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## THE ROLE OF SOCIAL NORMS IN THE STRUCTURAL MODEL EXPLAINING ALCOHOL USE AMONG STUDENTS

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Few studies have explored the complex relationships among several factors determining alcohol use or explained how norms operate in the relationships between alcohol use and other psychological constructs. This study aims to explore the complex relationships in the proposed model explaining students' alcohol use with special emphasis on descriptive and injunctive norms. Cross-sectional data were collected from 719 university students (59.0% females;  $M_{age} = 21.25$ ;  $SD = 1.99$ ), who were asked to fill in a set of AUDIT items, cognitive and affective attitudes, descriptive and injunctive norms, self-regulation, self-determination, drinking motives, and alcohol expectancies. Structural equation modelling was used for data analysis. It was found that (1) self-regulation was neither directly nor indirectly associated with alcohol use; (2) self-determination was indirectly associated with alcohol use through injunctive norms, attitudes and drinking motives; (3) descriptive norms were associated with alcohol use directly; (4) injunctive norms were associated with alcohol use directly as well as indirectly via alcohol expectancies, attitudes and drinking motives; (5) alcohol expectancies were associated with alcohol use directly. In addition to identifying individual associations among variables, this study also explains which factors contribute to students' alcohol use and norms and how these factors interact, which can be useful for the development of prevention programmes.

Keywords: structural model, alcohol use, descriptive and injunctive norms, factors of alcohol use, university students

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## INTRODUCTION

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Alcohol use (AU) is a serious public health problem, reaching the highest prevalence among university students (e.g. Stone, Becker, Huber, & Catalano, 2012; Menagi, Harrell, & June, 2008), who typically engage in a specific pattern of AU that is called binge (or hazardous) drinking (Dowdall & Wechsler, 2002). The factors that contribute to AU need exploring because as many as about 66% of Slovak university students have reported to have engaged in binge drinking – the consumption of 5 or more drinks per occasion (Šebeňa, Mikolajczyk, & Orosová, 2009). In this study, descriptive and injunctive norms are considered to be the key factors of AU as they belong to the most commonly used factors in prevention and intervention programmes (e.g. Collins, Carey, & Sliwinski, 2002; LaBrie, Hummer, Grant, & Lac, 2010).

Descriptive and injunctive norms are based on the concept of social norms with emphasis put on individuals' perspectives. Descriptive and injunctive norms reveal how individuals perceive social norms and how they are regulated by such norms (Lovaš, 1998a). We will apply the Norm Focus theory (Cialdini et al., 1999 in Cialdini, 2007), which distinguishes injunctive (how acceptable a particular behaviour is) and descriptive (the prevalence of that particular behaviour) norms (Dams-O'Connor, 2007; Rimal & Real, 2003). Numerous studies have shown that university students tend to overestimate the prevalence and acceptance of AU (e.g. Abar & Maggs, 2010; Moreira, Smith, & Foxcroft, 2010), which leads to an increase in university students' AU (Borsari & Carey, 2003; Berkowitz, 2004). The studies published so far usually focus only on a single factor determining AU (e.g. social norms; Neighbors et al., 2008; Rimal & Real, 2003; Lewis et al., 2010). In contrast, the present study seeks to point out that descriptive and injunctive norms are not the only important factor of AU. It is necessary to understand the whole process of contextual causation and influence. It is important to identify processes by which descriptive and injunctive norms influence AU among university students and to explore AU as a complex model. Such findings can be instrumental in designing more effective prevention and intervention programmes. Although many programmes have been developed, only some of them are effective – a fact that can be attributed to stereotypical applications of the approach devoted to making descriptive and injunctive norms more real without understanding how they function in context with a whole range of other key factors determining AU.

In this study, a significant role is attributed to self-regulation and self-determination in the whole process. In addition to being important with respect to carrying out different behaviours such as AU through behavioural regulation, self-regulation and social norms also constitute crucial factors for

behaviour modification. Social norms can be external (social, group-specific) or internal (internalised social requirements) factors determining the regulation of behaviour (Ölander & Thøgersen, 1995). Furthermore, the definition of norms also confirmed the association between self-regulation and norms: social norms are defined as the sum of personal regulatory beliefs about the appropriateness of social behaviour (Huesmann & Guerra, 1997). Other authors also show that norms regulate individuals, i.e. what is reflected in their behavioural tendencies (Lovaš, 1998a), the main function of norms being the regulation of people's behaviour and thinking (Lovaš, 1998b). Furthermore, Abraham, Sheeran, and Johnston (1998) claim that social norms represent behavioural standards, which occurs during each process of self-regulation. Norms are an essential part of each and every step along the self-regulation pathway that manifests itself through actions and goal achievement. Studies have generally shown that self-regulation has an indirect impact on AU through social norms (Gailliot, Gitter, Baker, & Baumeister, 2012; Bagozzi, 1992). Corroborated by the theoretical link described above, this finding is crucial also to the present study.

The concept of self-determination is based on Self-Determination Theory (SDT; Deci & Ryan, 2008; Deci, 1992). In line with this, we hypothesize that controlled behaviour, characterised by influences from the social environment, is associated with social norms concerning the prevalence and acceptance of AU, which subsequently leads to AU among university students. In SDT, social norms represent a certain form of extrinsic motivation (regulation of behaviour). This hypothesis has been empirically tested and partially confirmed by Hagger et al. (2012), who show that social norms are intermediaries between external regulation and intentions towards AU. This association was also expected in our model of AU. This expectation is further supported by the fact that individuals who demonstrate a controlled (or extrinsic) motivation have a tendency to comply with real or imagined pressures or social norms when making decisions about their future behaviour. Individuals who demonstrate an autonomous (or integrated) motivation guide their behaviour by their own self, their behaviour thus being more self-determined and not subject to external contexts and social pressures (Dams-O'Connor, 2007; Deci & Ryan, 2008). Consequently, self-determination can be an important protective factor against the influence of social pressure (also incorrect overestimated social norms).

