Descriptive normative beliefs and the self-regulation in alcohol use among Slovak university students

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ABSTRACT

Aim This study aims (i) to understand how descriptive normative beliefs (DNB) about typical students' alcohol use and self-regulation (SRG) are related to alcohol use (AU) by exploring the indirect effect of SRG on AU through DNB and (ii) to explore gender differences and the differences between universities in DNB, SRG and AU.

Subject and methods The cross-sectional data were collected online from 817 Slovak university students from four universities (75.22% females; M age = 19.61; SD = 1.42), who filled in the AUDIT-C items, items measuring the DNB about typical students' AU and SRG. T-tests, one-way Anova and structural equation modelling were used for data analysis.

Results Gender differences in AU and DNB were found with males having higher levels of both AU and DNB. The tested model of AU fits the data well. A significant association was found between DNB and (i) AU (positive) and (ii) SRG (negative). The analysis confirmed the existence of an indirect effect of SRG on AU through DNB.

Conclusion The study contributes to research concerning AU by the way in which DNB and SRG are linked to AU among Slovak university students. The research findings can also be used in developing prevention and intervention programs.

Keywords alcohol use, descriptive normative beliefs, self-regulation, Slovak university students

Introduction

Most studies have shown that alcohol use (AU) reaches its highest prevalence among university students.1,2 Binge drinking, defined as the use of five or more drinks per occasion (four or more for women),3 is particularly common among university students4,5 and is influenced by many factors such as gender, race, attitudes, normative beliefs, friends and society, etc.2,6 This study focused on descriptive normative beliefs (DNB) and self-regulation (SRG) that, according to previous work, are important predictors of AU among university students.7,8

DNB are an individual's perception of the prevalence of behaviour.9,10 Previous research has mainly dealt with the influence of DNB on AU.2,11 Numerous studies have confirmed the existence of a positive correlation between DNB on university students' AU.7,11 Contradictory findings exist as for the gender-related differences in DNB. While some studies have not found gender differences in DNB,12,13 others have claimed that females14 or males15,16 have a higher level of DNB.

SRG is the extensive ability to exert control over one's inner states, processes and responses.17 In empirical studies, the concept of SRG is associated with different types of behaviour such as dieting, alcohol and drug use, smoking, etc.18,19 The relationship between SRG and AU can be explained by the SRG theory, stating that individuals with lower self-regulatory capacities are more likely to initiate AU, less likely to maintain its moderate use and more likely to...
become heavy drinkers. On the other hand, numerous studies have not found support for the existence of a relationship between SRG and AU. It should be pointed out that this discrepancy may be due to a more complicated association between the variables.

**Objectives**

The first aim of the study is to explore gender differences and the differences between universities in DNB, SRG and AU. The main aim of the study is to explore the relationships between DNB, SRG and AU among Slovak university students according to gender. It was hypothesized that there would be an indirect effect of SRG on AU through DNB. The equivalency of the indirect effect model by gender was also evaluated.

**Method**

**Sample and procedure**

Data were collected in 2011 within the SLiCE study. Eight hundred and seventeen first-year Slovak university students participated (75.22% females; mean age = 19.61; SD = 1.42) in the study. Four universities from Eastern Slovakia took part in this study (65.7% Pj Safarik University in Kosice; 17.7% the University of Presov; 10.7% The University of Veterinary Medicine and Pharmacy in Kosice; 5.9% the Technical University in Kosice). The universities provided access to the e-mail addresses of all first-year students (totally 4078). To obtain a larger sample size, the project was also presented to students at each university during regular seminars. Students were encouraged to participate in the survey by an invitation e-mail and asked to fill in the online questionnaires without incentives. In total, 1272 students, who gave informal consent, were approached and 817 completed the survey resulting in a response rate of 64.23%.

**Measures**

‘University students’ AU’ was measured by the AUDIT-C (The revised Alcohol Use Disorders Identification Test Consumption) — a 3-item alcohol screening test for the early detection of risky drinking (e.g. ‘How often do you have a drink containing alcohol?’). The AUDIT-C uses a 5-point scale. A higher value on the scale represents more risky drinking. Individual items were used in the analysis. Cronbach’s alpha was 0.73.

‘DNB about typical students’ AU’ were measured by adjusting three items of the AUDIT-C used to measure AU. The items related to the behaviour of a typical student, e.g. ‘How often do you think a typical student at ... [university]... has a drink containing alcohol?’ The same 5-point scale as for the AUDIT-C was used. Higher values on the scale represent DNB of higher AU by a typical student. Individual items were used in the analysis. Cronbach’s alpha was 0.60.

