Journal of Behavioral Addictions 5(1), pp. 59–67 (2016)
DOI: 10.1556/2006.5.2016.017

A longitudinal study of factors explaining attitude change towards gambling among adolescents

STÅLE PALLESEN[1]*, DANIEL HANSS[1], HELGE MOLDE[2], MARK D. GRIFFITHS[3] and RUNE AUNE MENTZONI[1]

[1]Department of Psychosocial Science, University of Bergen, Bergen, Norway
[2]Department of Clinical Psychology, University of Bergen, Bergen, Norway
[3]Psychology Division, International Gambling Research Unit, Nottingham Trent University, Nottingham, United Kingdom

(Received: July 23, 2015; accepted: December 28, 2015)

Background and aims: No previous study has investigated changes in attitudes toward gambling from under legal gambling age to legal gambling age. The aim of the present study was therefore to investigate attitudinal changes during this transition and to identify predictors of corresponding attitude change. *Methods:* In all 1239 adolescents from a national representative sample participated in two survey waves (Wave 1; 17.5 years; Wave 2; 18.5 years). *Results:* From Wave 1 to Wave 2 the sample became more acceptant toward gambling. A regression analysis showed that when controlling for attitudes toward gambling at Wave 1 males developed more acceptant attitudes than females. Neuroticism was inversely related to development of acceptant attitudes toward gambling from Wave 1 to Wave 2, whereas approval of gambling by close others at Wave 1 was positively associated with development of more acceptant attitudes. Continuous or increased participation in gambling was related to development of more acceptant attitudes from Wave 1 to Wave 2. *Conclusions:* Attitudes toward gambling became more acceptant when reaching legal gambling age. Male gender, approval of gambling by close others and gambling participation predicted development of positive attitudes toward gambling whereas neuroticism was inversely related to development of positive attitudes toward gambling over time.

Keywords: attitudes, longitudinal, change, gambling

Studies have consistently shown that people's attitude toward gambling is a good predictor of how much they gamble and how likely they are to experience gambling-related problems (Chiu & Storm, 2010; Delfabbro, Lambos, King, & Puglies, 2009; Delfabbro & Thrupp, 2003; Orford, Griffiths, Wardle, Sproston, & Erens, 2009; Williams, Connolly, Wood, & Nowatzki, 2006; Wood & Griffiths, 2004). Such findings lend support to theories implying that attitudes play an important role in determining people's intentions to act and, indirectly, their actual behavior, such as the theory of planned behavior (Ajzen, 1991; Fishbein, 2000). It is also known that the prevalence of problem gambling is higher among adolescents than adults (Gupta et al., 2013; Nowak & Aloe, 2014; Volberg, Gupta, Griffiths, Olason, & Delfabbro, 2010). Consequently, knowledge of factors that may influence attitudes toward gambling over time in this age group may point to important indicators in terms of risk factors as well as preventive and therapeutic priorities.

Previous studies across different countries have shown that young males typically hold more positive attitudes toward gambling than women (Buczkiewicz, Griffiths, & Rigbye, 2007; Hanss, Mentzoni, Delfabbro, Myrseth, & Pallesen, 2014; Jackson, Dowling, Thomas, Bond, & Patton, 2008; Moore & Ohtsuka, 1997; Wood & Griffiths, 1998). Other individual factors such as personality also appear to play a role. For instance, Taormina (2009) found that Neuroticism and Gregariousness were both positively related to acceptant attitudes toward gambling, whereas Hanss et al. (2014) showed that Agreeableness was negatively associated with acceptant attitudes toward gambling. It has also been reported that impulsivity and sensation seeking both correlate significantly and positively with acceptant attitudes toward gambling (Breen & Zuckerman, 1999; Hanss et al., 2014; Lee, 2013; McDaniel & Zuckerman, 2003). In relation to social influence, it has been found that social constraints in terms of parental monitoring are inversely related to acceptant attitudes toward gambling among adolescents (Magoon & Ingersoll, 2006). Additionally, participation in gambling by family and friends and approval of gambling have been shown to be positively associated with acceptant attitudes toward gambling, but not if others close to the individual have experienced gambling problems (Hanss et al., 2014; Orford et al., 2009).