It can be summarised that, based on the facts and findings referred to above, we assumed there was an association between descriptive/injunctive norms and AU, and expected that self-regulation and self-determination were in the back-

ground of this association. To look at AU more comprehensively, however, we need to focus on additional factors determining AU, which we assume to be crucial in the relationship between social norms and AU based on existing research. For the sake of brevity, let us mention that the AU model proposed herein is based on the following factor definitions key research findings. The factors include: (1) *attitudes toward AU* (global positive or negative evaluations of behaviour performance; Zimmermann & Sieverding, 2010; Hagger et al., 2012), where an indirect impact of social norms on AU through attitudes was found (Kam, Matsunaga, Hecht, & Ndiaye, 2009); (2) *drinking motives* (motivation for AU; LaBrie, Hummer, Pedersen, Lac, & Chithambo, 2012), which belong to the most proximal factors of AU (Kuntsche & Kuntsche, 2009; Martens, Rocha, Martin, & Serrao, 2008); (3) *alcohol expectancies* (the expected physiological, psychological, behavioural, cognitive and emotional effects of AU; William, Stoner, Norris, Lopez, & Lehman, 2000), which have been addressed by many studies showing that (a) drinking motives are intermediaries between alcohol expectancies and AU (Kuntsche, Knibbe, Engels, & Gmel, 2007; Read, Wood, Kahler, Maddock, & Palfai, 2003); (b) alcohol expectancies determine individuals' attitudes towards AU (Abraham, Sheeran & Johnston, 1998); (c) alcohol expectancies are intermediaries between social norms and AU (Wood, Read, Palfai, & Stevenson, 2001; Merrill, Read, & Colder, 2013).

The theoretical background mentioned above addresses many factors of AU. The aim of this study is to explore the complex relationships in the proposed model of AU. This model was prepared based on partial research findings reported by other authors (the relationship between social norms, AU and one other factor), as well as statistical analysis of Brutovská (2015). The considerations are also based on the theory of triadic influence (Flay & Petraitis, 2006), which describes three types of influences contributing to AU. There are also between-stream influences, which are characterised by interactions. The theory of triadic influence has been tested in an intervention programme which showed that the components targeting peer social influence (social norms of prevalence estimates; friends' use; perceived friends' encouragement to use; and attitudes) were effective components of the preventive interventions to reduce AU (Liu & Flay, 2009). Selected associations from theoretical and research studies were subsequently plotted and a complex model of AU was developed. The following research questions were formulated:

1. Does the proposed model fit the data?
2. What direct associations are indicated by the proposed model of AU?

3. What indirect associations are indicated by the proposed model of AU?
4. How do the mentioned variables manifest themselves in relation to AU?

## OBJECTIVE OF THE STUDY

The study aims to explore the complex relationships in the proposed model explaining university students' AU on the basis of several variables (self-regulation, self-determination, attitudes towards AU, alcohol expectancies, and drinking motives) with special emphasis on injunctive and descriptive norms.

## METHODS

### Study sample and procedure

Fifty-three university lecturers (the list of lecturers is available on the official websites of the relevant universities) were asked to participate in the data collection process, but only 14 of them responded (the response rate being 26.42%). Based on individual agreements, the lecturers' students were contacted face to face. All students agreed to participation.

Data were collected using online paper-pencil questionnaires from October to December 2014. 719 Slovak university students participated in the study. The students whose questionnaires lacked more than 40% of the required data were excluded from the database (3.06% of all respondents). The final sample consisted of 697 university students ( $M_{age} = 21.28$ ;  $SD = 1.93$ ; 60.1% females) from different universities (43.5% P. J. Šafárik University in Košice; 29.4% Technical University of Košice; 23.8% Prešov University; 3.3% other universities).

## Measures

Variable	AU
No of ways of measuring	1
Measure	AUDIT (Babor, Eiddle, Saunders, & Monteiro, 2001)
Subscales/factors (M/SD)	2 subscales (Doyle, Donovan, & Kivlahan, 2007): a) the frequency of AU (4.23/2.56); b) alcohol-related consequences (3.04/3.81)
Number of items	10
Examples of the items and response scale used	"How often do you have 6 or more standard drinks on one occasion?" with 5 possible answers from "never" (0) to "daily or almost daily" (4). Items 1-8 use a similar 5-point scale. Items 9-10 (e.g. "Have you or someone else been injured because of your drinking?") use a 3-point scale from "no" (0) to "yes, over the last year" (4).
Description	An alcohol screening test for the early detection of risky or high-risk drinking; A higher total score represented more frequent AU and more alcohol-related consequences
Cronbach's alpha	0.75 for the frequency of AU; 0.71 for alcohol-related consequences

(Continued)

