problems, although these were generally low indicating that a lot of variation in psychosocial functioning in young people is likely to be explained by factors other than gambling. This may support the view that many adolescents who score positively on gambling screens do not have clinically significant problems.

The accurate and meaningful measurement of problem gambling in adolescents is of utmost importance. This analysis aimed to address some of the critical issues being debated in the literature, in particular, the issue of whether a gambling tool initially validated for an adult population will be transferable to adolescents. Criticisms of the VGS as a conservative tool are to some degree borne out in this study, although the prevalence rate for problem gambling yielded by the instrument did not differ substantially from that obtained using the DSM-IV-J. However, the rates of PG in females were notably different. Despite the conservative nature of the VGS (HS) the higher detection rate shown may indicate it is a more robust measure in the female population. The study does, however, confirm that the VGS could be used as reasonable substitute for the DSM-IV-J in Australian research. The advantage is that researchers and clinicians can use a more harm-based measure in their screening of problem gambling in adolescents. Apart from this being more consistent with the prevailing national definition and public health approaches, it is also clinically and descriptively useful because the VGS can potentially capture the prevalence of a wider range of gambling-related harms (when one examines the individual items e.g., restorative items such as guilt compared with pejorative items such as deceit).

The value of assessing particular forms of harm, as opposed to prevalence rates based on summative scores on these instruments, is emphasized in the Productivity Commission (2010) report as an important way in which epidemiological research can be enhanced in Australia. Another advantage of the VGS is that it requires little modification for use in adolescent populations and this is conceptually very useful in prevalence studies that may wish to sample people aged 16 years and older and then track them longitudinally. Having separate adolescent and adult measures is more conceptually awkward because there will be discontinuity in the measurement of problem or pathological gambling from adolescence into adulthood.

A limitation of this study is that no independent 'gold standard' clinical interview or assessment was available to validate the cut off scores used in this study. While it may be

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argued that the DSM-IV-J is itself a 'gold-standard' assessment, the results of this study suggest otherwise. Thus, it would be useful to study a clinical population where a validated clinical interview could be used to cross reference the item responses. Such a tool was used in the original validation of the VGS and similar clinical interviews have repeatedly been shown to be more accurate than self-report measures alone (Ben-Tovim et al. 2001; Eack et al. 2006; Tolchard and Battersby 2010). Similar processes were followed in the recent development of the CAGI (Tremblay et al. 2010), although the CAGI requires further testing against other established measures in a large school or community population. The VGS has also only been used so far in Australia so it remains unclear how well it would perform in other countries. Nevertheless, given its many similarities to recently developed measures such as the CAGI, it is likely that it will perform well. Even if researchers do not decide to use the measure itself, the study nonetheless underscores the importance of broadening the assessment of adolescent problem gambling to encompass measures that capture different forms of psychological, social and financial harm.

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