Although some factors that relate to attitudes toward gambling have been identified, there is significant shortage of knowledge of factors that may influence changes of attitudes toward gambling over time. In a trend study from Macao, the results suggested that there was development of a more negative attitude toward gambling as a consequence of the local gambling industry being deregulated and expanded (Vong, 2009). Some central theories of attitude

* Corresponding author: Ståle Pallesen; Department of Psychosocial Science, University of Bergen, Christiesgt. 12, 5015 Bergen, Norway; Phone: +47 55588842; E-mail: staale.pallesen@uib.no

change have put much emphasis on behavior when it comes to attitude change and formation. According to the theory of cognitive dissonance, an unpleasant arousal/dissonance occurs when a person in absence of external pressure behaves in contradiction to an initial attitude. The dissonance will motivate attitude change in line with the behavior and as such eliminate the dissonance (Festinger & Carlsmith, 1959). According to self-perception theory, individuals typically infer which attitudes they possess based on their own behavior, without any preceding unpleasant cognitions or feelings (Bem, 1967), hence this theory seems to explain attitude formation more than attitude change.

In Norway it is illegal to gamble for minors (<18 years old). During the transition from 17 to 18 years of age, it is reasonable to assume that changes in gambling attitudes can occur. In the present study, attitudinal data were used from a random sample of Norwegians, first (Wave 1) when 17.5 years old (i.e., when they could not legally gamble) and then one year later (Wave 2; when gambling was legally available). The following questions were investigated: (i) Will attitudes toward gambling change when adolescents transcend from underage to legal gambling age? (ii) Which factors (i.e., gender, personality, social influence and/or gambling behavior) explain change in gambling attitudes during the transitional period?

METHODS

Participants and procedure

Three thousand adolescents aged 17.5 years ($n = 1500$ female), randomly drawn from the Norwegian National Registry, received a postal invitation to participate in a survey about gambling, together with a questionnaire and a pre-paid return envelope (Wave 1). The questionnaire could also be completed online. Up to two reminder letters were sent to those who did not reply. All respondents received a gift certificate worth NOK 200 (approximately €24) as a compensation for taking part in the study. A small minority of individuals ($n = 77$) were excluded from the initial sample because they could not be reached (invalid mailing address) or were unable to participate (e.g., due to disability). Of the remaining sample, 2059 participants completed and returned the questionnaire. Four of the respondents were excluded from the dataset at this stage because they were younger than 17 years. This resulted in a response rate of 70.4%. One year later, the same participants received a new questionnaire about gambling. The procedure with reminders and gift certificates was the same as for Wave 1. A total of 1344 returned the questionnaire at Wave 2. Based on a unique ID-number the responses from Wave 1 and Wave 2 were merged. See Table 1.

Table 1. Overview of participants, percentage or mean scores and standard deviation *(SD)* on relevant variables at Wave 1 and Wave 2 ($N = 1162$–1239)

Variable	Percentage	Mean	*SD*
Attitutes Towards Gambling Scale			
Wave 1		2.69	0.53
Wave 2		2.76	0.55
Gender			
Female		58.4%	
Male		41.6%	
MINI-International Personality Item Pool (Wave 1)			
Extroversion		3.71	0.86
Agreeableness		4.21	0.65
Conscientiousness		3.64	0.75
Neuroticism		2.73	0.83
Intellect / Openness		3.37	0.56
Eysenck Narrow Impulsiveness Subscale (Wave 1)		5.04	2.91
Arnett Inventory of Sensation Seeking (Wave 1)		2.60	0.34
Parental Monitoring Scale (Wave 1)		4.21	0.68
Family and friends approval of gambling (Wave 1)		2.31	0.69
Own knowlegde of gambling (Wave 1)		2.94	1.03
Lifetime gambling participation of close others (Wave 1)			
Yes	78.7%		
No	21.3%		
Lifetime gambling problems of close others (Wave 1)			
Yes	7.0%		
No	93.0%		
Own gambling participation last year			
Neither gambled at Wave 1 nor Wave 2	51.2%		
Gambled only at Wave 1	9.5%		
Gambled only at Wave 2	24.2%		
Gambled both at Wave 1 and Wave 2	15.0%		

Measures

Attitudes toward gambling. The 14-item Attitudes Towards Gambling Scale (ATGS) by Orford et al. (2009) was used to assess attitudes toward gambling at both Wave 1 and Wave 2. The ATGS items and information about the response alternatives are provided in Table 2. A total of 1239 participants had completed all items on the ATGS across both waves. Items that represent positive attitudes were reverse-coded and then a composite score was computed by adding up scores on the 14 items (Orford et al., 2009) and then dividing this by 14. Higher scores reflected more acceptant attitudes toward gambling. Cronbach's alpha for the ATGS at Wave 1 and Wave 2 was .83 and .85, respectively. See Table 2.