Variable	Attitudes towards AU
No of ways of measuring	2
Measure	Cognitive attitudes (Helmer et al., 2014)
Subscales/factors (M/SD)	None (2.08/1.02)
Number of items	2
Examples of the items and response scale used	"Which of the following best describes your attitude to using alcoholic beverages?" with 5 possible answers from negative (1) to positive (5) attitude.
Description	A higher total score represented more positive cognitive attitudes towards AU.
Cronbach's alpha	0.57
Measure	SAADA-II (Basu, Malhotra, Varma, & Malhotra, 1998)
Subscales/factors (M/SD)	1 factor found in the sample of Slovak university students (Brutovská, 2015) (55.39/10.22)
Number of items	16
Examples of the items and response scale used	"When it comes to parties, weddings, and other similar ceremonies, drinking should be allowed."; A 5-point response scale from "full agreement" (1) to "full disagreement" (5).
Description	A higher total score represented more positive affective attitudes towards AU.
Cronbach's alpha	0.83
Variable	Descriptive norms
No of ways of measuring	Several (different authors use different measures)
Measure	Consistent with AUDIT items (McAlaney & McMahon, 2007; Core Institute, 2008)
Subscales/factors (M/SD)	2 subscales (similarly to the subscales of AUDIT): a) typical male/female students' frequency of AU (male: 6.87/2.18; female: 5.35/2.19); b) typical male/female students' alcohol-related consequences (male: 11.20/5.40; female: 9.06/5.31)
Number of items	10
Examples of the items and response scale used	"How often do you think a typical student at your university has 6 or more drinks on one occasion?" with 5 possible answers from "never" (0) to "daily or almost daily" (4). Items 1-8 use a similar 5-point scale. Items 9-10 (e.g. "Do you think a typical student or someone else has been injured because of his/her drinking?") use a 3-point scale from "no" (0) to "yes, over the last year" (4).
Description	The questions asked about typical students' (both males and females, separately) AU; A higher total score represented descriptive norms about typical students' more frequent AU and more alcohol-related consequences.
Cronbach's alpha	0.56/0.66 for a typical male/female student's frequency of AU and 0.74/0.76 for a typical male/female student's alcohol-related consequences
Measure	General descriptive norms (Crowford & Novak, 2010)
Subscales/factors (M/SD)	None (6.11/1.91)
Number of items	2
Examples of the items and response scale used	"Slovak university students drink more than students in other countries."; the response scale represents the extent of agreement from "fully disagree" (1) to "fully agree" (5).
Description	A higher total score represented a higher level of general descriptive norms.
Cronbach's alpha	0.53

(Continued)

Measure	Descriptive normative estimates (Elek, Miller-Day, & Hecht, 2006)
Subscales/factors (M/SD)	None (9.09/1.93)
Number of items	3
Examples of the items and response scale used	"How many students at your university drink 5-6 drinks on one occasion during the day when they are drinking?" with a scale from 1 "almost nobody" to 4 "the majority".
Description	A higher total score represented a higher level of descriptive normative estimates about the number of university students who use alcohol.
Cronbach's alpha	0.66
Variable	Injunctive norms
No of ways of measuring	Several (due to the existence of different reference groups)
Measure	Consistently with items measuring cognitive attitudes towards AU (Bewick et al., 2010)
Subscales/factors (M/SD)	None (3.00/1.67)
Number of items	2
Examples of the items and response scale used	"Which of the following statements do you think predict the best opinion for a majority of the students at your university towards AU?" with 5 possible answers ranging from <i>negative</i> (1) to <i>positive</i> (5) attitudes expressed by a majority of students.
Description	A higher total score represented students' injunctive norms about more positive attitudes toward AU manifested by a majority of university students.
Cronbach's alpha	0.80
Measure	General injunctive norms (Crowford & Novak, 2010)
Subscales/factors (M/SD)	None (5.21/1.43)
Number of items	2
Examples of the items and response scale used	"Most of the students at our university think that it is OK to get drunk on different occasions." on a scale from "fully disagree" (1) to "fully agree" (5).
Description	A higher total score represented a higher AU acceptance rate at universities.
Cronbach's alpha	0.51
Measure	Parental and peer injunctive norms (Elek et al., 2006)
Subscales/factors (M/SD)	2 subscales: a) parental norms (5.79/2.41); b) peer norms (8.88/2.40)
Number of items	6
Examples of the items and response scale used	"How angry would the parent(s) of a university student be if they found out that he/she drinks 5-6 drinks on one occasion on a typical day of drinking?"; a response scale from "very angry" (1) to "not angry" (4).
Description	A higher score represented peer injunctive norms about more friendly behaviour/parental injunctive norms about more non-angry behaviour with regard to individuals using alcohol.
Cronbach's alpha	0.81 for parental and 0.86 for peer injunctive norms
Variable	Self-regulation
No of ways of measuring	1
Measure	A modified version of the Self-Regulation Questionnaire (Carey, Neal, & Collins, 2004)
Subscales/factors (M/SD)	4 factors: a) laxity (6.39/1.69); b) resolution (15.40/2.66); c) self-discipline (14.65/2.84); d) self-correction (11.03/2.32)
Number of items	13



(Continued)