SRG was measured by the 31-item Self-Regulation Questionnaire (SSRQ). The factor structure of the SSRQ was assessed on the sample of Slovak university students, and a four-factor model solution consisting of 13 items was found (the first factor: self-discipline (items 17, 20, 12, 8); the second factor: self-correction (items 11, 29, 13); the third factor: resolution (items 21, 1, 14, 18); the fourth factor: laxity (items 6, 4); Sebena R et al. Submitted for publication). Items were scored on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). To reduce the impact of random noise, the scores of the four subscales (defined as the sums of the respective items in each subscale) were used in the structural equation modelling (SEM) instead of the individual items. A higher score in the subscales means a higher level of SRG. Cronbach’s alpha was 0.82.

**Procedures and statistical analysis**

A descriptive analysis of the observed variables, t-test and one-way Anova were used to investigate the gender-related and university-related differences using SPSS 20.

To test and estimate causal relations in the model, SEM was used in AMOS 20. The following indicators were used to assess the fit of the SEM models. The model is herein 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 and that is why the following criteria based on descriptive indices of fit were used as well: SRMR ≤ 0.08; GFI and AGFI ≥ 0.90; CFI ≥ 0.95; RMSEA < 0.08; PCLOSE ≥ 0.50. The cut-off values for modification indices were specified as 5.0 while always checking whether adding a given covariance between items was meaningful. For SEM, all respondents with missing observations for at least 40% of the variables were removed (15.72% of the observations). Finally, the data from 686 university students (74.3% females) were analysed. Three positively skewed variables (three items concerning AU) were logged to approximate normal distributions. The remaining missing observations were imputed by the mean of individual items. Subsequently, four subscales of SRG were computed. The model was based on the indirect effect of SRG (four subscales) on AU (three items) through DNB (three items). The model was estimated separately by gender. The indirect effect was tested by bootstrapping, using bias-corrected confidence intervals in AMOS 20.
Results

Gender and universities differences in observed variables

Firstly, gender differences in the observed variables were analysed (Table 1): (i) AU is significantly higher for males than for females; (ii) males have a higher level of DNB that means they are convinced about the higher level of typical student’s AU; (iii) no statistically significant gender differences in SRG were found. In summary, males tended to have higher levels of AU and DNB than females. Further analysis (SEM) was conducted controlling for gender.

Furthermore, the differences between universities in the observed variables were analysed (Table 2). No significant differences were found.

Structural equation modelling

The structure of the tested model assumes the existence of an indirect effect of SRG on AU through DNB. The tested model was estimated separately by gender and did not fit the data well enough (Table 3—Tested model) so modification indices were examined to identify possible sources of the poor fit. Adding three covariances between errors of indicators led to a significant improvement of the model fit. These covariances were meaningful (The first covariance relates to SRG errors formulated on personality characteristics concerning self-discipline, resolution and consistency. The second covariance relates to errors in measuring AU asking about the frequency and quantity of AU. The third covariance relates to DNB errors analogous to the second covariance.), and the model was therefore re-estimated. This modified model (Fig. 1) fits the data well (Table 3—Modified model) and explained 26% of the variance in male AU and 20% of the variance in female AU.

The significant path coefficients showed that:

1. SRG was significantly and negatively associated with DNB (for males: \( \beta = -0.24; SE = 0.03; P = 0.019 \); for females: \( \beta = -0.19; SE = 0.01; P = 0.002 \));
2. DNB were significantly and positively associated with AU (for males: \( \beta = 0.45; SE = 0.04; P = 0.001 \); for females: \( \beta = 0.44; SE = 0.03; P < 0.001 \));
3. SRG was not directly associated with AU (for males: \( \beta = -0.15; SE = 0.01; P = 0.114 \); for females: \( \beta = -0.06; SE = 0.01; P = 0.303 \)).

Furthermore, the equivalency of model was tested to find out whether the modified model was statistically the same for males and females or whether differences exist. Two models were prepared: (i) the first model (unconstrained model was estimated separately by gender and did not fit the data well enough (Table 3—Tested model) so modification indices were examined to identify possible sources of the poor fit. Adding three covariances between errors of indicators led to a significant improvement of the model fit. These covariances were meaningful (The first covariance relates to SRG errors formulated on personality characteristics concerning self-discipline, resolution and consistency. The second covariance relates to errors in measuring AU asking about the frequency and quantity of AU. The third covariance relates to DNB errors analogous to the second covariance.), and the model was therefore re-estimated. This modified model (Fig. 1) fits the data well (Table 3—Modified model) and explained 26% of the variance in male AU and 20% of the variance in female AU.

