



The association between at-risk gambling and binge drinking in the general Swedish population



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ABSTRACT

While the association between problem gambling and alcohol use disorders has been studied previously, little is known about the association between risk gambling and risk drinking. This study aimed at examining the association between at-risk gambling and binge drinking in the general Swedish population and to test whether this association remained after controlling for demographic factors. The data was part of a larger ongoing survey in the general Swedish population. Respondents (N = 19 530) were recruited through random digit dialing and interviewed about their alcohol habits (binge drinking), at-risk gambling (the Lie/Bet questionnaire) and demographics (gender, age, education, residence size, marital status, labor market status, country of origin and smoking). There was an association between lifetime at-risk gambling and current (12 months) weekly binge drinking for both men (OR = 1.73; CI 95%: 1.27–2.35) and women (OR = 2.27; CI 95%: 1.05–4.90). After controlling for demographics this association no longer remained significant (OR = 1.38; CI 95%: .99–1.90 for men and OR = 1.99; CI 95%: .94–4.66 for women). Age and smoking had the largest impact on this association. At-risk gambling and binge drinking are associated behaviors. However, it seems as if this association may be confounded by demographic variables. We hypothesize that similarities in personality profiles and health aspects could account for an additional part of the association.

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1. Introduction

Excessive gambling and drinking can yield severe consequences affecting individuals, their families and society. Gambling disorder (GD) and Alcohol Use Disorders (AUD) are commonly described as two separate syndromes (American Psychiatric Association, 2013).

Shaffer et al. (2004), however, suggest an addiction syndrome with common etiology underlying both substance and behavioral addictions. Both GD and AUD share common diagnostic features, such as for instance increased tolerance and withdrawal. Further, meta-analyses show that individuals with GD and individuals with Substance Use Disorders (SUD) seem to have a similar personality profile characterized by high neuroticism, disinhibition and disagreeableness, (Kotov, Gamez, Schmidt, & Watson, 2010; Maclaren, Fugelsang, Harrigan, & Dixon, 2011). The prevalence of other psychiatric disorders, such as depression, anxiety and personality disorders, has shown to be significantly higher in individuals with both GD and AUD, than in individuals with GD only (Abdollahnejad, Delfabbro, & Denson, 2014). In addition, demographic factors such as age, gender, marital status, residential size,

ethnicity, education, income and employment are associated with both gambling and drinking (Johansson, Grant, Kim, Odlaug, & Götestam, 2009; Marsh & Dale, 2005; Matzger, Delucchi, Weisner, & Ammon, 2004; Nalpas et al., 2011; Swendsen et al., 2009). However, there seem to be gender differences and some studies have not confirmed an association between problematic gambling and drinking among females (Griffiths, Wardle, Orford, Sproston, & Erens, 2010; Huang, Jacobs, & Derevensky, 2011).

The behaviors also seem to have a direct impact on each other. Among non-pathological gamblers, about 80% reported consuming four to ten drinks of alcohol during their last episode of gambling on electronic gaming machines (Baron & Dickerson, 1999). Further, alcohol consumption paired with gambling has shown to result in larger bets and greater and more rapid losses (Cronce & Corbin, 2010; Giacomassi, Stitt, & Vandiver, 1998). In addition, hazardous drinking has been found to be one of the strongest predictors of problem gambling stability (Abbott, Williams, & Volberg, 2004).

A complication in this research field is the many terms defining excessive gambling and drinking. The two diagnoses alcohol abuse and alcohol dependence are integrated into Alcohol Use Disorders (AUD), ranging from mild to severe (DSM-IV-TR; American Psychiatric Association, 2000; DSM-5; American Psychiatric Association, 2013). There is no general consensus on a definition of risk drinking, but at-