Examples of the items and response scale used	"I give up quickly"; a 5-point response scale ranging from "strongly disagree" (1) to "strongly agree" (5).
Description	The questionnaire assesses self-regulation capacity. The questionnaire was modified according to the data obtained based on a sample of Slovak university students (Brutovská, 2015; Šebeňa Mikolajczyk, Helmer, Urban, & Orosová, submitted for publication). A higher score in the subscales means a higher level of self-regulation.
Cronbach's alpha	0.43 for laxity; 0.67 for self-discipline; 0.67 for self-correction; 0.72 for resolution
Variable	Self-determination
No of ways of measuring	1
Measure	TSRQ (Levesque et al., 2007)
Subscales/factors (M/SD)	2 factors used: a) autonomous motivation (32.02/7.68); b) controlled motivation (25.99/7.15) (factor motivation not used as it represented unmotivated behaviour)
Number of items	15
Examples of the items and response scale used	"I keep my alcohol drinking within safe limits because I enjoy it."; a 7-point response scale ranging from "not true at all" (1) to "very true" (7).
Description	The questionnaire assessed the degree to which a person's motivation for responsible AU was relatively autonomous or self-determined. A higher score represented a higher motivation of a particular type.
Cronbach's alpha	0.73 for controlled and 0.87 for autonomous motivation
Variable	Drinking motives
No of ways of measuring	1
Measure	DMQ-R (Cooper, 1994; Martens et al., 2008)
Subscales/factors (M/SD)	4 factors (motives): a) coping (9.82/4.63), b) social (13.62/5.50); c) conformity (8.18/3.96); d) enhancement (9.93/4.67)
Number of items	20
Examples of the items and response scale used	The respondents are asked "Thinking of all the times you drink, how often would you say that you drink for each of the following reasons?" e.g. "To forget about your problems"; a 5-point response scale ranging from "almost never/never" (1) to "almost always/always" (5).
Description	The questionnaire detects general drinking motives. A higher score represented higher drinking motives of a particular type.
Cronbach's alpha	0.87 for coping and for conformity; 0.88 for enhancement; 0.91 for social motives
Variable	Alcohol expectancies
No of ways of measuring	1
Measure	Alcohol Outcome Expectancies Scale (Leigh & Stacy, 2004)
Subscales/factors (M/SD)	2 subscales: a) positive alcohol expectancies (49.22/19.66); b) negative alcohol expectancies (25.62/13.00)
Number of items	34
Examples of the items and response scale used	When I drink alcohol, how likely is it that this would happen? e.g. "I am more accepted socially"; a 6-point response scale ranging from "no chance" to "certain to happen."
Description	A higher score represented higher alcohol expectancies for the given factor.
Cronbach's alpha	0.95 for positive and 0.88 for negative alcohol expectancies



## Procedures and statistical analysis

To test and assess the relationships in the model, structural equation modelling (SEM) was used in AMOS 20. To reduce the impact of random noise, the scores of the subscales pertaining to the individual variables were used in SEM instead of the individual items. The missing observations were imputed by the mean. The model is sometimes regarded as well-fitting when the log-likelihood test shows no significant difference from the saturated model. The log-likelihood test is, however, likely to be significant with a sample size larger than 400 (Byrne, 2010), and that is why the following criteria based on descriptive indices of fit were used as well:  $\chi^2/df \leq 5$ ; SRMR  $\leq 0.08$ ; GFI and AGFI  $\geq 0.90$ ; CFI  $\geq 0.90$ ; RMSEA  $< 0.08$ ; PCLOSE  $\geq 0.50$ ; NFI  $\leq 0.08$ ; PNFI and PCFI  $> 0.70$  (Byrne, 2010; Marsh & Hocevar, 1985). The cut-off values for modification indices were specified as 5.0 while always checking whether adding a given covariance between items was meaningful. The indirect associations in the model were tested by bootstrapping, using bias-corrected confidence intervals.

## RESULTS

The results of the study will be described according to the research questions. The first research question is whether *the proposed model fits the data well*. The appendix (the correlation matrix including the indicators of factors from the structural model) shows a correlation matrix (Pearson correlation coefficient) among the indicators of factors included in the model. The tested model was assessed and did not fit the data well enough (Table 1 – Tested model), so modification indices were examined to identify possible sources of poor fit. Adding 3 covariances (shown in Figure 1 as dashed lines) between the errors of indicators led to a significant improvement in model fit (Table 1 – Modified model). These covariances were meaningful and the model was therefore re-assessed. The modified model (Figure 1) fitted the data relatively well overall (although some descriptive indices of fit are not completely acceptable, they are sensitive to the sample size; the model also had a complex structure) and explained 81% of the variance in AU.

The answer to the second research question (*What direct associations are indicated by the proposed model of AU?*) is provided by the significant path coefficients, which showed that:

(a) AU was significantly and positively associated with *descriptive norms* ( $\beta = 0.38$ ; S.E. = 0.007;  $p < 0.001$ ), *drinking motives* ( $\beta = 0.48$ ; S.E. = 0.111;  $p < 0.001$ ), *attitudes towards AU* ( $\beta = 0.82$ ; S.E. = 0.006;  $p = 0.008$ ), and negatively with *injunctive*

*norms* ( $\beta = -0.61$ ; S.E. = 0.372;  $p = 0.008$ ), but was not associated with *alcohol expectancies*, *self-regulation* or *self-determination*.

(b) *descriptive norms* were significantly and positively associated with *alcohol expectancies* ( $\beta = 0.20$ ; S.E. = 0.041;  $p < 0.001$ ), but were not associated with *self-regulation*, *self-determination*, *drinking motives* or *attitudes towards AU*.

(c) *injunctive norms* were significantly and positively associated with *alcohol expectancies* ( $\beta = 0.17$ ; S.E. = 0.764;  $p = 0.021$ ), *drinking motives* ( $\beta = 0.38$ ; S.E. = 0.106;  $p < 0.001$ ) and *attitudes towards AU* ( $\beta = 0.79$ ; S.E. = 13.530;  $p < 0.001$ ); they were also significantly negatively associated with *self-determination* ( $\beta = -0.30$ ; S.E. = 0.076;  $p = 0.002$ ). But *injunctive norms* were not associated with *self-regulation*.

