

Published as: Canale, N., Vieno, A., Pastore, M., Ghisi, M. & Griffiths, M.D. (2016). Validation of the 8-item Attitudes Towards Gambling Scale (ATGS-8) in a British Population Survey. *Addictive Behaviors*, 54, 70-74.

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.

Keywords: Gambling, Attitudes, Public opinion, Psychometric evaluation, Population study

1. Introduction

Problem gambling is a public health concern in many European countries (Molinaro et al., 2014; Volberg, Gupta, Griffiths, Olason, & Delfabbro, 2010) and it has been associated with significant health and psychosocial problems (Abbott et al., 2013; Lorains, Cowlshaw, & 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 Spurrier & 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 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

et al. 2001; Derevensky et al. 2010; Kassinove 1998; Sutton & Griffiths, 2008), the 14-item ATGS was specifically designed to reflect broad attitudes toward 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-8¹. 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 et al., 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 7,746 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

104 (61%). To ensure British population representativeness, data were weighted based on age, gender,
105 and region (see Wardle et al., 2011 for additional methodological details).

106

107 *2.2 Measures*

108 *2.2.1 Attitudes towards gambling*

109 The ATGS-8 by Orford et al. (2009) was used to assess attitudes. All eight items of the
110 ATGS concern attitudinal statements that some people have about gambling (e.g., “People should
111 have the right to gamble whenever they want”). Participants were asked to indicate how much they
112 agreed or disagreed with each attitudinal statement. ATGS-8 items were scored using a Likert scale:
113 1 = “strongly disagree” to 5 = “strongly agree”. The sum of eight items forms a total ATGS-8 score
114 (range 8–40). In short, the higher the ATGS score, the more favorable attitudes the individual has
115 towards gambling.

116

117 *2.2.2 Gambling-related problems in the previous year*

118 Gambling problems were assessed using an adapted version of the DSM-IV pathological
119 gambling criteria (American Psychiatric Association, 2000; Sproston, Erens, & Orford, 1999;
120 Wardle et al., 2011) recorded in the 2010 BGPS (Wardle et al., 2011). Ten gambling-related
121 problems (e.g., “In the last 12 month have you made unsuccessful attempts to control, cut back or
122 stop gambling?”) were assessed (i.e., salience, increased tolerance, problems with spouse and/or
123 other people, work-related problems, and financial problems). Instead of scoring the presence or
124 absence of a symptom, the respondents rated each item on a 4-point scale of the frequency each
125 symptom occurred (0 being ‘never’ and 3 ‘very often’). There is a lack of consensus regarding
126 appropriate cutoff scores for determining the problem gambling status of gamblers (Orford, Wardle,
127 Griffiths, Sproston, Erens, 2007). Consequently, total DSM-IV score served as the primary
128 dependent variable as is common in such studies the gambling field. The internal consistency of the
129 total DSM-IV score was .81 (CI = .80/.82).

130

131 *2.2.3 Gambling frequency*

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

138

139 2.3 Analysis

140 The R (R Core Team, 2013) Package lavaan (Rosseel, 2012) was used to validate the scale
141 and to estimate parameters. A cross validation with a three-step analytic approach was carried out.
142 The original sample was randomly split into three partitions. In the first step (Partition 1), the
143 factorial properties of the ATGS-8 were evaluated. A Confirmatory Factor Analysis (CFA) using
144 robust diagonally weighted least squares for ordinal items (e.g., Likert-type scales) was used to test
145 the structure of the scale. To evaluate the overall model fit, the following indices were used:
146 comparative fit index (CFI), root mean square error of approximation (RMSEA) [90% confidence
147 interval (CI)], and non-normed fit index (NNFI; also known as the Tucker-Lewis index-TLI). In
148 addition, to determine the equivalence of factor structure in different subgroups according to
149 gender, a multi-group CFA was performed to examine measurement invariance of the ATGS-8
150 across males and females. A hierarchical approach was considered by successively constraining
151 model parameters and comparing changes in model fit (Steenkamp & Baumgartner, 1998). Three
152 models (i.e., configural, metric and scalar) were estimated and represented prerequisites for
153 meaningful across-group comparisons based on factor scales. The use of ΔX^2 values has been
154 criticized because of their sensitivity to sample size (Cheung & Rensvold, 2002). For this reason,
155 testing for invariance was examined through the practical perspective (Byrne & Stewart, 2006),
156 which recommends that invariance can be based on two criteria: (a) the multigroup factor model
157 exhibits an adequate fit to the data and (b) the change in values for fit indices (e.g., ΔCFI ,
158 $\Delta RMSEA$) is negligible. A ΔCFI larger than 0.01 and a change larger than .015 in $\Delta RMSEA$ is
159 indicative of non-invariance (Canale, Santinello, & Griffiths, 2015; Chen, 2007; Gilson et al.,
160 2013). Finally, to confirm the concurrent validity of the ATGS-8, separate regression models were
161 performed. In all models, variables of attitudes towards gambling², as well as age and gender were
162 the independent variables, whereas frequency of gambling and gambling problems were the
163 dependent variables. Following Cudeck and Brown (1983), a cross validation strategy was used in
164 which the observed-variables model was developed (second step) using a calibration data sample
165 (Partition 2) and then confirmed (third step) using an independent validation sample (Partition 3).
166 Two regression analyses with gambling frequency and gambling problems as outcome variables
167 with both partitions (partition 2 and partition 3) were performed. Therefore, the sample was
168 randomly split into three partitions, all containing one-third of the data (n=2582): Partition 1 (51%
169 female; mean age= 46.47; SD=18.52); Partition 2 (52% female; mean age= 46.63; SD=18.99); and
170 Partition 3 (51% female; mean age= 46.17; SD=18.92). The three groups did not differ as far as
171 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 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 0.98 and 0.98, 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 male 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 ($\Delta\text{CFI}=.000$; $\Delta\text{RMSEA}=.005$), 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 ($\Delta\text{CFI}=.006$; $\Delta\text{RMSEA}=.012$).