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### Table 1 Gender differences in the observed variables

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
<th>t-test</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>t</td>
<td>df</td>
<td>Sig.</td>
<td></td>
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<tr>
<td>AU</td>
<td>4.90</td>
<td>2.48</td>
<td>3.25</td>
<td>2.2</td>
<td>8.51</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>DNB</td>
<td>6.88</td>
<td>2.4</td>
<td>6.27</td>
<td>1.84</td>
<td>3.81</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>SRG</td>
<td>98.53</td>
<td>7.85</td>
<td>98.45</td>
<td>5.99</td>
<td>0.15</td>
<td>0.883</td>
<td></td>
</tr>
</tbody>
</table>

AU, alcohol use; DNB, descriptive normative beliefs; SRG, self-regulation.

### Table 2 Differences between universities in the observed variables

<table>
<thead>
<tr>
<th></th>
<th>UPJS</th>
<th>UVL</th>
<th>TU</th>
<th>PU</th>
<th>One-way Anova</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>AU</td>
<td>3.68</td>
<td>2.27</td>
<td>2.68</td>
<td>2.2</td>
<td>3.55</td>
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<tr>
<td>DNB</td>
<td>6.40</td>
<td>1.89</td>
<td>6.18</td>
<td>1.83</td>
<td>7.5</td>
</tr>
<tr>
<td>SRG</td>
<td>98.33</td>
<td>6.44</td>
<td>97.96</td>
<td>5.23</td>
<td>99.35</td>
</tr>
</tbody>
</table>

AU, alcohol use; DNB, descriptive normative beliefs; SRG, self-regulation; UPJS, PJ Safarik University in Kosice; UVL, The University of Veterinary Medicine and Pharmacy in Kosice; TU, the Technical University in Kosice; PU, the University of Presov.

### Table 3 Model fit

<table>
<thead>
<tr>
<th></th>
<th>( \chi^2 )</th>
<th>df</th>
<th>P</th>
<th>( \chi^2/df )</th>
<th>SRMR</th>
<th>GFI</th>
<th>AGFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>PCLOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested model</td>
<td>196.36</td>
<td>64</td>
<td>&lt;0.001</td>
<td>3.17</td>
<td>0.09</td>
<td>0.95</td>
<td>0.91</td>
<td>0.90</td>
<td>0.054</td>
<td>0.21</td>
</tr>
<tr>
<td>Modified model</td>
<td>144.53</td>
<td>58</td>
<td>&lt;0.001</td>
<td>2.49</td>
<td>0.07</td>
<td>0.96</td>
<td>0.93</td>
<td>0.93</td>
<td>0.047</td>
<td>0.69</td>
</tr>
</tbody>
</table>
model) was without any constraints on coefficient values and (ii) the second model (constrained model) contained equality constraints for all analogous parameters in the male and female models. The equivalency of the models was assessed using the $P$-value of the log-likelihood test as well as the difference in CFI ($\Delta$CFI) of the models. The models are considered non-equivalent when (i) the $P$-value is $< 0.01$, and (ii) $\Delta$CFI is $> 0.01$.\textsuperscript{24} No differences between the models seemed to exist (Table 4). It can therefore be said that the modified model is statistically equivalent for males and females.

Finally, the existence of an indirect effect of SRG on AU through DNB was tested. The value of the test statistic $P$-value was $P = 0.005$, pointing to the existence of an indirect effect of SRG on AU through DNB. The estimated size of the standardized indirect effect of SRG on AU was $-0.089$. 

Fig. 1 Path diagram for the model ($N = 686$): males and females.
That is due to the indirect effect of SRG on AU, when SRG goes up by 1 SD, AU goes down by 0.089 SD.

In summary, a direct effect of SRG on AU was not found among Slovak university students ($P = 0.227$; lower CI bound $= -0.013$; upper CI bound $= 0.002$). However, its indirect effect was identified through DNB ($P = 0.005$; lower CI bound $= -0.012$; upper CI bound $= -0.004$). The total effect of SRG on AU was significant ($P = 0.008$; lower CI bound $= -0.021$; upper CI bound $= -0.005$). By this, lower levels of SRG do not directly relate to higher levels of AU. Rather, they increase the level of DNB that subsequently increases the level of AU. This means that students with low SRG think that typical students drink more frequently and in greater amounts and subsequently drink more and more often themselves.

