Personal and perceived peer use and attitudes towards use of non-prescribed sedatives and sleeping pills among university students in seven European countries

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Abstract

Introduction: The use of non-prescribed sedatives and sleeping pills among university students has been described as an important public health issue. However, the impact of perceived social norms on students' use and attitudes towards use of non-prescribed sedatives and sleeping pills (NPSSP) is still unclear. Our aim was to investigate whether perceptions of peer use and approval of use are associated with students' personal use and approval of NPSSP use.

Methods: Cross-sectional data from the Social Norms Intervention for the Prevention of Polydrug Use (SNIPE) project containing 4,482 university students from seven European countries were analyzed to investigate self-other discrepancies regarding personal use and attitudes towards NPSSP use. Associations between personal and perceived peer use and between personal and perceived approval of use were examined using multivariable logistic regression.

Results: The majority (51.0%) of students perceived their peers' NPSSP use to be higher than their personal use. 92.6% of students perceived their peers' approval of NPSSP use to be identical or higher than their personal approval. Students perceiving that the majority of peers had used NPSSP at least once displayed higher odds for personal lifetime use (OR: 1.95, 95% CI: 1.49-2.55). Perceived peer approval of NPSSP use was associated with higher odds for personal approval (OR: 5.49, 95% CI: 4.63-6.51).

Conclusions: Among European university students, perceiving NPSSP use and approval of use to be the norm was positively associated with students' personal NPSSP use and approval of use, respectively. Interventions addressing perceived social norms may prevent or reduce NPSSP use among university students.

Final trial registration number: DRKS00004375 on the 'German Clinical Trials Register'.

Keywords: university students; non-medical use; sedatives; sleeping pills; perceptions; social norms

1. Introduction

The non-medical use of prescription drugs, particularly among young adults, has been recognized as an important public health issue worldwide (Martins & Ghandour, 2017). The misuse of several prescription drugs, such as stimulants, opioids, or tranquilizers, is associated with a high potential for addiction and other serious physical and psychosocial consequences (United Nations Office on Drugs and Crime, 2011). However, prescription drugs are often perceived to be safer, and more socially acceptable than most illicit drugs, because they are produced by pharmaceutical companies and usually prescribed by physicians (Bodenlos, Malordy, Noonan, Mayrsohn, & Mistler, 2014; Compton & Volkow, 2006; Hildt, Franke, & Lieb, 2011; Martins & Ghandour, 2017).

The non-medical use of prescription drugs among university students may serve as a coping strategy to manage the demands of university life and to achieve a better work-life balance (Hildt, Lieb, & Franke, 2014; Jensen, Forlini, Partridge, & Hall, 2016; Maier, Liechti, Herzig, & Schaub, 2013). The phenomenon of taking prescription drugs for the purpose of improving cognitive performance (e.g., alertness, concentration, or memory) has been termed *pharmacological cognitive enhancement* or *brain doping* (Partridge, Bell, Lucke, Yeates, & Hall, 2011). Further, evidence indicates that university students use sedatives to improve sleep or relax after stressful days, thus aiming to improve cognitive performance the next day. This is also referred to as *indirect cognitive enhancement* (Maier, et al., 2013; Maier & Schaub, 2015). Academic performance-enhancing drugs and sedatives are often used in combination: while performance-enhancing drugs are used to achieve the highest possible performance level during the day, sedatives are used to aid relaxation (Maier, et al., 2013).

Typically, peers have a significant impact on young adults' behaviors and their attitudes, and people tend to adapt their personal behavior to match that of their peers (Borsari & Carey, 2001). However, a growing body of evidence indicates that young people's perceptions of their peers' behaviors (*descriptive norms*) and attitudes towards behaviors (*injunctive norms*) are often inaccurate (Berkowitz, 2005; Perkins, 2003). University students tend to falsely believe that their peers behave or approve of behaviors differently from actual prevailing norms (*misperceptions*) (Berkowitz, 2005; Perkins, 2003), and from their personal behavior and approval of behavior (*self-other discrepancies*) (Borsari & Carey, 2001). Young people generally overestimate how riskily their peers behave. These misperceptions of other's behavior or attitudes towards behavior represent the basis for the adaptation of personal behavior and attitude towards the perceived norm (Berkowitz, 2005). Most research on misperceptions of health-related behaviors among university students originated in the U.S.A. and particularly refers to descriptive norms regarding alcohol consumption (Borsari & Carey, 2001; Perkins, 2014). In recent years, these findings were replicated in Europe (McAlaney, Bewick, & Hughes, 2011; McAlaney, et al., 2015). These studies show that exaggerated perceptions of peer alcohol consumption are associated with increased personal alcohol consumption among university

students (Borsari & Carey, 2001; McAlaney, et al., 2011; McAlaney, et al., 2015; Perkins, 2014). There is further evidence on university students' misperceptions of their peers' use of tobacco and illicit substances (e.g., marijuana, cocaine, ecstasy, and amphetamines) (Arbour-Nicitopoulos, Kwan, Lowe, Taman, & Faulkner, 2010; Bertholet, Faouzi, Studer, Daeppen, & Gmel, 2013; Dempsey, et al., 2016; Helmer, et al., 2014; Kilmer, et al., 2006; Martens, et al., 2006; Perkins, Meilman, Leichliter, Cashin, & Presley, 1999; Pischke, et al., 2015), as well as regarding risky sexual behavior (Martens, et al., 2006).

