



Short Communication

Validation of the 8-item Attitudes Towards Gambling Scale (ATGS-8) in a British population survey

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HIGHLIGHTS

- Public attitudes concerning gambling are an important factor in shaping public policy.
- There is little research assessing gambling attitudes within general populations.
- The ATGS-8 is a valid scale to assess gambling attitudes among the general population.
- The invariance of the ATGS-8 across gender was established.
- More positive attitudes towards gambling were positively related to gambling problems.

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ABSTRACT

Introduction: Public opinions concerning gambling are an important factor in shaping public policy. Little empirical attention has been given to assessing gambling attitudes within the general population. The aim of the present study is to validate the 8-item Attitudes Towards Gambling Scale (ATGS-8) in British individuals and to investigate associations of these attitudes with frequency of gambling and gambling problems.

Methods: Data were derived from 7746 individuals participating in the British Gambling Prevalence Survey 2010, a comprehensive interview-based survey conducted in Great Britain between November 2009 and May 2010. Confirmatory factor analysis and separate regression analyses were applied.

Results: The one-dimensional structure of the ATGS-8 was confirmed in the community sample and by gender. Furthermore, more positive attitudes towards gambling were positively related to frequency of gambling and gambling problems.

Conclusions: The present study extends the previous evaluations of the scale by providing detailed evidence for the utility and usefulness of the ATGS-8 in a community sample and across gender. The ATGS-8 is a valid instrument to assess public opinion on gambling among the general population.

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1. Introduction

Problem gambling is a public health concern in many European countries (Molinero et al., 2014; Volberg, Gupta, Griffiths, Ólason, & Delfabbro, 2010) and it has been associated with significant health and psychosocial problems (Abbott et al., 2013; Lorains, Cowlishaw, & Thomas, 2011). The widespread growth of gambling over the past 20 years has placed the regulation of gambling at the foreground of social issues for many governments around the world. As a consequence of a 'policy paradigm shift' concerning public policy towards gambling (Smith et al., 2011), governments have to shape policy in accordance

with the parameters of what the public regards as acceptable (McAllister, 2014). In order to implement effective best practice for the regulation of gambling, there is a need to have robust knowledge based on empirical evidence concerning the opinions on gambling regulation within the general population.

Despite an extensive focus in gambling studies on cognitive biases and errors associated with gambling (see Spurrer & Blaszczynski, 2014, for a recent review), few studies have surveyed opinions on gambling regulation within the general population at a national level. Previous national studies have shown that overall public attitudes towards gambling appear to be negative in Great Britain (Orford, Griffiths, Wardle, Sproston, & Erens, 2009), Finland (Salonen et al., 2014) and Australia (McAllister, 2014). The theory of planned behavior (Ajzen, 1991, 2011) suggested that a person's attitude towards behaviors, subjective norms, and perceived behavioral control influenced

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individuals' behavioral intentions and behavior. Previous studies have found that more favorable attitudes towards gambling were associated with increased gambling participation and higher gambling problems (e.g. Canale, Vieno, Griffiths, Rubaltelli, & Santinello, 2015; Lee, Back, Hodgins, & Lee, 2013; Orford et al., 2009).

Public attitudes towards gambling can be divided into attitudes to gambling in general (i.e., gambling is dangerous for family life), and more specific attitudes towards such things as the government regulation of gambling (i.e., there are too many opportunities for gambling nowadays). In view of the key role played by public attitudes in determining policy and legislation, it is surprising how little attention has been given to assessing them. The 14-item Attitudes Towards Gambling Scale (ATGS-14) (Wardle et al., 2007) was the first standardized measure of gambling attitudes to be included in a large-scale national prevalence survey – the 2007 British Gambling Prevalence Survey (BGPS; Wardle et al., 2007). Despite the existence of numerous measures of gambling attitudes, which tend to vary depending upon the form of gambling considered (Connolly, Williams, & Morris, 2001; Derevensky, Sklar, Gupta, & Messerlian, 2010; Kassinove, 1998; Sutton & Griffiths, 2008), the 14-item ATGS was specifically designed to reflect broad attitudes towards gambling independently from particular forms of gambling (i.e., gambling in casinos, betting on horse races or playing a lottery) or related policy issues (public attitudes towards gambling policy issues of current or future interest in Britain or elsewhere) (Orford et al., 2009). Therefore, interpretation and generalization of findings has been made easy.