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risk drinking (or hazardous drinking) is sometimes referred to as drinking more than 14 standard drinks per week for men, or more than seven for females, and binge drinking as drinking five drinks or more in a row for males and four or more for females (National Institute on Alcohol Abuse and Alcoholism, 2005). Binge drinking has been associated with injuries, car accidents, unsafe sexual activity, falls, assaults and overall poor neuropsychological functioning (Fillmore & Jude, 2011). In addition, binge drinkers have an elevated risk for developing AUD. The term pathological gambling has been replaced with Gambling Disorder (DSM-IV-TR; American Psychiatric Association, 2000; DSM-5; American Psychiatric Association, 2013). Studies suggest that the changes in the DSM yields a higher prevalence of GD compared to pathological gambling (Rennert et al., 2014), but will only have a minimal impact on SUD prevalence (Peer et al., 2013). The broader term problem gambling is often used to also include individuals that do not fill the criteria for a diagnosis but still suffer significant consequences of their gambling (Blaszczynski & Nower, 2002; Williams & Volberg, 2014). Further the term at-risk gambling is a behavior that may lead to more severe consequences – a gambler being at-risk for developing gambling problems. Often it is defined by a gambler experiencing one or two negative consequences of their gambling (Problem Gambling Research and Treatment Centre, 2011). At-risk gamblers have been found to experience higher distress level, more family problems from their gambling and higher levels of alcohol dependence than have non-problem gamblers (Marshall & Wynne, 2004).

Research on the association between problem/pathological gambling and AUD have reported large variation estimates across studies. Meta-analyses found prevalence rates ranging from 19–29% for problem gambling among treatment seeking patients with AUD and 9–73% for AUD among problem gamblers in community based samples, respectively (Cowlshaw, Merkouris, Chapman, & Radermacher, 2014; Lorains, Cowlshaw, & Thomas, 2011). Another study found a stronger association between pathological gambling and AUD in groups with higher socioeconomic status (Welte, Barnes, Wiczorek, Tidwell, & Parker, 2001). However, for milder problems such as problem gambling (rather than pathological gambling) and alcohol abuse (rather than dependence), the association no longer remained statistically significant when controlling for socio-demographic variables (Kessler et al., 2008; Park et al., 2010; Petry, Stinson, & Grant, 2005). Studies have found gender, education and race/ethnicity to have an impact on this association (Elia & Jacobs, 1993; Rennert et al., 2014; Toneatto & Brennan, 2002).

Even though the association between AUD and problem gambling has been studied before, very few studies have examined the association between risk gambling and risk drinking. A study examining SUD in treatment seeking problem gamblers found a prevalence rate of 16.5% for risky or harmful alcohol use (Smith et al., 2010) and Bischof et al. (2013) found that 44% of at-risk gamblers also filled the criteria for AUD. Adolescent problem gamblers were significantly more likely to binge drink than non-problem gamblers, but also non-problem gamblers had a higher risk of weekly binge drinking than individuals who did not gamble at all (Walker, Clark, & Folk, 2010). In Sweden, nearly 55% of problem gamblers had risky drinking habits, whereas 13% with risky alcohol habits were also at-risk gamblers (Swedish National Institute of Public Health, 2010).

Even though risk behaviors affect a substantially larger group than diagnostic conditions (e.g. AUD and GD), studies on the association between at-risk gambling and risk drinking are sparse. To our knowledge and our surprise, we found no published study examining the association between at-risk gambling and risk drinking. Furthermore, the influence of demographics is overlooked at times. Therefore, this study aimed at examining the association between at-risk gambling and binge drinking in the general Swedish population, controlling for relevant demographic variables.

The aim of this study was to examine the association between lifetime at-risk gambling and current (12 months) binge drinking in the

general Swedish population and to test whether this association remained after controlling for confounding variables.

2. Methods

2.1. Participants

This cross-sectional study is part of the larger, ongoing so called Monitoring project (Ramstedt, Lindell, & Raninen, 2013). The Monitoring project aims at estimating alcohol- and tobacco use in the Swedish population and the data is used as a basis for the official alcohol statistics in Sweden. The sampling, through random-digit dialing, and interviewing, carried out using Computer Aided Telephone Interviews (CATI), are conducted by a commercial company (Ipsos) specialized in performing telephone interviews (Raninen, Leifman, & Ramstedt, 2013). The Monitoring project has been evaluated by an independent expert group who concluded that the methods of the project were satisfying (Ramstedt, Sohlberg, Engdahl, & Svensson, 2009). The Monitoring project has been previously described (Leifman & Trollidal, 2013; Ramstedt et al., 2013; Ramstedt, 2010; Raninen et al., 2013) and will only be summarized here. Every month 1500 randomly assigned respondents answer questions about their alcohol and tobacco habits. Multiple (30) contact attempts are made before it is coded as a non-response (Ramstedt, 2010). From April 2012 until May 2013, all participants were also screened for at-risk gambling. Accordingly, this represents the time frame for the database to the present study.