(d) *alcohol expectancies* were significantly and positively associated with *drinking motives* ( $\beta = 0.62$ ; S.E. = 0.006;  $p < 0.001$ ) and *attitudes towards AU* ( $\beta = 0.16$ ; S.E. = 0.398;  $p = 0.008$ ).

➔ TABLE 1  
Model fit

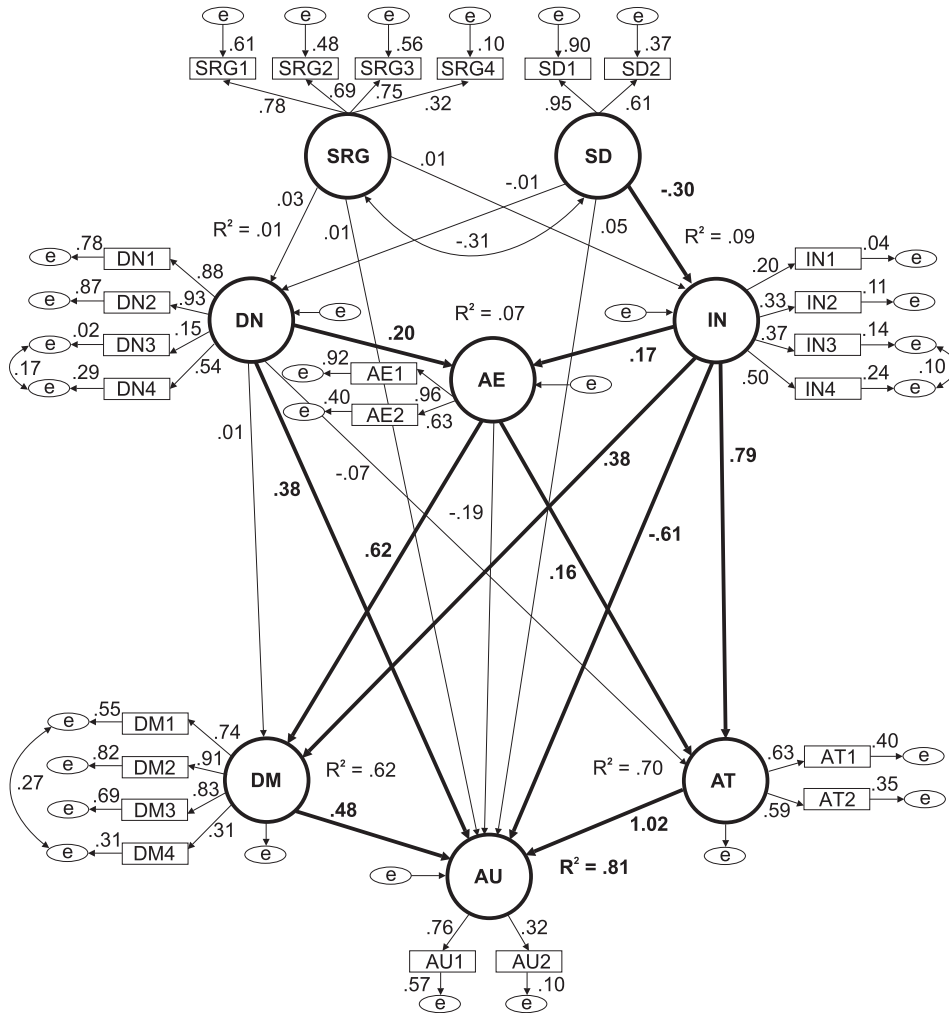
	Tested model	Modified model
$\chi^2$	1111.12	1048.15
<i>df</i>	232	229
<i>p</i>	< 0.001	< 0.001
$\chi^2/df$	4.79	4.58
SRMN	0.09	0.08
GFI	0.87	0.88
AGFI	0.84	0.84
CFI	0.85	0.86
NFI	0.81	0.82
PNFI	0.68	0.68
PCFI	0.71	0.71
RMSEA	0.074	0.073
PCLOSE	< 0.001	< 0.001

The third research question (*What indirect associations are indicated by the proposed model of AU?*) tested the existence of several indirect associations:

- The indirect association between *self-determination* and:
  - *alcohol expectancies* through *injunctive norms* was not supported ( $p = 0.093$ ).
  - *attitudes towards AU* through *injunctive norms* was supported ( $p = 0.010$ ; the effect size = -0.249). When *self-determination* goes up by 1 SD, *attitudes towards AU* go down by 0.249 SD.
  - *drinking motives* through *injunctive norms* was supported ( $p = 0.024$ ; the effect size = -0.149). When *self-determination* goes up by 1 SD, *drinking motives* go down by 0.149 SD.

FIGURE 1  
Path diagram for the  
model (N = 697)<sup>a</sup>

- AU was supported ( $p = 0.035$ ; the effect size =  $-0.133$ ).  
When self-determination goes up by 1 SD, AU goes  
down by 0.133 SD.



<sup>a</sup> Significant results are in black; Abbreviations in the model: AU = alcohol use; AT = attitudes toward AU; DM = drinking motives; AE = alcohol expectancies; DN = descriptive norms; IN = injunctive norms; SRG = self-regulation; SD = self-determination.

- The indirect association between *descriptive norms* and *attitudes towards AU* through *alcohol expectancies* ( $p = 0.288$ ), as well as between *descriptive norms* and *AU* ( $p = 0.591$ ), was not supported. But the indirect association between

descriptive norms and drinking motives through alcohol expectancies was supported ( $p = 0.013$ ; the effect size = 0.123). When descriptive norms go up by 1 SD, drinking motives go up by 0.123 SD.