Five-factor personality domain traits. The personality domain traits Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Intellect / Imagination were assessed using the 20-item MINI-International Personality Item Pool (Donnellan, Oswald, Baird, & Lucas, 2006) at Wave 1. Each dimension was assessed via four items. Example items included: "Am the life of the party" (to measure Extraversion), "Feel others' emotions" (Agreeableness), "Like order" (Conscientiousness), "Have frequent mood swings" (Neuroticism), and "Have a vivid imagination" (Intellect / Imagination). Participants rated how accurately each item described them on a 5-point scale ranging from *very inaccurate* (1) to *very accurate* (5). An index variable was computed by adding the score of the four items for each dimension and dividing this score by four ($\alpha = .81$ Extraversion, $\alpha = .70$ Agreeableness, $\alpha = .67$ Conscientiousness, $\alpha = .69$ Neuroticism, $\alpha = .65$ Intellect / Imagination). Higher scores on the index variables indicated greater levels of the respective traits.

Impulsivity. The 13-item Narrow Impulsiveness Subscale of the Eysenck Impulsivity Scale (Eysenck & Eysenck, 1977) was used to assess impulsivity at Wave 1. An example item was: "Do you often buy things on impulse?" Participants answered each item with *yes* (1) or *no* (0). An Impulsivity index was computed by summing up the scores across the 13 items (Kuder–Richardson 20 reliability coefficient = .74). Higher scores indicated greater levels of impulsivity.

Sensation seeking. Sensation seeking was assessed at Wave 1 by the 20-item Arnett Inventory of Sensation Seeking (AISS) (Arnett, 1994). One composite score was computed (average across the 20 items, $\alpha = .63$). An example item was: "I would like to travel to places that are strange and far away." Participants answered the items on a four-point scale ranging from *describes me very well* (4) to *does not describe me at all* (1). Higher scores indicated greater levels of sensation seeking.

Parental monitoring. The six-item Parental Monitoring Scale (Li, Feigelman, & Stanton, 2000) was used to assess participants' perceived level of parental monitoring at Wave 1. An example item was: "My parents know where I am after school/work." Participants answered the items on a five-point scale ranging from *never* (1) to *always* (5). An index was computed by averaging answers to the six items ($\alpha = .85$). Higher scores indicated greater levels of parental monitoring.

Family/peer approval of gambling. Four items adopted from Delfabbro and Thrupp (2003) were used to assess family and peers' approval of gambling at Wave 1. Two items captured friends' approval of gambling: "Most of my friends approve of gambling" and "Most of my friends gamble a lot". In the two items assessing family's gambling approval, the word 'friends' was replaced by the word 'family'; otherwise the statements were identical. Participants answered the items on a five-point scale ranging from *strongly disagree* (1) to *strongly agree* (5). A composite score was computed by averaging answers to the four items

Table 2. Means and standard deviations of ATGS items at Wave 1 and Wave 2 ($N = 1239$)

	Wave 1		Wave 2	
ATGS items	Mean[a]	*SD*	Mean[a]	*SD*
There are too many opportunities for gambling nowadays	2.22	0.99	2.21	1.01
People should have the right to gamble whenever they want[†]	3.10	0.97	3.18	1.02
Gambling should be discouraged	2.81	0.99	2.91	1.01
Most people who gamble do so sensibly[†]	2.86	0.91	2.84	0.93
Gambling is a fool's game	3.53	0.97	3.68	0.89
Gambling is dangerous for family life	2.61	0.94	2.70	0.88
Gambling is an important part of cultural life[†]	2.23	0.93	2.20	0.90
Gambling is a harmless form of entertainment[†]	2.46	0.90	2.45	0.89
Gambling is a waste of time	2.66	1.00	2.75	0.96
On balance gambling is good for society[†]	2.27	0.80	2.33	0.81
Gambling livens up life[†]	2.26	0.85	2.38	0.88
It would be better if gambling was banned altogether	3.24	0.99	3.44	0.97
Gambling is like a drug	3.05	1.09	3.15	1.07
Gambling is good for communities[†]	2.34	0.84	2.43	0.84
Composite score	2.69	0.53	2.76	0.55

Note: [a]Participants answered the items on a five-point scale ranging from *strongly agree* (1) to *strongly disagree* (5). For the single ATGS items, mean values higher than 3 represent a positive attitude and mean values lower than 3 represent a negative attitude toward gambling. A mean value of 3 represents a neutral attitude toward gambling. [†] Reverse-coded items.

($\alpha = .72$). Higher scores indicated greater family/peer approval of gambling.

Knowledge of gambling. Perceived knowledge of gambling was assessed by two items at Wave 1: "I know how most gambling games work" and "I could easily learn how most gambling games work". These items were answered on a 5-point scale ranging from *strongly disagree* (1) to *strongly agree* (5). An index was calculated by averaging the two responses. The Pearson's product-moment correlation coefficient between the responses to the two items was .56.

Gambling participation by close persons. Two questions were included at Wave 1 concerning gambling participation by those individuals close to the respondents (e.g., father, mother or other close persons). The questions pertained to lifetime participation in gambling, and whether a close person had ever developed problems due to gambling. The response alternatives were 'yes' or 'no'.