In the 2010 survey, there was a reduction of the number of attitude items on the ATGS due to space constraints. Consequently, the 2010 survey included a shortened 8-item scale, the ATGS-8.¹ Therefore, the ATGS-8 has a number of distinct advantages in that it: (i) can assess general attitudes towards gambling, rather than relative to a specific gambling activity (Orford et al., 2009); (ii) can be applied to the general population (including those with gambling problems); and (iii) can be easily embedded within large-scale epidemiological surveys given its short length.

To date, the ATGS-8 has been developed and analyzed in the BGPS population study (Wardle et al., 2011) and was also employed in the 2011 Australian National University (ANU) survey on gambling (McAllister, 2014), and in a population study conducted in 2011 in Finland (Salonen et al., 2014). The objectives of the present study were to test, validate, and further psychometrically analyze the ATGS-8 in the same sample that was used in the original BGPS study (Wardle et al., 2011). In particular, the first aim was to confirm the single-factor solution of the ATGS-8 (McAllister, 2014; Salonen et al., 2014). Since frequency and gambling problems are found to be higher among males (e.g., Shaffer, Hall, & Vander Bilt, 1999), measurement invariance was also tested across gender because this was not done in Wardle et al.'s (2011) original study. The second aim was to ascertain concurrent validity by testing the associations between gambling attitudes and frequency of gambling and gambling problems. In the present study, it was hypothesized that more positive attitudes towards gambling would be particularly associated with frequency of gambling and gambling-related problems (Canale, Vieno et al., 2015; Canale, Santinello, & Griffiths, 2015; Lee et al., 2013; Orford et al., 2009).

2. Method

2.1. Participants

Data from the 2010 BGPS were used for the validation of the ATGS-8 (Orford et al., 2009). The analyzed data comprised 7746 individuals (52% female). The mean age was 46.42 years ($SD = 18.82$) and the majority of the respondents were White/White British (90%) and married

(61%). To ensure British population representativeness, data were weighted based on age, gender, and region (see Wardle et al., 2011 for additional methodological details).

2.2. Measures

2.2.1. Attitudes towards gambling

The ATGS-8 by Orford et al. (2009) was used to assess attitudes. All eight items of the ATGS concern attitudinal statements that some people have about gambling (e.g., "People should have the right to gamble whenever they want"). Participants were asked to indicate how much they agreed or disagreed with each attitudinal statement. ATGS-8 items were scored using a Likert scale: 1 = "strongly disagree" to 5 = "strongly agree". The sum of eight items forms a total ATGS-8 score (range 8–40). In short, the higher the ATGS score, the more favorable attitudes the individual has towards gambling.

2.2.2. Gambling-related problems in the previous year

Gambling problems were assessed using an adapted version of the DSM-IV pathological gambling criteria (American Psychiatric Association, 2000; Sproston, Erens, & Orford, 1999; Wardle et al., 2011) recorded in the 2010 BGPS (Wardle et al., 2011). Ten gambling-related problems (e.g., "In the last 12 months have you made unsuccessful attempts to control, cut back or stop gambling?") were assessed (i.e., salience, increased tolerance, problems with spouse and/or other people, work-related problems, and financial problems). Instead of scoring the presence or absence of a symptom, the respondents rated each item on a 4-point scale of the frequency each symptom occurred (0 being 'never' and 3 'very often'). There is a lack of consensus regarding appropriate cutoff scores for determining the problem gambling status of gamblers (Orford, Wardle, Griffiths, Sproston, & Erens, 2010). Consequently, total DSM-IV score served as the primary dependent variable as is common in such studies in the gambling field. The internal consistency of the total DSM-IV score was .81 ($CI = .80/.82$).

