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A survey study on the associations between misperceptions on substance use by peers and health and academic outcomes in university students in North-West Europe

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Abstract

Introduction: The basis of Social Norms Theory is that behavior is influenced by the perception of peer behavior. This implies that an overestimation (misperception) of substance use by peers would lead to an increase in personal substance use. It is hypothesized that the misperception of substance use by peers is negatively associated with health and academic performance, and that this association can be explained by an increase in personal substance use. The aim of this study is to investigate the associations of misperception of consumption of tobacco, alcohol, and recreational drugs with health and academic performance, and to test whether or not this association could be explained by substance use in a sample of university students.
Methods: Data of 6403 university students in five European countries were gathered through a questionnaire about substance use by themselves and by peers, physical and mental health, and academic functioning. Misperception is defined as an overestimation of the estimated prevalence of substance use among students. Multivariate models are built with misperception regarding tobacco, alcohol and recreational drugs, and personal use of substances as independent variables, and health and academic performance as dependent variables.
Results: Misperception is significantly associated with health and academic functioning. This association could not be explained by personal substance use.
Conclusions: This study subscribes to an earlier work on the importance of social norms, which indicates a negative influence of misperceptions on health and academic outcomes.

Keywords: public health; social behavior; students; substance use.

Introduction

Smoking tobacco, drinking alcohol, and using recreational drugs is prevalent among university students (1, 2). Substance use has been shown to be associated with diminished emotional wellbeing and a suboptimal health status (3). Apart from the health effects of tobacco, alcohol or drugs, using these substances may also affect functioning at school or at university (4–6).

In a review, Berkowitz states that peer influences have a greater impact on individual behavior than biological, personality, familial, religious, cultural, and other influences (7). This is the basis of Social Norms Theory, which states that behavior is influenced by the perception of peer behavior. An overestimation of alcohol consumption of peers may have unfavorable consequences for personal alcohol consumption by students (7). In the past decades, research in the US has shown that students tend to overestimate the consumption of alcohol by their student peers (8–10). Recently, European researchers have started to investigate this topic as well, and their findings point in a similar direction, with a high proportion of students overestimating alcohol consumption by their peers (11, 12).

According to Social Norms Theory, students are expected to change their behavior in accordance with the social norms. This would imply that an overestimation of alcohol consumption by peers would lead to an increase in personal alcohol consumption. It is hypothesized that misperception regarding substance use by peers would be associated with worse health and academic outcomes, and these outcomes can be explained by an increase in personal substance consumption.

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The aim of this study is to test two hypotheses: 1) misperception on substance use by peers is a determinant of reduced health and academic outcomes in university students in Western Europe, and 2) the negative association between misperception on substance use and health and academic outcomes can be explained by an increase in one's personal use of tobacco, alcohol, and recreational drugs.

Methods

University students in the Netherlands, Belgium, Denmark, Finland, and Sweden were invited to complete an internet-based questionnaire about their consumption of alcohol and self-rated health. Given that this was an anonymous questionnaire on a voluntary basis, this study was exempt from the Medical Ethical Review.

Populations

The study populations consisted of samples from university students in five European countries, including the University of Amsterdam in the Netherlands (n=4836), Antwerp University in Belgium (n=27,210), University of Southern Denmark (n=18,254), Police College of Finland (n=548), and the Karolinska Institute in Sweden (n=5189). From hereon, we shall refer to these five populations by referring to the countries.

Study protocol

The questionnaire was Internet based, implying that data were collected from students through a www-based survey link, which was disseminated via email. This technique has been argued to be an effective data collection approach when researching computer-literate university students (13). In addition, data were collected at the University of Antwerp (Belgium) via a student health website associated with a separate health promotion project. Each survey was translated by one of the co-authors into the appropriate language for each site. Reminder emails were sent out approximately one week after the initial invitation, however in each instance, the majority of responses were returned within 48 h of the first email

Questionnaire content

In keeping with the existing social norms literature, the questionnaire items used were simple ones that focused on key aspects of the target behaviors with categorical or ordinal variables, and which could also be easily translated between sites (11).

General information

Sex, age, type of study (business, science, medicine/health care, social science, arts/humanities, law, education, and others), and university (Belgium, the Netherlands, Denmark, Finland, and Sweden), were investigated by multiple choice questions retrieved from a questionnaire previously developed for use in student health research (14).