Own gambling participation. In both surveys the respondents were asked if they had participated in gambling during the last 12 months. A list of gambling opportunities in Norway was provided. The response alternatives were 'yes' or 'no'.

Statistical analysis

Means and standard deviations were computed for the single ATGS items and the ATGS composite score across both waves. The change in attitudes toward gambling from Wave 1 to Wave 2 was analyzed by a paired *t*-test. The results were supplemented by calculation of Cohen's *d*, where 0.2 is regarded as a small, 0.5 is regarded as a moderate, and 0.8 is regarded as a large effect size, respectively (Cohen, 1988), as well as by calculation of the Pearson product-moment correlation coefficient. A hierarchical multiple linear regression analysis was then conducted. The dependent variable was attitudes toward gambling at Wave 2. In the first step attitudes toward gambling at Wave 1 was entered as an independent variable. In the second and final step, gender, the five-factor model of personality (Extroversion, Agreeableness, Conscientiousness, Neuroticism and Openness / Intellect), impulsivity, sensation seeking, parental monitoring, family and friends approval of gambling, own knowledge of gambling, family and friend lifetime participation, and problems with gambling and own participation in gambling were entered as independent variables. The latter variable was nominal and comprised four categories (neither gambled at Wave 1 nor Wave 2, gambled only at Wave 1, gambled only at Wave 2, or gambled both at Wave 1 and Wave 2). The participation variable was dummy coded and the 'neither gambled at Wave 1 nor Wave 2' constituted the reference category. Preliminary analyses ensured no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. Correlation coefficients (Pearson product-moment correlation, point-biserial correlation, or phi coefficients) between all predictors were also calculated.

Ethics

The study was conducted in line with the principles expressed in the Declaration of Helsinki. Consent was given by the respondents themselves by ticking the alternative "I agree to participate in this study" in the questionnaire. As all respondents were above 16 years of age parental participation was not necessary according to Norwegian legislation. The consent procedure described here as well as the project as a whole was approved by the Regional Committee for Medical Health Research Ethics, Health Region South East Norway (project number 2012/914).

RESULTS

Changes in attitudes toward gambling from Wave 1 to Wave 2

The mean score on the ATGS at Wave 2 ($M = 2.76$, $SD = 0.55$) was higher than the mean score on the ATGS ($M = 2.69$, $SD = 0.53$) at Wave 1 ($t = 4.99$, $df = 1238$, $p < .01$). The effect size for the difference was 0.13. The Pearson product-moment correlation coefficient between the two measures was .57 ($N = 1239$, $p < .01$). The mean change in attitude score (absolute value) was 0.39 ($SD = .33$).

Correlation coefficients between the independent variables

Table 3 shows the correlation coefficients between all the independent variables. The correlation coefficients range from −.58 (between 'neither gambled at Wave 1 nor Wave 2' and 'only gambled at Wave 2') to .50 (between own attitudes toward gambling at Wave 1 and approval of gambling among family/friends).

Regression analysis on attitudes toward gambling at Wave 2

Table 4 shows the results of the hierarchical multiple linear regression analysis where attitudes toward gambling at Wave 2 comprised the dependent variable. Attitudes toward gambling at Wave 1 was entered in Step 1, explaining 31.8% of the variance. After entry of the other independent variables (gender, Extroversion, Agreeableness, Conscientiousness, Neuroticism, Openness / Intellect, impulsivity, sensation seeking, parental monitoring, family and friends approval of gambling, own knowledge of gambling, family and friends lifetime participation and problems with gambling and own participation in gambling) in Step 2, the total variance explained by the model as a whole was 38.1% ($F17{,}1067 = 38.62$, $p < .01$). The variables added in Step 2 explained an additional 6.2% of the variance after controlling for attitudes toward gambling at Wave 1 ($\Delta R^2 = .062$, $\Delta F16{,}1067 = 6{,}72$, $p < .01$). In the final model, the following independent variables were significantly related to attitudes toward gambling at Wave 2: Attitudes toward gambling at Wave 1 ($\beta = .444$, $p < .01$), gender (male = 1, female = 2, $\beta = -.107$, $p < .01$), Neuroticism at Wave 1 ($\beta = -.059$, $p < .05$), family and friends approval of gambling at Wave 1 ($\beta = .085$, $p < .01$), gambled only at Wave 2 ($\beta = .096$, $p < .01$), and gambled both at Wave 1 and Wave 2 ($\beta = .113$, $p < .01$).