- The indirect association between *injunctive norms* and:
  - *drinking motives* through alcohol expectancies was supported ( $p = 0.033$ ; the effect size = 0.106). When injunctive norms go up by 1 SD, drinking motives go up by 0.106 SD.
  - *attitudes towards AU* through alcohol expectancies was supported ( $p = 0.013$ ; the effect size = 0.028). When injunctive norms go up by 1 SD, attitudes towards AU go up by 0.028 SD.
  - *AU* through attitudes towards AU was supported ( $p = 0.001$ ; the effect size = 1.034). When injunctive norms go up by 1 SD, AU goes up by 1.034 SD.
- The indirect association between *alcohol expectancies* and *AU* through *drinking motives* and *attitudes towards AU* was supported ( $p = 0.017$ ; the effect size = 0.466). When alcohol expectancies go up by 1 SD, AU goes up by 0.466 SD.

The last research question concerned the *relationship between the individual variables and AU*. It was found that, in relation to AU:

- no direct ( $p = 0.855$ ) or indirect associations ( $p = 0.720$ ) between *self-regulation* and AU were found. Consequently, self-regulation was not directly or indirectly associated with AU.
- no direct association between *self-determination* and AU was found ( $p = 0.370$ ). However, an indirect association between the two was identified through several variables [*injunctive norms*, *attitudes*, *drinking motives*] ( $p = 0.035$ ; lower CI bound = -0.304; upper CI bound = -0.004). Although self-determination was not directly associated with AU, it is associated indirectly through more variables.
- a direct association between *descriptive norms* and AU was shown ( $p = 0.005$ ; lower CI bound = 0.019; upper CI bound = 0.063), but no indirect association was found ( $p = 0.591$ ). Descriptive norms were only directly associated with AU.
- a direct association between *injunctive norms* and AU ( $p = 0.008$ ; lower CI bound = -0.150; upper CI bound = -0.092) and an indirect association through several variables [*alcohol expectancies*, *drinking motives*, *attitudes*] ( $p = 0.001$ ; lower CI bound = 0.235; upper CI bound = 1.007) were found. Injunctive norms had both direct and indirect effects through more variables associated with AU.

- no direct association between *alcohol expectancies* and AU was shown ( $p = 0.055$ ), but an indirect association through drinking motives and attitudes towards AU was found ( $p = 0.017$ ; lower CI bound = 0.011; upper CI bound = 0.099). Alcohol expectancies were only indirectly associated with AU.

## DISCUSSION AND CONCLUSION

The aim of the study was to develop and explore a complex model explaining university students' AU, since AU is a serious public health problem, mainly among university students (e.g. Stone et al., 2012; Menagi et al., 2008). Some authors have done research into either one or a limited number of factors determining AU, and also prevention and intervention programmes are focused on a limited range of factors determining AU, e.g. programmes focusing on the correction of descriptive norms or attitudes (e.g. Collins et al., 2002; LaBrie et al., 2010). For this reason, our aim was to point out that it is important to develop programmes that will consider many different factors. The proposed model includes several different factors determining AU and their mutual relationships (based on theoretical and research findings) that fitted the data well, explaining 81% of the variance in AU. Additional direct and indirect associations between the individual variables and AU were demonstrated. Since AU is the final variable in the proposed model and a mere confirmation or refutation of the relationship (direct or indirect) between the individual variables and because AU is crucial for the development of intervention or prevention programmes, we will deal with these findings in the discussion.

It was shown that AU was positively associated with descriptive norms only directly. This result completely corroborates several other studies (e.g. Lewis & Paladino, 2008; Stone et al., 2012; Merrill et al., 2013). On the other hand, the indirect association between descriptive norms and AU through drinking motives or attitudes towards AU was not confirmed as expected on the basis of previous studies (e.g. Kuntsche & Kuntsche, 2009; Martens et al., 2008; Kam et al., 2009). It can be assumed that this indirect association could be relevant only for some drinking motives, e.g. conformity. The indirect association through attitudes towards AU is more likely to be expected with regard to injunctive norms. It can be assumed that individual attitudes towards AU are more likely to be influenced by norms about other people's attitudes (injunctive norms).

AU was also directly positively associated with drinking motives. The same results have been obtained by Hull and

Slone (2004) and Martens et al. (2008). Further studies showed that different types of drinking motives were related to different types of AU (Read et al., 2003; Littlefield, Sher, & Wood, 2010). Consequently, it is recommended that this direct association be explored in greater detail.

Furthermore, the structural model showed a positive association between AU and attitudes towards AU. This corresponds with other existing findings about this demonstrated association between more positive attitudes towards AU and stronger intentions towards AU (Usoro, 2000; Trafimow, 1996) or higher personal AU (Elek et al., 2006).

The last significant finding in relation to AU concerns injunctive norms. The study demonstrates that there is a direct negative association between injunctive norms and AU, as well as an indirect association through attitudes towards AU and drinking motives. As for the direct negative association, the results concerning injunctive norms are not very clear. This finding is in contrast to studies which have shown positive relationships between injunctive norms about the acceptability of AU and personal AU (Borsari & Carey, 2003; Lewis & Neighbors, 2004; Perkins, 2002). On the other hand, several studies have found results that are similar to those in the present study (Chawla, Neighbors, Lewis, Lee, & Larimer, 2007; Neighbors et al., 2008). It is reasonable to agree with the explanation provided in Lewis et al. (2010), where this finding is explored in greater detail, suggesting that less severe injunctive norms (e.g. drinking occasionally) are positively associated with AU, while more severe injunctive norms (e.g. drinking daily) and injunctive norms with a more distal normative referent (e.g. typical student) are negatively associated with AU, just as they are in the present study. Students seem to be unable to imagine what the expression "typical student" means, they do not identify with typical students, and therefore they assess their behaviour conversely, which may affect their behaviour in a negative way. The finding about the indirect association between injunctive norms and AU through attitudes towards AU and drinking motives is consistent with other existing findings (Kam et al., 2009; Kuntsche & Kuntsche, 2009; Martens et al., 2008).