2.2.3. Gambling frequency

The 2010 BGPS survey included 16 gambling activities. Participants were asked whether they had participated in any of them during the past year (e.g., "In the last 12 months, how often have you bought scratchcards?"). Participants were further asked to indicate frequency of involvement in those activities (2 + days a week/once a week/once month, less than once a week/less than once a month). The highest frequency of gambling reported in the last 12 months of a gambler was used (Wardle et al., 2011).

2.3. Analysis

The R (R Core Team, 2013) Package lavaan (Rosseel, 2012) was used to validate the scale and to estimate parameters. A cross validation with a three-step analytic approach was carried out. The original sample was randomly split into three partitions. In the first step (Partition 1), the factorial properties of the ATGS-8 were evaluated. A Confirmatory Factor Analysis (CFA) using robust diagonally weighted least squares for ordinal items (e.g., Likert-type scales) was used to test the structure of the scale. To evaluate the overall model fit, the following indices were used: comparative fit index (CFI), root mean square error of approximation (RMSEA) [90% confidence interval (CI)], and non-normed fit index (NNFI; also known as the Tucker-Lewis index-TLI). In addition, to determine the equivalence of factor structure in different subgroups according to gender, a multi-group CFA was performed to examine measurement invariance of the ATGS-8 across males and females. A hierarchical approach was considered by successively constraining model parameters and comparing changes in model fit (Steenkamp & Baumgartner, 1998). Three models (i.e., configural, metric and scalar) were estimated and represented prerequisites for meaningful cross-group comparisons based on factor scales. The use of $\Delta\chi^2$ values has

¹ The development of the ATGS-8 is described in greater detail in the report of the 2010 BGPS (Wardle et al., 2011).

Table 1
Standardized item loadings, internal consistency and percentages of item endorsements (Partition 1, n = 2582).

	Standardized item loadings	% Endorsement ²		
		Britain in 2010	Australia in 2011 ³	Finland in 2011 ³
1. People should have the right to gamble whenever they want	.60	61.5	68.0	53.0
2. There are too many opportunities for gambling nowadays ¹	.59	72.4	84.0	33.0
3. Gambling should be discouraged ¹	.75	42.1	70.0	91.9
4. Most people who gamble do so sensibly	.56	34.2	43.0	65.1
5. Gambling is dangerous for family life ¹	.58	61.4	81.0	65.7
6. On balance gambling is good for society	.68	12.4	16.0	38.8
7. Gambling livens up life	.62	21.0	23.0	52.5
8. It would be better if gambling was banned altogether ¹	.66	14.3	24.0	14.2
<i>Internal consistency</i>				
Cronbach's alpha (CI 95%)	.78 (.77/.79)			

Note: ¹These items have been reverse scored. ²% Endorsement for an item represents the percentage of respondents agreed or strongly agreed with the statement. ³The results from the 2011 ANU survey (McAllister, 2014) and 2011 population study in Finland (Salonen et al., 2014) are presented as reference information. All factor loadings are significant ($p < .001$). Model fit: $\chi^2 = 327.59$, $df = 20$; CFI = .98, NNFI = .98, RMSEA = .07(.06–.08).

Table 2
Fit indices for measurement invariance tests (Partition 1, n = 2582).

Model	n	χ^2	df	p	CFI	Δ CFI	RMSEA (90% CI)	Δ RMSEA
Men	1177	165.6	20	<.001	.981	–	.079 (.068–.090)	–
Women	1405	199.0	20	<.001	.981	–	.080 (.070–.090)	–
Configural Invariance	2582	364.6	40	<.001	.981	–	.079 (.072–.087)	–
Metric Invariance	2582	375.05	47	<.001	.981	.000	.074 (.067–.081)	.005
Scalar Invariance	2582	509.08	86	<.001	.975	.006	.062 (.057–.067)	.012