Table 3. The correlation coefficients between the independent study varibles ($N = 1119–1239$)

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. Attitudes towards gambling Wave 1	−.24**	−.06*	−.16**	−.08**	−.07*	−.03	.08**	.16**	−.15**	.50**	.28**	.17**	−.04	−.17**	.01	.06*	.16**
2. Gender (1 = male, 2 = female)		.03	.28**	.03	.34**	.02	−.02	−.23**	.23**	−.12**	−.32**	.02	−.03	.11	.02	−.07*	−.09**
3. Extraversion			.33**	.13**	−.16**	.12**	.18**	.23**	.06*	−.04	.09**	−.00	−.03	−.09**	−.01	.08**	.04
4. Agreeableness				.16**	.06*	.12**	−.07*	.01	.22**	−.11**	−.08**	−.04	.06*	.02	−.07*	.03	−.01
5. Conscientiousness					−.16**	−.07*	−.35**	−.10**	.23**	−.10**	−.11**	−.08**	−.06*	.03	−.01	−.02	−.01
6. Neuroticisim						.08**	.21**	−.12**	−.02	.02	−.16**	−.01	.06*	.06*	.00	−.05	−.04
7. Openness / Intellect							.11**	.17**	.02	−.03	.07*	−.01	−.01	.01	.04	.01	−.07*
8. Eysenck Narrow Impulsiveness Subscale (Wave 1)								.29**	−.28**	.14**	.12**	.06*	.09**	−.15**	.00	.06*	.12**
9. Arnett Inventory of Sensation Seeking (Wave 1)									−.17**	.17**	.32**	.09**	.02	−.09**	.01	.02	.09**
10. Parental Monitoring Scale (Wave 1)										−.15**	−.15**	−.06*	−.15**	.10**	−.01	−.02	−.11**
11. Family and Friends Approval of Gambling (Wave 1)											.38**	.29**	.06*	−.21**	.06	.07*	.16**
12. Own knowlegde of gambling (Wave 1)												.19**	.02	−.18**	−.01	.08**	.15**
13. Lifetime gambling participation of close others (Wave 1; 0 = no, 1 = yes)													.13**	−.12**	−.01	.08**	.07**
14. Lifetime gambling problems of close others (Wave 1; 0 = no, 1 = yes)														−.06*	.10**	−.02	.02
15. Neither gambled at Wave 1 nor Wave 2 (0 = no, 1 = yes)															−.33**	−.58**	−.43**
16. Gambled only at Wave 1 (0 = no, 1 = yes)																−.18**	−.14
17. Gambled only at Wave 2 (0 = no, 1 = yes)																	−.24
18. Gambled both at Wave 1 and Wave 2 (0 = no, 1 = yes)																	

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

Table 4. Hierarchical linear regression on attitudes toward gambling at Wave 2 ($N = 1084$)

Variable	B	*SE*	β	*t*	Δ*R2*
FIRST STEP					.318**
Attitudes Towards Gambling Scale (Wave 1)	0.586	.026	.564	22.494**	
SECOND STEP					
Attitudes Towards Gambling Scale (Wave 1)	0.461	.030	.444	15.298**	.062**
Gender (male = 1, female = 2)	−1.666	.454	−.107	−3.669**	
MINI-International Personality Item Pool (Wave 1)					
Extroversion	0.001	.253	.000	0.005	
Agreeableness	0.000	.323	.000	−0.001	
Conscientiousness	−0.500	.274	−.049	-1.824	
Neuroticism	−0.556	.258	−.059	−2.153*	
Intellect / Openness	−0.091	.343	−.007	−1.824	
Eysenck Narrow Impulsiveness Subscale (Wave 1)	−0.052	.078	−.020	−0.674	
Arnett Inventory of Sensation Seeking (Wave 1)	0.756	.629	.033	1.186	
Parental Monitoring Scale (Wave 1)	−0.137	.303	−.012	−0.452	
Family and friends' approval of gambling (Wave 1)	0.957	.340	.085	2.815**	
Own knowlegde of gambling (Wave 1)	0.197	.214	.026	0.920	
Lifetime gambling participation of close others (Wave 1) (no = 1, yes = 2)	0.477	.493	.025	0.969	
Lifetime gambling problems of close others (Wave 1) (no = 1, yes = 2)	−1.177	.745	−.037	−1.499	
Own gambling participation last year[a]					
Gambled only at Wave 1	−0.891	.670	−.034	−1.330	
Gambled only at Wave 2	1.740	.474	.096	3.673**	
Gambled both at Wave 1 and Wave 2	2.381	.559	.113	4.256**	

*$p < .05$, **$p < .01$.
[a]Neither gambled at Wave 1 nor Wave 2 comprised the reference category, B = unstandardized regression.