### Discussion and conclusion

#### Main findings of this study

The research findings have confirmed gender differences in AU (males have a higher level of AU than females) and in DNB (typical students have a higher level of AU according to males than according to females). On the other hand, no statistically significant gender-related differences in SRG were found. Similarly, no university-based differences were found as had been assumed.

By testing the indirect effect of SRG on AU through DNB, the modified model fitted the data well and explained 26% of the variance in male AU and 20% of the variance in female AU. The findings showed that the modified model was statistically indistinguishable for males and for females. It is interesting that while research studies have shown gender differences in AU or DNB, this study has demonstrated that these factors are linked in the same manner to AU. Furthermore, in the tested model, SRG was negatively directly associated with DNB but was not directly associated with AU. DNB were positively directly associated with AU. The SEM confirmed the existence of an indirect effect of SRG on AU through DNB. It means that higher SRG is associated with DNB about a lower level of typical students’ AU. This is subsequently associated with a lower level of individuals’ AU for both males and females. Thus, students with different levels of SRG perceive AU of the majority of university students differently, which is what leads to a different level of AU.

#### What is already known about this topic

The findings concerning the gender differences are consistent with other studies that have confirmed: (i) gender-related differences in AU with males consuming alcohol more frequently and in greater amounts than females; (ii) gender-related differences in DNB with males having higher levels of DNB. On the other hand, the findings about no gender differences in SRG are not consistent with previous studies. However, these studies were focused on concepts such as achievement or learning strategies and not on AU.

The research findings concerning the associations between DNB, SRG and AU are consistent with other studies, which have shown: (i) a positive correlation between DNB and AU; (ii) the connection between DNB and SRG and (iii) no direct association between SRG and AU. On the other hand, the current finding regarding the lack of association between SRG and AU are on the contrary to the authors, who found this association. It was hypothesized that there would be an indirect effect of SRG on AU through DNB based on the claim that DNB appear, realize and modify behaviour, including AU, through the regulation of this behaviour. Thus, DNB could constitute a factor regulating the AU of university students.

#### What this study adds

This study contributes to the literature that highlights the importance of a fine-grained examination of AU among university students and the manner in which DNB and SRG are linked to AU among Slovak university students. These findings suggest that SRG may play an important role in the process of the actual interpretation of environmental clues and in the way individuals interpret others’ attitudes toward AU. In this way, it may significantly contribute to the whole process in which DNB are formed. Although SRG did not directly contribute to AU itself, it was found to be significantly related to AU via the DNB.

The research findings can also be used in developing prevention and intervention programs. It is well known that DNB largely contribute to AU and that making DNB more accurate can lead to a decrease in AU (Crowford and Novak 2010). This study has shown that a lower level of DNB is associated with high SRG, so a decrease in AU can be achieved indirectly through the increase in SRG through different activities.

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**Table 4 The tested equivalency of model**

<table>
<thead>
<tr>
<th></th>
<th>$\chi^2$</th>
<th>df</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconstrained model</td>
<td>148.115</td>
<td>60</td>
<td>0.932</td>
</tr>
<tr>
<td>Constrained model</td>
<td>167.804</td>
<td>73</td>
<td>0.926</td>
</tr>
<tr>
<td>Difference between models</td>
<td>19.689</td>
<td>13</td>
<td>0.006</td>
</tr>
</tbody>
</table>

$P > 0.10$ $\Delta$CFI $< 0.01$
The findings provide the basis for further analyses by adding additional psychological factors into the analysis (e.g., self-determination, alcohol expectancies), which can clarify the associations between SRG, normative beliefs and AU in a wider context. Future analyses could also be focused on research examining which other factors have an indirect effect on AU through DNB. It is important to incorporate other socio-demographic variables such as living with or without parents, or socio-economic class, which would be significant factors. There have been contradictory findings in relation to AU and only a few studies in relation to normative beliefs.35

**Limitations of this study**

Data were collected online, which could have lowered the response rate. The sample is limited by the no gender-balanced sample. On the other hand, this gender distribution corresponded with the count of males and females at Slovak universities. A limited range of variables and the cross-sectional nature of the data set also mean other limitations in the study. Drawing causal conclusions would be methodologically problematic.

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**References**