Academic outcome

Academic outcome was operationalized as a delay in the study program and was investigated by self-reports, using a single item: "Are you experiencing a delay in your study program at this moment"? with answering options that included "yes" and "no" (14).

Health

Students' perception of their health was investigated using a single item SRH-5: "How do you evaluate your health in general"? with a Likert scale between 1 (excellent) and 5 (bad) (15). This measure was dichotomized into an outcome variable "suboptimal health", which was coded 0 for response alternatives 1 and 2 and 1 for answering options 3–5, corresponding to a previous study on the health of medical students (16).

Substance use

Substance use was investigated using questions regarding self-reported use of tobacco, alcohol, and recreational drugs. For tobacco and recreational drugs, these questions related to whether or not the students used either. For alcohol, students were asked how often they drank alcohol in the past month and how often they had become drunk in the past month, both with answering options from 1 (not at all) to 8 (every day). Answering options are listed in Table 2.

Social norms

Social norms regarding substance use were investigated by asking the participants about their estimations of the respective percentages (response alternatives in 10% increments) of students at their own university that smoked tobacco, drank alcohol, or used recreational drugs. In addition, they were asked to estimate the frequency of alcohol consumption of their peer students in the past month and the frequency of drunkenness by these peers in the past month (11).

Definition of misperception

According to the Social Norms Theory (7), overestimation is related to actual behavior. Thus, we only defined misperception as overestimation; underestimation – known to be very uncommon – was considered in the group without misperception. Therefore, in this study we defined misperception as a higher estimated prevalence of consumption of substances among students (the social norms) per university than the actual reported consumption of substances of the students who completed the questionnaire. The social norms were determined per university, because country differences are known to exist for prevalence of substance use (17, 18).

For smoking tobacco and consumption of recreational drugs, misperception was based on the percentage of users amongst the respondents. For example, 23% of respondents at the University of Amsterdam reported smoking tobacco. All students who chose the answering category that 30%–39% or more of their peer students smoked tobacco were classified as having misperception regarding smoking tobacco by peer students. The social norms are listed in Table 3.

For frequency of alcohol consumption and frequency of drunkenness, the median category of the actual use of the students was used to define the "correct" prevalence. For example, the answering option "drinking alcohol twice a week" was the median category chosen by university students in Amsterdam. This implied that participants who answered that students at their university drank alcohol three to four days per week or more often were classified as having misperception regarding frequency of alcohol consumption. Young people are highly capable of reporting their alcohol consumption and drunkenness in a valid and reliable way (19).

Analyses

Logistic regression analyses (Enter method) were performed to calculate multivariate models for self-rated health and academic outcomes (delay in the study program) as dependent variables. A similar approach was followed for both dependent variables. First, each misperception variable (frequency of alcohol consumption, frequency of drunkenness, and smoking tobacco and consumption of recreational drugs) was included as an independent variable in a model, together with the confounders (age, sex, and university). Odds ratios were calculated for the misperception variable. Next, all misperception models were corrected for personal consumption of tobacco, frequency of alcohol consumption, frequency of drunkenness, and consumption of recreational drugs by adding these variables to the models. A value of $p<0.05$ was considered statistically significant. SPSS 15.0 software was used for all analyses.

Results

A total of 6403 students completed the questionnaire. Except for those enrolled in Finland, most students were females. In Belgium, Denmark and Sweden, most students were younger than 20 years, whereas those in the Netherlands and Finland were older (Table 1). The response rate varied per university. Response rate is 13% in Denmark, 26% in the Netherlands, 33% in Sweden, and 66% in Finland. In Belgium, 659 surveys were completed, comprising 2% of the total student population. However, since data were collected from a website rather than through an email survey, it was not possible to calculate a response rate comparable to the other sites.

Students from Sweden (who were studying at the health faculty) and Finland reported the lowest and highest general self-rated health, respectively. The percentage of students reporting a delay in their study program was highest in Netherlands (33%) and lowest in Finland (2%).