DISCUSSION

The present study examined how adolescent attitudes towards gambling changed over time. The first question investigated whether attitudes toward gambling would change following the transition from under legal age to legal age. The findings showed a significant change in direction of more acceptant attitudes. However, the change was small with an effect size of 0.13. As neutral responses to the attitude items would result in a score of 3.00, the mean composite score of 2.79 following the transition still indicates a slightly overall negative attitude toward gambling. Although not directly comparable, the present results are in line with a study showing that legalization of medical marijuana is not associated with changes in drug-related attitudes among youths and young adults (Khatapoush & Hallfors, 2004). Studies have further shown that deregulation of the gambling market appears to change people's attitudes in a more conservative direction (Vong, 2009). Little is generally known in terms of the effects of regulation and legislation on gambling attitudes, thus future studies should focus more on this specific topic.

The correlation between the attitude measure at Wave 1 and Wave 2 was only .57. This is also reflected by the fact that even though the mean score changed little between the two waves, the mean absolute value of change was .39, suggesting a relatively large change (some becoming far more negative and some becoming far more positive towards gambling). In order to investigate the second question about which factors could explain changes in attitudes toward gambling from below legal to above legal age, a hierarchical regression analysis was conducted. Attitudes toward gambling at Wave 1 were entered in Step 1 and explained only 31.8% of the variance of attitudes toward gambling at Wave 2. This finding is in line with the impressionable years hypothesis which proposes that individuals are highly susceptible to attitude change during late adolescence and early adulthood, and that this susceptibility drops precipitously immediately thereafter (Krosnick & Alwin, 1989). Therefore, the current findings suggest reasonably high attitude instability toward gambling among adolescents. However, little is known about how changes regarding attitudes toward gambling relate to age more generally. This should therefore be something that future studies should examine.

The remaining predictors were all entered in Step 2 but explained only an additional 6.2% of the variance in attitudes toward gambling at Wave 2. Gender was significantly and negatively associated with attitudes toward gambling at Wave 2, suggesting that males over the one-year period developed relatively more acceptant attitudes toward gambling than females. This confirms the findings of other studies showing that men overall have more positive attitudes toward gambling that women (Hanss et al., 2014; Jackson et al., 2008; Moore & Ohtsuka, 1997; Wood & Griffiths, 1998). Furthermore, the results of the present study suggest that this gender difference regarding attitudes toward gambling increases during late adolescence.

In terms of the five-factor model of personality, only Neuroticism was significantly related to attitudes toward gambling at Wave 2. Neuroticism was associated with a less positive change in attitudes toward gambling from Wave 1

to Wave 2, a finding that is at odds with previous studies which have shown positive associations between Neuroticism and attitudes toward gambling (Taormina, 2009) and between Neuroticism and attitudes toward alcohol and drugs (Francis, 1996). One explanation for the inconsistency concerning Neuroticism might be because the attitudes toward gambling at Wave 1 overall were slightly negative, and people high in Neuroticism may be prone to perceive gambling as more dangerous than others in line with their harm-avoidant tendency (Elliot & Thrash, 2002), they therefore develop less positive attitudes toward gambling than others during the one-year follow-up period. Neither impulsivity nor sensation seeking were significantly related to attitudes toward gambling in Wave 2. Although these personality factors have been shown to correlate positively with attitudes toward gambling (Breen & Zuckerman, 1999; Hanss et al., 2014; Lee, 2013; McDaniel & Zuckerman, 2003), the results of the present study suggest that these personality factors are unrelated to changes in attitudes toward gambling in late adolescence. Positive parental monitoring has been shown to be negatively related to gambling problems (Griffiths, 2010; Magoon & Ingersoll, 2006) but was unrelated to changes in attitudes toward gambling in the present study. Previous studies have however found that positive parental monitoring between the ages of 11 and 14 years comprised a protective factor in terms of development of gambling problems between the ages of 16 to 22 years (Lee, Stuart, Ialongo, & Martins, 2014). Taken together, this may suggest that parental monitoring exerts an influence on gambling mainly at lower ages than late adolescence, and is in line with the general notion that parents have less influence on their offspring as they mature.

The results also showed that approval of gambling from family and friends was associated with development of more acceptant attitudes toward gambling during the follow-up period. This suggests that social influence from close others may play a role in changing attitudes toward gambling in late adolescence. This finding corroborates and expands previous knowledge showing that others that are close to the individual may play an important role in terms of gambling behavior and gambling attitudes (Hanss et al., 2014; Orford et al., 2009). However, lifetime gambling participation and lifetime gambling problems of close others were not related to change of attitudes toward gambling from Wave 1 to Wave 2.