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 endogenous variable and the direct

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

208

209 **4. Discussion**

210 The present study extends the information and psychometric testing of the ATGS-8 by using
211 a cross-validation strategy and more robust statistical analyses to provided other measurement
212 properties not investigated in the original analysis by Wardle et al. (2011), such as model fit and
213 measurement invariance of the ATGS-8 across gender (males vs. females). The scale had
214 acceptable internal consistency with the expectancy dimension equal to the required $\alpha = 0.70$
215 threshold (Nunnally & Bernstein, 1994). The hypothesized single-factor structure of the ATGS-8
216 (McAllister, 2014; Salonen et al., 2014) provided a good fit to the data. The overall public attitudes
217 towards gambling were negative in Great Britain. This result is also consistent with previous studies
218 using the same instrument that overall public opinion is generally negative towards gambling in
219 Finland (Salonen et al., 2014) and Australia (McAllister, 2014). However, there are notable
220 differences between the populations that necessitate future evaluations. For example, although more
221 than 70% of respondents believed that gambling should be discouraged in Australia (90% in
222 Finland), only 40% of British respondents agreed or strongly agreed with this statement. In general,
223 Australian and Finnish' opinions are more strongly expressed than those of their British
224 counterparts, perhaps because of the greater degree of public discussion concerning public policy
225 towards gambling in Australia and Finland, resulting in greater familiarity with the main arguments
226 (McAllister, 2014).

227 Furthermore, the invariance of the ATGS-8 across gender was established. This is an issue
228 that has not been addressed in previous evaluations of the scale (McAllister, 2014; Salonen et al.,
229 2014; Wardle et al., 2011) and is important as it shows that the ATGS-8 scale scores are not
230 confounded by gender and that they can be used to make meaningful comparisons between levels of
231 males' and females' attitude. Separate regression analyses in both partitions demonstrated that
232 people who had more positive attitudes towards gambling were more likely to participate in
233 gambling activities and to have gambling related problems. These results confirm that favorable
234 attitude towards gambling is associated with more gambling (Canale et al., 2015; Lee et al., 2013;
235 Orford et al., 2009), and for this reason, favorable attitudes may be considered as an important risk
236 factor to be reduced. In addition, the present findings highlight the good concurrent validity of the
237 scale.

238 The present study clearly has some limitations. Firstly, the data were self-report and subject
239 to standard limitations (e.g., memory recall biases, social desirability, etc.). Secondly, the sum of

240 gambling problems may not be an appropriate proxy for problem gambling severity. Thirdly, the
241 effects found in the present study were modest, suggesting that additional factors are likely to be
242 influential in the development of gambling problems. Other unconsidered factors associated with
243 gambling (e.g., reasons for gambling [Canale, Santinello, & Griffiths, 2015]) or the community
244 (different countries; Molinaro et al., 2014) may also be predictive of gambling-related variables.

245

246 **5. Conclusions**

247 The present study extends the previous psychometric evaluations of the scale (McAllister,
248 2014; Salonen et al., 2014) by providing detailed evidence for the utility and usefulness of the
249 ATGS-8 in a community sample and across gender (males vs. females). The ATGS-8 is an
250 instrument with good psychometric properties and useful for assessing gambling attitudes among
251 the general population.

252

253 **Notes**

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

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

258

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