In the next paragraph, we elucidate a non-significant association with AU. We found no direct or indirect association between AU and self-regulation, which is in contrast not only to our expectations but also to many earlier reports (e.g. Pearson, Kite, & Henson, 2012; Mun, Von Eye, Bates, & Vaschillo, 2008). Additional studies showed that self-regulation was indirectly associated with AU through norms (e.g. Gailliot et al.,

2012; Brutovská, Orosová, Kalina, & Šebeňa, 2015). On the other hand, Carey et al. (2004) and Neal and Carey (2005), similarly to our study, failed to support the existence of an association between self-regulation and AU. This finding might be caused by the fact that we used a modified version of the Self-Regulation Questionnaire, modifying it according to the data from university students from only one university and we suspect this method may not correspond to all university students in general. This is, however, only one of the possible explanations. Further research is needed to find out why this result occurred.

Furthermore, no direct significant association between AU and alcohol expectancies was found, which is in contrast to some studies showing that more positive alcohol expectancies predict higher AU (e.g. Gaher & Simons, 2007). We expected that this direct association did not exist as alcohol expectancies can influence AU indirectly through drinking motives or attitudes towards AU, which was confirmed, and is also suggested by other authors (Kuntsche et al., 2007; Read et al., 2003; Abraham et al., 1998).

Finally, no direct significant association between AU and self-determination was found, although the indirect association with AU through injunctive norms was confirmed. Similarly, Hagger et al. (2012) found a lack of direct impacts of motivational constructs on behaviour, demonstrating that motivational orientations promote the formation of norms, which have a direct association with actual behaviour. Our finding supported the main expectation of this study, which was based on the links between SDT, norms and AU, although this finding was confirmed only in relation to injunctive norms but not descriptive ones. In contrast to this, Dams-O'Connor (2007) found that extrinsic motivation influenced the relationship between norms (both descriptive and injunctive ones) and AU among university students, so the relationship between norms and AU is stronger among individuals with a controlled behaviour compared to those with an autonomous behaviour. In our case, only the indirect association with AU through injunctive norms was found, which might be caused by the fact that descriptive norms are thought to function as heuristic cues in the decision-making process and might, in contrast to injunctive norms, have a more automatic/direct influence on behaviour (Kredentser, Fabrigar, Smith, & Fulton, 2012).

It is also important to point out the limits of the present study. All variables were assessed by self-report, although self-report measures of drinking are largely reliable and valid



(Laforge, Borsari, & Baer, 2005; Wills & Cleary, 1997). The cross-sectional design of the study represents another limitation of the study. Drawing causal conclusions would be methodologically problematic, so causality and processes must be interpreted with caution. In addition, another limitation of the study involves the instruments used to explore some variables. The same subscales show low levels of internal consistency, but except for one case (when the construct of descriptive norms is measured by 3 different instruments), these subscales consist of less than 3 items, which obviously has an impact on the value of reliability. Finally, the model fit was not in line with the standards for model fit, so the results must be interpreted with caution and other analytical data must be taken into account as well.

In conclusion, the present study provides information about the complex relationships in a model explaining Slovak university students' AU by using several variables with emphasis on descriptive and injunctive norms. Many intervention programmes designed for university students focus on the modification of descriptive norms or attitudes (e.g. at P. J. Šafárik University in Košice, Slovakia; Brutovská, Orosová, & Šebeňa, 2014) and do not take into account injunctive norms or other variables. In contrast to this, programmes created for early adolescents in Slovakia consider many AU-related factors, e.g. the Unplugged programme developed on the assumption that the most effective prevention programmes implemented a combination of an approach based on providing information, an approach based on social influence, and an approach based on skill-enhancement (Berinšterová & Orosová, 2014). The effectiveness of the Unplugged programme was confirmed (Berinšterová & Orosová, 2016). According to our findings, intervention programmes for university students should consider not only descriptive norms or attitudes, but also take into account other variables that are influenced by social norms (e.g. drinking motives, alcohol expectancies), as well as variables that have an impact on social norms (self-determination). Such an approach might lead to a higher reduction of AU among university students.