been criticized because of their sensitivity to sample size (Cheung & Rensvold, 2002). For this reason, testing for invariance was examined through the practical perspective (Byrne & Stewart, 2006), which recommends that invariance can be based on two criteria: (a) the multi-group factor model exhibits an adequate fit to the data and (b) the change in values for fit indices (e.g., Δ CFI, Δ RMSEA) is negligible. A Δ CFI larger than .01 and a change larger than .015 in Δ RMSEA is indicative of non-invariance (Canale, Santinello et al., 2015; Chen, 2007; Gilson et al., 2013). Finally, to confirm the concurrent validity of the ATGS-8, separate regression models were performed. In all models, variables of attitudes towards gambling,² as well as age and gender were the independent variables, whereas frequency of gambling and gambling problems were the dependent variables. Following Cudeck and Browne (1983), a cross validation strategy was used in which the observed-variables model was developed (second step) using a calibration data sample (Partition 2) and then confirmed (third step) using an independent validation sample (Partition 3). Two regression analyses with gambling frequency and gambling problems as outcome variables with both partitions (Partition 2 and Partition 3) were performed. Therefore, the sample was randomly split into three partitions, all containing one-third of the data (n = 2582): Partition 1 (51% female; mean age = 46.47; SD = 18.52); Partition 2 (52% female; mean age = 46.63; SD = 18.99); and Partition 3 (51% female; mean age = 46.17; SD = 18.92). The three groups did not differ as far as concern gender and age.

3. Results

3.1. Confirming the factor structure

The percentages of item endorsements and item loadings are shown in Table 1. Public opinion was generally negative towards gambling in Britain. In fact, 70% believed that there are too many opportunities for gambling. However, there was little support for banning gambling. Only 14% supported banning gambling, and 61% agreed that people

² After the factor solution was confirmed, factor scores were calculated for gambling attitudes, and were used in the regression analyses.

should have the right to gamble whenever they want. However, it is worth noting that only 40% of respondents agreed or strongly agreed with the statement that gambling should be discouraged in Britain. The internal consistency of the ATGS was good [$\alpha = .78$ (CI = .77–.79)]. The results of the CFA revealed high and homogenous item loadings that were 0.50 or higher (see Table 1). The fit indices revealed a good model fit with CFI and NNFI values of .98 and .98, respectively. The RMSEA value was .07 (.06–.08) and therefore a reasonable approximate fit.

3.2. Measurement invariance across gender

Before measurement invariance testing, the one-factor ATGS-8 model was estimated separately in both males and females. Results demonstrated that the model fit was adequate for both men and women (see Table 2). A configural model was first established as a baseline model, and all parameters were freely estimated (unconstrained) across gender. Fit indices showed that this model had adequate fit for the data suggesting that the factor structure is similar across groups. A subsequent metric model that tested for invariance of all factor loadings was established. All item loadings were related to each factor, and were constrained to equality. Fit statistics showed that this model (compared to the configural model) did not result in a significant degradation of fit (Δ CFI = .000; Δ RMSEA = .005), suggesting that the scale assesses similar underlying factors across both males and females. Scalar invariance was tested by constraining the intercept of each item while maintaining constraints on the factor loadings. Fit statistics showed that this model (compared to the metric model) did not result in a significant degradation of fit (Δ CFI = .006; Δ RMSEA = .012).

3.3. Link with frequency of gambling and gambling problems

Separate regression analyses were performed to determine the concurrent validity of the scale (see Table 3). More positive gambling attitudes were associated with higher levels of gambling frequency and gambling problems. Retesting the model on the validation sample (Partition 3) showed that the standardized parameters, R^2 of each

Table 3

Estimated parameters and R^2 , standard errors of the two regression analyses with gambling frequency and gambling problems as outcome variables with both partitions (Partition 2 and Partition 3).