The participants consisted of 19,530 randomly selected, nationally representative Swedish residents. Out of the 19,530, 54% were female and 46% male. They were between 16–82 years old with a mean age of 50. In total, 40% had a university education, 67% were married or cohabiting and 92% were born in Sweden. In total, 3.1% reported lifetime at-risk gambling and 4.4% current weekly binge drinking.

The monthly non-response is about 60% during the study period. A respondent not being reached or declining participation is replaced, so that 1500 individuals are interviewed every month. A previous study of 2500 non-responders that were re-contacted a year later, found no significant differences in alcohol habits between those and responders answering at the first occasion (Wennberg, Svensson, & Ramstedt, 2011). Though, the proportion of abstainers was significantly higher among the initial non-responders.

2.2. Measures

Respondents were screened for at-risk gambling using the Lie/Bet questionnaire (Johnson et al., 1997). Respondents reporting that they had, 1. lied to people important to them about how much they gambled and/or 2. felt the need to bet more and more money, were classified as lifetime at-risk gamblers. A previous study conclude that the Lie/Bet screening showed both high sensitivity (.92) and specificity (.96) for screening problem and pathological gamblers in a community sample (Götestam, Johansson, Wenzel, & Simonsen, 2004). The respondents screening positive on one of the Lie/Bet questions, and accepting to participate in an upcoming study, were sent a postal survey (Sundqvist & Wennberg, 2014) including the short version of the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS). The short version NODS-PERC, consists of four of the originally 17 questions (Vollberg, Abbott, Rönnerberg, & Munck, 2001). The authors found the combination of the four questions about Preoccupation, Escape, Risked relationships and Chasing (PERC) to best predict problem gambling. A majority of the respondents were not classified as problem or pathological gamblers according to the PERC and hence, at-risk gambling seems as an accurate definition of this group.

To screen for binge drinking the respondents were asked: *During the last 12 months, how often did you at the same occasion drink alcohol equivalent to at least a bottle of wine (75 cl), or 5 glasses of strong spirits (25 cl), or 4 cans of strong beer or strong cider (>3.5 percentage per volume), or 6*

cans of medium strong beer (3.5 percentage per volume). Also consider all the occasions when you combined different types of alcohol and try to report how often you drunk an equivalent amount. The response categories were a gradient ranging from 'more or less every day', '4–5 times a week', '2–3 times a week', 'once a week', 'about 2–3 times', a few times, 'about once' to 'never'.

Individuals reporting consuming alcohol equivalent to at least one bottle of wine, 25 cl of spirits or for cans of beer per occasion every week or more often during the past 12 months were classified as current weekly binge drinkers.

Further, respondents were also asked about their marital status, smoking habits, monthly income, educational level, contemporary occupation, city of residence and if they were born in or outside Sweden. Residential size was divided into large (The three largest cities in Sweden; Stockholm, Gothenburg and Malmö), medium (>100,000 residents within 100 km) or small (<100,000 residents within 100 km). Occupational status was categorized into employed/retired/other, student or unemployed. Marital status was categorized into living together with someone as a partner or not. Smoking habits was categorized into daily smoking or not, educational level into completed university or not and an income less than 10,000 SEK/month (about 1200 USD or 1080 EUR).

2.3. Data analyses

Demographics variables known in previous research (Johansson et al., 2009; Marsh & Dale, 2005; Matzger et al., 2004; Nalpas et al., 2011; Swendsen et al., 2009) to predict or to be likely to predict GD and AUD, and admitted for in the Monitoring project, were chosen as confounding variables in the analyses (gender, age, education, residence size, marital status, occupational status, country of origin and smoking). Even though smoking is not a demographic variable it is a behavior that is highly comorbid with both problem gambling and excessive drinking (Harrison, Desai, & McKee, 2008; McGrath & Barrett, 2009) and was therefore chosen to be included as a potential confounder. All variables are defined as demographics in order to

simplify. The variable "income" was excluded due to high number of missing cases.

To check for multicollinearity, Variance Inflation Factors (VIF) were calculated through linear Regression where all variables were included. All VIF-scores were between 1.01 and 1.06 and multicollinearity is therefore not likely to be a problem. To examine the association between lifetime at-risk gambling and current weekly binge drinking (12 months), multiple logistic regression models were computed. Model 1 was unadjusted since we were interested in the overall association. Model 2 was adjusted for age since younger are known to both gamble and drink to a greater extent. Model 3 was adjusted for age and smoking. Since smoking is not a demographic variable per se, we think it is interesting to see the impact of this factor. Finally a Full Model adjusted for all demographic variables was calculated. The analyses were stratified on gender, but not on age since that yielded too few cases in some cells. Data were analyzed using SPSS version 22.