More than 85% of the students drank alcohol, and there were no major differences between universities (Table 2). Among all respondents, 56% consumed alcohol once a week or more; the highest prevalence was found in the Netherlands (66%) and Belgium (63%). Then, 66% of all respondents reported that they were drunk at least once a month, the highest prevalence of which was reported in Denmark (72%) and Finland (68%). Among all the participants, 18% smoked tobacco, with the lowest and highest prevalence in Sweden (9%) and Belgium (27%), respectively. Moreover, 9% of the participants used recreational drugs, although this high percentage was mainly due to the number of recreational drug users in the Netherlands (19%) and Belgium (17%).

Misperception

A total of 52% of all participants overestimated the frequency of alcohol consumption by their student peers (Table 3). Students from Denmark and Belgium showed the highest percentage of misperception regarding frequency of alcohol consumption (73% and 71%, respectively). The frequency of drunkenness was overestimated in more than 79% of the cases, with the highest percentages in the Netherlands and Belgium (78%) and Denmark (85%). Misperception regarding smoking tobacco occurred in 82% of the participants, without any major differences between universities. Then, 51% of all respondents overestimated the use of recreational drugs by their peers. Large differences exist between countries; the prevalence of misperception regarding consumption of recreational drugs ranged from 5% in Finland to 65% in the Netherlands. The degree of underestimation was lower than 5%.

Multivariate models for self-rated health

Misperception on tobacco smoking, frequency of drunkenness, and consumption of recreational drugs was associated with a lower self-rated health (Table 4). After correcting for personal consumption of tobacco, alcohol (including frequency of drunkenness) and recreational drugs, these associations remained significant. Misperception regarding the frequency of alcohol consumption was not significantly associated with self-rated health.

Multivariate models for academic functioning

Misperception on frequency of drunkenness and consumption of recreational drugs were both associated with worse academic functioning (more delay in the study program) (Table 4). The direction of the association was different between the two misperception variables; specifically, misperception regarding consumption of recreational drugs was associated with worse academic functioning, while misperception regarding the frequency of drunkenness was associated with better academic functioning. After correcting the models for personal consumption of tobacco, alcohol (including frequency of drunkenness) and recreational drugs, these associations remained significant.

Discussion

This was the first study to investigate associations between misperceptions regarding substance consumption and health and academic outcomes among university students in different cities in Europe. In addition, we aimed to gain insights into the contribution of personal substance consumption to the association between health and academic outcomes on the one hand, and misperception on the other hand. Our main finding revealed that misperception regarding alcohol, tobacco, and recreational drugs was significantly associated with unfavorable health and academic outcomes. However, this association could not be explained by personal consumption of tobacco, alcohol, and recreational drugs.

Misperception regarding substance use and health and academic outcomes

The high proportion of students with misperception regarding substance use is in line with a study in the US, in which the student participants overestimated alcohol use, drug use, and sexual behavior among peers (10, 20). According to Social

Table 1 Descriptive data of the populations per university, referred to as the country, expressed as column percentages.

University in	NL	BG	DM	SW	FL	Total
n	1265	659	2420	1696	364	6403
	%	%	%	%	%	%
Gender						
Male	34.4	38.5	43.3	22.8	70.3	37.2
Female	65.6	61.5	56.7	77.2	29.7	62.8
Age						
≤20 years	25.6	70.5	54.4	44.7	1.4	25.6
21–24 years	51.1	26.4	39.7	40.4	45.9	51.1
≥25 years	23.2	3.0	5.8	14.9	52.7	23.2
Course						
Business	0.6	15.3	14.8			0.6
Science	10.0	5.5	22.7			10.0
Medicine/health	26.6	15.4	20.8	100.0		26.6
Social science	29.0	14.7	14.6			29.0
Arts/humanities	31.2	5.8	19.9			31.2
Law	0.9	2.1	3.0			0.9
Education		9.6	0.7			
Policing					100.0	
Other	1.7	31.5	3.5			1.7
Health						
Excellent (1) – poor (5)[a]	2.2 (0.8)	2.2 (0.8)	2.3 (0.9)	2.6 (0.9)	2.0 (0.8)	2.3 (0.9)
Low academic functioning, %	33.3	21.2	23.2	14.2	1.9	21.4

[a]Data presented as mean (standard deviation). NL, The Netherlands; BG, Belgium; DM, Denmark; SW, Sweden; FL, Finland.