An individual's own gambling participation only at Wave 2 and own gambling participation at both Wave 1 and Wave 2 were associated with development of more acceptant attitudes from Wave 1 to Wave 2 compared to not gambled at Wave 1 nor at Wave 2 (which constituted the reference group). This appears to suggest that continuous or increased participation in gambling is related to development of more acceptant attitudes toward gambling. Since the present study is not experimental and includes only two waves, the directionality between gambling attitudes and gambling behavior cannot be discerned. It is possible that behavior change influenced subsequent attitudes, a notion that is in line with both self-perception theory (Bem, 1967) and cognitive dissonance theory (Festinger & Carlsmith, 1959). Another possibility is that attitude formation and attitude change influence later behavior which would be consistent with theories such as the theory of planned behavior (Ajzen, 1991; Fishbein, 2000). Future experimental studies and longitudinal studies with more than two waves are better suited to elucidating the directionality and causality between gambling behavior and gambling attitudes.

Limitations and strengths

All data were self-report which may render the results vulnerable to well-known biases such as social desirability bias (Dodou & de Winter, 2014) and recall bias. Attitudes toward gambling were measured with a general gambling attitude instrument, although some studies have shown that people may have different attitudes toward different types of gambling (Kassinove, 1998; Sutton & Griffiths, 2008). The data were based on two waves, and more waves would allow for more detailed analyses of the attitude–behavior relationship. The behavioral measure of gambling was arguably crude and comprised participation in gambling over the previous 12 months. Another limitation is that the time span between the two waves of data collection was only one year, which may have reduced the potential for change in attitudes toward gambling. The different independent variables added in Step 2 explained only a limited proportion of the variance (i.e., 6.2%), hence several unidentified variables have probably been in play. However, in terms of strengths, it should be noted that the present study to the authors' knowledge, it is the first to assess changes of attitudes toward gambling using a longitudinal design. Furthermore, the sample was large and representative for older adolescents in Norway, most of the instruments used were well validated, and response rates were high.

Implications

In terms of implications, the results of the present study suggest that males develop relatively more acceptant attitudes toward gambling than females during late adolescence, therefore boys at this age may be ideal targets for preventive gambling measures. Approval of gambling by close others was also related to development of more acceptant attitudes toward gambling, consequently, prevention strategies in terms of one's responsibility as role models should receive more empirical attention (Lockwood, Jordan, & Kunda, 2002). Future studies should also address the association between gambling attitudes and gambling behavior and more longitudinal studies are warranted in order to identify factors that can predict changes in attitudes toward gambling over time.

Funding source: Norwegian Research Council (grant no. 175351).

Authors' contribution: Study concept and design (SP, DH, HM, MDG, RAM), analysis and interpretation of data (SP, DH, HM, MDG, RAM), obtaining funding (SP, HM,

RAM), writing and critical revision of the manuscript (SP, DH, HM, MDG, RAM).

Conflicts of interest: The authors declare no conflicts of interest.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179–211.

Arnett, J. (1994). Sensation seeking – A new conceptualization and a new scale. *Personality and Individual Differences, 16*, 289–296.

Bem, D. J. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review, 74*, 183–200.

Breen, R. B., & Zuckerman, M. (1999). 'Chasing' in gambling behavior: Personality and cognitive determinants. *Personality and Individual Differences, 27*, 1097–1111.

Buczkiewicz, M., Griffiths, M. D., & Rigbye, J. (2007). Adolescent attitudes towards gambling: Some preliminary findings. *Education and Health, 25*, 6–9.

Chiu, J., & Storm, L. (2010). Personality, perceived luck and gambling attitudes as predictors of gambling involvement. *Journal of Gambling Studies, 26*, 205–227.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Delfabbro, P., Lambos, C., King, D., & Puglies, S. (2009). Knowledge and beliefs about gambling in Australian secondary school students and their implications for education strategies. *Journal of Gambling Studies, 25*, 523–539.

Delfabbro, P., & Thrupp, L. (2003). The social determinants of youth gambling in South Australian adolescents. *Journal of Adolescence, 26*, 313–330.

Dodou, D., & de Winter, J. C. F. (2014). Social desirability is the same in offline, online, and paper surveys: A meta-analysis. *Computers in Human Behavior, 36*, 487–495.

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The Mini-IPIP scales: Tiny-yet-effective measures of the big five factors of personality. *Psychological Assessment, 18*, 192–203.

Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology, 82*, 804–818.

Eysenck, S. B. G., & Eysenck, H. J. (1977). The place of impulsiveness in a dimensional system of personality descriptions. *British Journal of Social and Clinical Psychology, 16*, 57–68.

Festinger, L., & Carlsmith, J. M. (1959). Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology, 58*, 203–210.

Fishbein, M. (2000). The role of theory in HIV prevention. *AIDS Care, 12*, 273–278.

Francis, L. J. (1996). The relationship between Eysenck's personality factors and attitude towards substance use among 13–15-year-olds. *Personality and Individual Differences, 21*, 633–640.