3. Results

3.1. Demographic characteristics

Differences between lifetime at-risk gamblers and non-risk gamblers are described in Table 1. Male at-risk gamblers were to a higher extent (then male non-risk gamblers) characterized by young age, daily smoking, living alone, lower education, being born outside of Sweden, living in a big city and not carrying an employment. For women, the pattern was similar, but there were smaller differences between the groups regarding age and residential size. Among women, nearly twice as many at-risk gamblers as non-risk gamblers were unemployed.

3.2. The association between at-risk gambling and binge drinking

Table 2 presents the association between lifetime at-risk gambling and current weekly binge drinking (12 months) separated on gender. Model 1 shows the unadjusted estimates while model 2 shows estimates adjusted only for age. In model 3 the estimates are adjusted for

Table 1

Demographic characteristics by lifetime at-risk gambling among a representative adult population. N = 19,530.

Demographic characteristics	Men (n = 9015)		Women (n = 10,515)	
	At-risk gambling n = 427	Not at-risk gambling n = 8588	At-risk gambling n = 180	Not at-risk gambling n = 10,335
Age (M, SD)	41.8 (18.1)	50.1 (17.7)	48.6 (17.9)	51.9 (17.5)
Smoking habits (%)				
Daily smoker	16.4	7.1	14.4	9.5
Non daily smoker	83.6	92.9	85.6	90.5
Missing (n)	0	8	0	3
Marital status (%)				
Living without partner	38.9	30.2	37.8	34.7
Living with partner	61.1	69.8	62.2	65.3
Missing (n)	0	5	0	6
Educational level (%)				
No university	71.3	64.6	59.2	55.7
University	28.7	35.4	40.8	44.3
Missing (n)	2	42	1	53
Place of origin (%)				
Born outside Sweden	10.3	7.1	12.8	8.7
Born in Sweden	89.7	92.9	87.2	91.3
Missing (n)	1	23	1	15
Residential size (%)				
Big city	40.0	31.5	33.9	33.4
Middle size city	50.6	57.5	53.9	55.5
Small size city	9.4	11.0	12.2	11.0
Missing (n)	0	1	0	2
Labor market status (%)				
Unemployed	3.8	2.7	4.5	2.3
Student	12.0	7.8	11.2	7.6
Employed, retired, other	84.2	89.5	84.3	90.1
Missing (n)	2	15	1	33

both age and smoking. Finally, in model 4 (Full Model), the estimates are adjusted for all demographic variables as well as for smoking.

Lifetime at-risk gamblers had more frequently been binge drinking during the last 12 months (11.8% for men and 3.9% for women) than non-risk gamblers (7.2% for men and 1.8% for women), (OR = 1.73; CI 95%: 1.27–2.35 for men and OR = 2.27; CI 95%: 1.05–4.90 for women). After adjusting for age (model 2), this association remained statistically significant, though weakened, for men (OR = 1.53; CI 95%: 1.11–2.09). For women the association was no longer statistically significant (OR = 2.15; CI 95%: .98–4.72). The association weakened further after adjusting for age and smoking (model 3). When adjusting for all variables included in model 4 (Full model), the association between lifetime at-risk gambling and current weekly binge drinking no longer remained statistically significant, neither for men (OR = 1.38; CI 95%: .99–1.90), nor for women (OR = 2.10; CI 95%: .94–4.66). Age and being a daily smoker had the largest impact on the association for both men and women. For men there is basically no difference in the estimate and only marginally in the confidence interval after the adjustment in the full model. For women on the other hand, there seems to be a small negative confounding as a result for the adjustment in the full model.

In conclusion, lifetime at-risk gamblers had a substantially higher risk for weekly binge drinking during the last year. However, this only held true when not controlling for confounding variables, mainly age and smoking.

4. Discussion

Our results indicate that individuals with lifetime at-risk gambling have substantially higher likelihood of current weekly binge drinking than individuals with no at-risk gambling. In the group of at-risk gamblers 11.8% of men and 3.9% of women were binge drinking every week. However, this association no longer remained statistically significant after controlling for relevant confounding variables. Age and smoking had the greatest impact on the association between at-risk gambling and binge drinking.