Norms Theory, misperception regarding substance use by peers is associated with increased personal consumption of substances. This was shown in studies in the US, where a positive relationship with actual behavior was observed, although the effect sizes were small (9, 11, 20). One study in France investigated correlates of smoking behavior in students and found that smoking behavior was associated with a high self-rated prevalence of smoking among friends (21).

Table 2 Descriptive results (column percentages) on substance use and misperception.

Substance use	n=6403	NL	BG	DM	SW	FL	Total
	n	1265	659	2420	1696	364	6403
Frequency of alcohol consumption in the past 30 days	Not at all	9.8	9.4	8.8	15.1	10.4	10.8
	Once a month	8.3	9.0	13.4	0	24.5	9.0
	2–3/month	15.4	18.8	32.2	18.9	41.5	24.5
	Once a week	16.0	15.5	20.5	29.2	14.6	21.0
	2/week	23.7	23.6	15.3	18.9	5.8	18.2
	3–4/week	20.9	18.5	7.3	13.9	2.7	12.6
	5–6 days/week	4.9	4.7	2.0	3.9	0.3	3.3
	Every day	0.9	0.5	0.6	0.2	0.3	0.5
Frequency of drunkenness in the last month	Not al all	41.2	35.1	27.6	37.5	32.2	34.0
	Once a month	26.4	25.9	30.0	33.3	41.6	30.4
	2–3/month	15.5	15.7	25.4	20.2	20.7	20.8
	Once a week	9.7	9.6	11.0	6.6	3.9	9.0
	2/week	5.1	8.7	5.0	2.0	0.6	4.3
	3–4 days/week	1.3	4.0	0.6	0.4	0.6	1.0
	5–6 days/week	0.6	0.6	0.2	0	0.3	0.3
	Every day	0.3	0.5	0.2	0	0.3	0.2
Smoking tobacco		23.0	26.9	17.8	8.9	19.2	17.5
Using recreational drugs		18.8	16.6	6.9	4.4	0.5	9.2

NL, The Netherlands; BG, Belgium; DM, Denmark; SW, Sweden; FL, Finland.

Table 3 Social norms and misperception figures in all countries.

Social norms and misperception	NL	BG	DM	SW	FL	Total
Social norm frequency of alcohol	2/week	2/week	2–3/month	1/week	2–3/month	2–3/month
Misperception on frequency of alcohol[a]	37.4	71.2	73.3	24.8	53.0	52.0
Social norm frequency of drunkenness	Never	Never	Once a month	Never	Once a month	Never
Misperception on frequency of drunkenness[a]	78.0	77.8	85.2	71.6	75.5	78.9
Social norm smoking tobacco	23.0	26.9	17.8	8.9	19.2	17.5
Misperception on tobacco smoking[a]	79.4	88.1	81.5	82.8	83.8	82.2
Social norm recreational drug use	18.8	16.6	6.9	4.4	0.5	9.2
Misperception on recreational drug use[a]	65.2	61.9	60.9	32.0	5.2	51.0

[a]Percentage of students with estimates higher than the norm. NL, The Netherlands; BG, Belgium; DM, Denmark; SW, Sweden; FL, Finland.

An increase of substance use, resulting from misperception regarding substance use by peers affects health and academic outcomes (3–6). However, the present results showed that although misperception was associated with suboptimal self-rated health, this could not be explained by personal substance use. Since this is a cross sectional study, cause and consequence cannot be distinguished; thus, it remains unknown whether students who overestimate the frequency of alcohol consumption by peer students would experience suboptimal self-rated health or whether students with a suboptimal self-rated health are more likely to overestimate substance use by peer students. This cause and consequence issue was addressed previously by Neighbors and colleagues, who suggested the influence of norms on behavior was larger than the influence of behavior on norms (22).

Misperception regarding frequency of alcohol consumption was not associated with suboptimal self-rated health. This may be explained by the fact that different from smoking tobacco and using recreational drugs, drinking alcohol does not have a negative effect on health when consumption is limited to small amounts (23). Unfortunately, we only collected information about the frequency of drunkenness and not the quantity of alcohol students were drinking. It can be assumed that students only drank small amounts on a frequent basis, which may explain the lack of association with health or academic outcomes. Surprisingly, misperception regarding frequency of drunkenness was associated with better academic functioning. However, only a small proportion of students (7.7%) did not have misperception regarding frequency of drunkenness, leading to empty cells in the multivariate models.