Griffiths, M. D. (2010). The role of parents in the development of gambling behaviour in adolescents. *Education and Health, 28*, 51–54.

Gupta, R., Nower, L., Derevensky, J. L., Blaszczynski, A., Faregh, N., & Temcheff, C. (2013). Problem gambling in adolescents: An examination of the pathways model. *Journal of Gambling Studies, 29*, 575–588.

Hanss, D., Mentzoni, R. A., Delfabbro, P., Myrseth, H., & Pallesen, S. (2014). Attitudes toward gambling among adolescents. *International Gambling Studies, 14*, 505–519.

Jackson, A. C., Dowling, N., Thomas, S. A., Bond, L., & Patton, G. (2008). Adolescent gambling behavior and attitudes: A prevalence study and correlates in an Australian population. *International Journal of Mental Health and Addiction, 6*, 325–352.

Kassinove, J. I. (1998). Development of the gambling attitude scales: Preliminary findings. *Journal of Clinical Psychology, 54*, 763–771.

Khatapoush, S., & Hallfors, D. (2004). "Sending the wrong message": Did medical marijuana legalization in California change attitudes about and use of marijuana? *Journal of Drug Issues, 34*, 751–770.

Krosnick, J. A., & Alwin, D. F. (1989). Aging and susceptibility to attitude change. *Journal of Personality and Social Psychology, 57*, 416–425.

Lee, G. P., Stuart, E. A., Ialongo, N. S., & Martins, S. S. (2014). Parental monitoring trajectories and gambling among a longitudinal cohort of urban youth. *Addiction, 109*, 977–985.

Lee, H.-S. (2013). Predicting and understanding undergraduate students' intentions to gamble in a casino using an extended model of the theory of reasoned action and the theory of planned behavior. *Journal of Gambling Studies, 29*, 269–288.

Li, X. M., Feigelman, S., & Stanton, B. (2000). Perceived parental monitoring and health risk behaviors among urban low-income African-American children and adolescents. *Journal of Adolescent Health, 27*, 43–48.

Lockwood, P., Jordan, C. H., & Kunda, Z. (2002). Motivation by positive or negative role models: Regulatory focus determines who will best inspire us. *Journal of Personality and Social Psychology, 83*, 854–864.

Magoon, M. E., & Ingersoll, G. M. (2006). Parental modeling, attachment, and supervision as moderators of adolescent gambling. *Journal of Gambling Studies, 22*, 1–22.

McDaniel, S. R., & Zuckerman, M. (2003). The relationship of impulsive sensation seeking and gender to interest and participation in gambling activities. *Personality and Individual Differences, 35*, 1385–1400.

Moore, S. M., & Ohtsuka, K. (1997). Gambling activities of young Australians: Developing a model of behaviour. *Journal of Gambling Studies, 13*, 207–236.

Nowak, D. E., & Aloe, A. M. (2014). The prevalence of pathological gambling among college students: A meta-analytic synthesis, 2005–2013. *Journal of Gambling Studies, 30*, 819–843.

Orford, J., Griffiths, M., Wardle, H., Sproston, K., & Erens, B. (2009). Negative public attitudes toward gambling: Findings from the 2007 British Gambling Prevalence Survey using a new attitude scale. *International Gambling Studies, 9*, 39–54.

Sutton, R., & Griffiths, M. D. (2008). The Casino Attitudes Scale: The development of a new brief psychometric instrument. *International Journal of Mental Health and Addiction, 6*, 244–248.

Taormina, R. J. (2009). Social and personality correlates of gambling attitudes and behavior among Chinese residents of

Macau. *Journal of Social and Personal Relationships, 26*, 1047–1071.

Volberg, R., Gupta, R., Griffiths, M. D., Olason, D., & Delfabbro, P. H. (2010). An international perspective on youth gambling prevalence studies. *International Journal of Adolescent Medicine and Health, 22*, 3–38.

Vong, F. (2009). Changes in residents' gambling attitudes and perceived impacts at the fifth anniversary of Macao's gaming deregulation. *Journal of Travel Research, 47*, 388–397.

Williams, R. J., Connolly, D., Wood, R. T., & Nowatzki, N. (2006). Gambling and problem gambling in a sample of university students. *Journal of Gambling Issues, 16*, 1–14.

Wood, R. T. A., & Griffiths, M. D. (1998). The acquisition, development and maintenance of lottery and scratchcard gambling in adolescence. *Journal of Adolescence, 21*, 265–273.

Wood, R. T. A., & Griffiths, M. D. (2004). Adolescent lottery and scratchcard players: Do their attitudes influence their gambling behaviour? *Journal of Adolescence, 27*, 467–475.