## APPENDIX

### The correlation matrix of the indicators of factors from the structural model

	AU1	AU2	AT1	AT2	DNB1	DNB2	DNB3	DNB4	INB1	INB2	INB3	INB4
AU1	1											
AU2	0.562**	1										
AT1	0.393**	0.198**	1									
AT2	0.376**	0.274**	0.352**	1								
DNB1	0.325**	0.358**	0.050	0.086*	1							
DNB2	0.323**	0.305**	0.092*	0.100*	0.836**	1						
DNB3	0.113**	0.037	-0.027	0.076*	0.159**	0.111**	1					
DNB4	0.314**	0.175**	0.082*	0.134**	0.513**	0.490**	0.241**	1				
INB1	-0.047	-0.080*	0.016	0.127**	0.243**	0.271**	0.115**	0.279**	1			
INB2	0.174**	0.085*	0.047	0.136**	0.355**	0.340**	0.270**	0.452**	0.359**	1		
INB3	0.229**	0.051	0.227**	0.184**	-0.007	0.089*	0.055	0.139**	0.129**	0.159**	1	
INB4	0.226**	0.197**	0.331**	0.171**	0.166**	0.200**	0.018	0.294**	0.143**	0.296**	0.290**	1
DM1	0.312**	0.366**	0.086*	0.237**	0.190**	0.178**	0.083*	0.171**	-0.061	0.134**	0.035	0.077*
DM2	0.468**	0.409**	0.308**	0.336**	0.193**	0.154**	0.029	0.221**	-0.099*	0.166**	0.116**	0.254**
DM3	0.428**	0.391**	0.265**	0.354**	0.177**	0.193**	0.079*	0.198**	-0.046	0.180**	0.189**	0.220**
DM4	0.169**	0.180**	-0.019	0.171**	0.182**	0.201**	0.088*	0.155**	-0.021	0.146**	0.112**	0.069
AE1	0.338**	0.334**	0.177**	0.184**	0.243**	0.158**	0.039	0.208**	-0.041	0.131**	0.053	0.184**
AE2	0.178**	0.357**	-0.074	0.084*	0.223**	0.148**	0.084*	0.155**	-0.015	0.098*	0.064	0.073
SRG1	-0.069	-0.185**	0.007	-0.023	-0.041	0.006	0.064	0.026	0.073	0.067	-0.032	0.031
SRG2	-0.058	-0.135**	0.020	-0.063	-0.016	0.002	0.008	0.036	0.073	0.061	-0.043	0.032
SRG3	-0.103**	-0.134**	-0.017	-0.117**	-0.032	-0.021	0.036	-0.005	0.010	0.037	-0.093*	0.055
SRG4	0.001	-0.144**	0.042	-0.022	-0.084*	-0.057	0.007	-0.059	0.068	-0.015	0.016	-0.074
SD1	-0.209**	-0.132**	-0.213**	-0.207**	0.001	-0.037	-0.030	-0.013	0.028	-0.007	-0.171**	-0.040
SD2	-0.154**	-0.033	-0.282**	-0.138**	-0.039	-0.025	-0.013	-0.057	-0.019	-0.185**	-0.155**	0.009

	DM1	DM2	DM3	DM4	AE1	AE2	SRG1	SRG2	SRG3	SRG4	SD1	SD2
DM1	1											
DM2	0.630**	1										
DM3	0.598**	0.732***	1									
DM4	0.551**	0.513**	0.491**	1								
AE1	0.504**	0.664***	0.530**	0.363**	1							
AE2	0.356**	0.344**	0.329**	0.344**	0.593**	1						
SRG1	-0.249**	-0.162**	-0.163**	-0.189**	-0.165**	-0.200**	1					
SRG2	-0.243**	-0.168**	-0.182**	-0.153**	-0.133**	-0.169**	0.563**	1				
SRG3	-0.218**	-0.138**	-0.188**	-0.158**	-0.072	-0.109**	0.589***	0.517**	1			
SRG4	-0.234**	-0.215**	-0.204**	-0.181**	-0.232**	-0.199**	0.252**	0.265**	0.170**	1		
SD1	-0.205**	-0.191*	-0.242**	-0.098*	-0.061	-0.060	0.232**	0.194**	0.341**	0.108**	1	
SD2	-0.068	-0.098*	0.123**	0.001	0.058	0.032	0.032	0.033	0.140**	-0.009	0.606**	1

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## Uloga društvenih normi u strukturnom modelu koji objašnjava uporabu alkohola među studentima

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Malo je studija istraživalo složene odnose između niza čimbenika koji određuju uporabu alkohola ili objašnjavalo kako norme djeluju na povezanost uporabe alkohola i drugih psiholoških konstrukata. Ova studija želi istražiti složene odnose u predloženom modelu koji objašnjavaju uporabu alkohola među studentima uz posebno isticanje

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deskriptivnih i injunktivnih normi. Transverzalni podaci prikupljeni su od 719 sveučilišnih studenata (59,0 % žena;  $M_{age} = 21,25$ ;  $SD = 1,99$ ), koji su ispunili upitnik AUDIT i odgovorili na pitanja o kognitivnim i afektivnim stavovima, deskriptivnim i injunktivnim normama, samoregulaciji, samoodređenju, motivima za konzumaciju alkohola i očekivanjima od alkohola. Model strukturnih jednadžbi primijenjen je u analizi podataka. Utvrđeno je: (1) da samoregulacija nije ni izravno ni neizravno povezana s uporabom alkohola; (2) da je samoodređenje neizravno povezano s uporabom alkohola putem injunktivnih normi, stavova i motiva za konzumaciju alkohola; (3) da su deskriptivne norme izravno povezane s uporabom alkohola; (4) da su injunktivne norme povezane s uporabom alkohola izravno, ali i neizravno, očekivanjima od alkohola, stavovima i motivima za konzumaciju alkohola; (5) da su očekivanja od alkohola izravno povezana s uporabom alkohola. Osim utvrđivanja pojedinačnih veza između varijabli, studija objašnjava i koji čimbenici pridonose konzumaciji alkohola i primjeni normi među studentima te kako ti čimbenici međusobno djeluju, što može biti korisno za razvoj preventivnih programa.

Ključne riječi: strukturni model, uporaba alkohola, deskriptivne i injunktivne norme, čimbenici uporabe alkohola, studenti sveučilišta



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