When considering academic functioning, only misperception regarding drunkenness and consumption of recreational drugs were significantly associated with academic functioning. This may be explained by the fact that being drunk and using recreational drugs can be expected to have more direct effects on studying at university, such as hangovers or fatigue after using XTC, rather than the health effects of smoking, that need a longer time to develop (e.g., lung disorders).

The results of this study showed that the associations between reduced health and academic performance and misperception cannot be explained by an increased personal use of substances by students, as would be expected from Social Norms Theory (7). Given that this is a cross-sectional study, cause and consequence cannot be distinguished, and as such, the following hypotheses can be formulated: 1) misperception regarding substance use by peers effects health and academic performance independent of personal consumption of substances, and 2) students with low health and worse academic performance are more likely to have misperception regarding substance use by peers. Future research with a longitudinal design is needed to confirm or reject any of these hypotheses.

Table 4 Models for misperception as a determinant of self-rated health and academic functioning delay, separate analyses for tobacco, frequency of alcohol consumption, frequency of drunkenness and recreational drugs, separate for self-rated health and academic functioning.

Dependent variable		Lower self-rated health			Worse academic functioning		
Misperception regarding		OR	95% CI		OR	95% CI	
			Lower	Upper		Lower	Upper
Tobacco smoking	Crude	**1.19**	**1.04**	**1.37**	1.03	0.88	1.21
	Adjusted[a]	**1.19**	**1.03**	**1.36**	1.02	0.87	1.20
Frequency of alcohol consumption	Crude	0.95	0.85	1.05	1.10	0.97	1.24
	Adjusted[a]	0.95	0.85	1.05	1.13	0.99	1.28
Frequency of drunkenness	Crude	**1.25**	**1.03**	**1.52**	**0.74**	**0.59**	**0.93**
	Adjusted[a]	**1.30**	**1.07**	**1.59**	**0.75**	**0.60**	**0.95**
Consumption of recreational drugs	Crude	**1.19**	**1.07**	**1.34**	**1.32**	**1.16**	**1.50**
	Adjusted[a]	**1.20**	**1.08**	**1.35**	**1.30**	**1.14**	**1.48**

[a]Models adjusted for university, personal consumption of tobacco, alcohol and recreational drugs. Bold values indicate $p<0.05$. OR, Odds ratio; CI, confidence interval.

Methodological considerations

The results of this study should be interpreted with caution due to the fact that the data were collected in different countries, where cultural and legislative differences exist. Nevertheless, these cultural differences can be considered small, since only students from North-Western European countries participated in this study. However, differences between countries, cities, and universities with regards the prevalence of substance consumption are overcome since we determined the social norms and misperception per university. In addition, it should be mentioned that since we included only one university per country, we investigated differences between universities or cities, rather than countries. The data rely on self reports regarding consumption of tobacco, alcohol, and recreational drugs. Previous research, however, has shown that young people are capable of giving valid reports about their consumption of alcohol (19).

The social norms in this study are based on the norm set by the participants. It is likely that students who drink alcohol more often are less likely to complete the questionnaire, although the high percentage of misperception has been presented in other studies as well (9–11). A final remark on the social norms in this study is that misperception has been defined as an overestimation of actual consumption, and not an underestimation. In our study, only a small percentage of respondents underestimated the consumption of substances by their peers. Given that overestimation is a risk factor for increasing personal consumption according to social norms theory, we decided to focus on overestimation only. Finally, the results of this study rely on self-reported data of a selection of student populations of all universities stated above. With the low response rates in some countries, we have to keep in mind that this group of participants may not be a representative sample of all students in those countries. Moreover, since our research aim is not to investigate prevalence, but the associations between variables, we do not expect that selection bias can have a large effect on the results presented here.

Conclusions

From the results of this study, it can be concluded that for university students in North-Western Europe, their misperception of substance use by their peers is associated with unfavorable health and academic outcomes. Although this is a cross-sectional study, this finding subscribes to the results of earlier work on the importance of social norms. The associations between misperception and health and academic outcomes are independent of an increase in personal consumption of substances through misperception. Future research is needed to gain insights into whether students with worse health and academic performance are more likely to have misperceptions regarding substance use by peers, or whether having misperceptions regarding substance use by peers negatively influences health and academic performance of university students.

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