In prior research, an association has been found between GD and AUD, as well as between problem gambling and alcohol abuse (Cowlshaw et al., 2014; Lorains et al., 2011). To a great extent, the latter seems to be due to socio-demographic similarities (Kessler et al., 2008; Park et al., 2010; Petry et al., 2005). This is in line with what was found in this study on risk behaviors in the general population. It is possible that other common risk factors for excessive gambling and drinking, such as shared personality profiles and health aspects (Johansson et al., 2009; Marsh & Dale, 2005; Sundqvist & Wennberg, 2014), could be an additional explanation for the association between the behaviors. If this is true it would mean that the association could be mainly due to shared characteristics rather than a causal link between the behaviors. That would be in line with the theory of an addiction syndrome (Shaffer et al., 2004). This model suggests addiction being a unitary

disorder with a variety of expressions. Our results indicate that the same line of thinking could be applied on a sub-clinical level, including at-risk gambling and binge drinking.

As described in the introduction, the heterogeneity in prevalence ratings for co-occurring GD and AUD is large across studies. Prevalence rates range from 9–73% for AUD among problem gamblers (Lorains et al., 2011) and 19–29% for problem gambling among AUD (Cowlshaw et al., 2014). Part of this could be explained by different sample characteristics. For example, a sample characterized by younger, smoking males with a lower socio-demographic status and living in a big city would yield a higher co-occurrence than a sample with non-smoking, highly educated women.

A limitation in the study is the large proportion of non-responders. A study within this project found no significant differences in alcohol habits between 2500 non-responders re-contacted a year later compared to responders answering at the first occasion, (Wennberg et al., 2011). Nevertheless, a group of “hard” non-responders (not responding despite extensive effort) remain unstudied. We believe that this group includes a higher proportion with both excessive gambling and drinking, and consequently that we underestimate the prevalence. Studies on non-responders have found an underestimation on risk behaviors, but also non-responders to be younger, male and with lower socio-economic status (MacLennan, Kypri, Langley, & Room, 2012; Meiklejohn, Connor, & Kypri, 2012). If this holds true in this study, this could mean that the association between at-risk gambling and binge drinking might not be significantly different if non-responders were included. Another limitation is the use of only two questions for screening at-risk gamblers. It is likely that the use of more items would have yielded a higher proportion of at-risk gamblers or even some problematic gamblers. Further, the study design did not admit to also include personality profiles and psychiatric comorbidity, variables that probably would have an additional impact on the association between at-risk gambling and binge drinking. However, a major strength of the study is the recruitment of a large nationally representative sample from the general population, as well as and the focus on risk behaviors. This is warranted as a complement to studies focusing on problematic/disordered behaviors in a clinical or student setting. An alternative approach of studying the association between excessive gambling and drinking could be to explore different prevalence rates for different demographic profiles. A study including both personality profiles, health factors (e.g. comorbidity) and demographic factors could further help understand the association between gambling and drinking behaviors on different problem levels.

In conclusion, the association between at-risk gambling and binge drinking did not maintain significant when controlling for common demographics influencing the association. We hypothesize that personality profiles and health aspects are other important confounders, explaining an additional part of the association between excessive gambling and drinking. If this holds true, a psychosocial profile associated with at-risk gambling, rather than at-risk gambling per se, is associated with an increased risk of binge drinking.

Table 2

The association between lifetime at-risk gambling and past year binge drinking measured as odds ratios (OR) with corresponding 95% confidence intervals (CI 95%). N = 19,530.

	Model 1 OR	CI 95%	Model 2 OR	CI 95%	Model 3 OR	CI 95%	Model 4 OR	CI 95%
Men n = 9015								
Risk gambling	1.73**	1.27–2.35	1.53**	1.11–2.09	1.38*	1.01–1.91	1.38	0.99–1.90
Women n = 10,515								
Risk gambling	2.27**	1.05–4.90	2.15	.98–4.72	1.99	.90–4.40	2.10	.94–4.66

Model 1: Unadjusted.

Model 2: Adjusted for age.

Model 3: Adjusted for age and smoking.

Model 4: Adjusted for age, smoking, marital status, residential size, educational level, labor market status and place of origin.

* $p < .05$.

** $p < .01$.

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K.S. and P.W. designed the study and wrote the protocol. K.S. conducted literature researches and provided summaries of previous research studies. K.S. conducted the statistical analysis. I.R. contributed with statistical and epidemiological advising. K.S. wrote the first draft of the manuscript and all three authors contributed to and have approved the final manuscript.

All three authors declare no conflicts of interest.

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