	Partition 2 (calibration) $n = 2572$				Partition 3 (validation) $n = 2572$			
	Gambling frequency		Gambling problems		Gambling frequency		Gambling problems	
	Estimated	SE	Estimated	SE	Estimated	SE	Estimated	SE
Gender	-.05	.05	-.10	.06	-.07	.05	-.08	.06
Age	.11	.002	-.14	.002	.08	.002	-.15	.002
Attitudes towards gambling	.23	.006	.12	.007	.22	.006	.11	.006
R^2	.07		.05		.06		.05	

endogenous variable and the direct effects of gambling attitude on gambling frequency and gambling problems (see Table 3) were largely in accordance with the development sample (Partition 2).

4. Discussion

The present study extends the information and psychometric testing of the ATGS-8 by using a cross-validation strategy and more robust statistical analyses to provided other measurement properties not investigated in the original analysis by Wardle et al. (2011), such as model fit and measurement invariance of the ATGS-8 across gender (males vs. females). The scale had acceptable internal consistency with the expectancy dimension equal to the required $\alpha = .70$ threshold (Nunnally & Bernstein, 1994). The hypothesized single-factor structure of the ATGS-8 (McAllister, 2014; Salonen et al., 2014) provided a good fit to the data. The overall public attitudes towards gambling were negative in Great Britain. This result is also consistent with previous studies using the same instrument that overall public opinion is generally negative towards gambling in Finland (Salonen et al., 2014) and Australia (McAllister, 2014). However, there are notable differences between the populations that necessitate future evaluations. For example, although more than 70% of respondents believed that gambling should be discouraged in Australia (90% in Finland), only 40% of British respondents agreed or strongly agreed with this statement. In general, Australian and Finnish' opinions are more strongly expressed than those of their British counterparts, perhaps because of the greater degree of public discussion concerning public policy towards gambling in Australia and Finland, resulting in greater familiarity with the main arguments (McAllister, 2014).

Furthermore, the invariance of the ATGS-8 across gender was established. This is an issue that has not been addressed in previous evaluations of the scale (McAllister, 2014; Salonen et al., 2014; Wardle et al., 2011) and is important as it shows that the ATGS-8 scale scores are not confounded by gender and that they can be used to make meaningful comparisons between levels of males' and females' attitude. Separate regression analyses in both partitions demonstrated that people who had more positive attitudes towards gambling were more likely to participate in gambling activities and to have gambling related problems. These results confirm that favorable attitude towards gambling is associated with more gambling (Canale, Vieno, et al., 2015; Canale, Santinello et al., 2015; Lee et al., 2013; Orford et al., 2009), and for this reason, favorable attitudes may be considered as an important risk factor to be reduced. In addition, the present findings highlight the good concurrent validity of the scale.

The present study clearly has some limitations. Firstly, the data were self-report and subject to standard limitations (e.g., memory recall biases, social desirability, etc.). Secondly, the sum of gambling problems may not be an appropriate proxy for problem gambling severity. Thirdly, the effects found in the present study were modest, suggesting that additional factors are likely to be influential in the development of gambling problems. Other unconsidered factors associated with gambling (e.g., reasons for gambling [Canale, Santinello et al., 2015]) or the community (different countries; Molinaro et al., 2014) may also be predictive of gambling-related variables.

5. Conclusions

The present study extends the previous psychometric evaluations of the scale (McAllister, 2014; Salonen et al., 2014) by providing detailed evidence for the utility and usefulness of the ATGS-8 in a community sample and across gender (males vs. females). The ATGS-8 is an instrument with good psychometric properties and useful for assessing gambling attitudes among the general population.

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No external funding source for this study has been received.

Contributors

The authors worked in collaboration for this study. Natale Canale and Massimiliano Pastore were involved in the management of the database. Natale Canale was responsible for carrying out the statistical analysis and wrote the first draft of the manuscript. The authors gave substantial contributions to the interpretation of results and critically revised the drafted manuscripts several times.

Conflict of interest

Mark D. Griffiths has received funding for a number of research projects in the area of gambling education for young people, social responsibility in gambling and gambling treatment from the Responsibility in Gambling Trust, a charitable body which funds its research program based on donations from the gambling industry. All other authors declare that they have no conflicts of interest.

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