Several studies have examined misperceptions or self-other discrepancies about the non-medical use of prescription drugs, as well as associations between descriptive norms and personal use, particularly regarding prescription stimulants (Helmer, et al., 2016; Kilmer, Geisner, Gasser, & Lindgren, 2015; McCabe, 2008; Sanders, Stogner, Seibert, & Miller, 2014; Silvestri & Correia, 2016), with only one study, to date, investigating sedative use (Sanders, et al., 2014). Perceived approval among peers for the use of non-prescribed stimulants at the same university (Helmer, et al., 2016) and perceived approval among close friends, or by the typical university student or parents (Silvestri & Correia, 2016), were positively associated with personally approving such substances among university students. The role of perceived injunctive norms regarding non-medical use of sedatives, however, has not been investigated so far.

The present study aimed to investigate self-other discrepancies regarding the use and attitudes towards using non-prescribed sedatives and sleeping pills (NPSSP) in a sample of university students from seven European countries. We also aimed to investigate if perceptions of peer use (perceived descriptive norm) and peer approval of use (perceived injunctive norm) were associated with personal use and approval of NPSSP use in our study population.

2. Material and Methods

2.1 Data

This analysis is based on data from the 'Social Norms Intervention for the prevention of Polydrug usE' (SNIPE) project funded by the European Commission (LS/2009-2010/DPIP/AG). SNIPE was a cross-national study including students from universities in Belgium, Denmark, Germany, the Slovak Republic, Spain, Turkey, and the United Kingdom (UK). An overview of the SNIPE study is provided by Pischke and colleagues (2012). In brief, SNIPE aimed to test the feasibility of a web-based, personalized 'social norms'-feedback for the prevention of licit and illicit substance use for European university students. Participants were recruited from one or more designated intervention and delayed-intervention control universities (21 sites in total) (McAlaney, et al., 2015). Recruitment methods aimed at increasing students' registrations on the survey website varied between countries and included, inter alia, emails, classroom announcements, social media, and printed flyers. Students

who registered on the website received an email including a hyperlink to the survey webpage. Study participation was voluntary, and participants' information was pseudonymized. For the analysis reported in this manuscript, baseline data from both, students at intervention and students at delayed-intervention control universities, were considered. Statistical analysis was conducted on an anonymized dataset. For each site participating in the SNIPE project, ethical approval was obtained from the respective responsible authorities. Participants answered questions on their personal use of licit (i.e., alcohol, tobacco), and illicit substances (e.g., cocaine, ecstasy, amphetamines), as well as on their personal use of substances to improve academic performance and NPSSP. Further questions related to the students' personal attitudes towards use of the aforementioned substances. Moreover, perceptions of peer substance use and attitudes towards substance use were assessed. Demographic questions, such as on the participants' age, sex, migrant status, and living situation (living with or without other students), were also included.

2.2 Measurements

Students' personal use of NPSSP was measured by asking how often they used sedatives or sleeping pills which were not prescribed, followed by a list of active ingredients as examples for NPSSP (e.g., diazepam, alprazolam, flunitrazepam, midazolam, stilnoct). Perceptions of peer NPSSP use (perceived descriptive norm) were assessed by asking students how often in the last two months they think most (at least 51%) of the [female in case of a female respondent/male in case of a male respondent] students at their university have used sedatives or sleeping pills which were not prescribed, followed by a list of active ingredients as examples for NPSSP (e.g., diazepam, alprazolam, flunitrazepam, midazolam, stilnoct). These questions were tailored to the same sex and university of the respondents. Response options for both questions were 'Never in my/their life', 'Have used but not in the last two months', 'Once in the last two months', 'Twice in the last two moths', 'Once every two weeks in the last two months', 'Weekly', 'Twice a week', 'Thrice a week', 'Four times a week', and 'Every day or nearly every day'. Furthermore, information about students' personal attitude towards NPSSP use was collected by asking: "Which of the following best describes your attitude to using each of these substances?". Concerning students' perceptions of attitudes towards using NPSSP among their peers (perceived injunctive norm), respondents were asked: "Which of the following do you think best describes the attitude of most (at least 51%) of the [female/male] students at your university to the use of each of these substances?". Response options for both questions were 'Never ok to use', 'Ok to use occasionally if it doesn't interfere with work or study', 'Ok to use frequently if it doesn't interfere with work or study', 'Ok to use occasionally even if it does interfere with work or study', and 'Ok to use frequently if that is what the person wants to

do'. Country, sex, age, year of study, and living situation were considered as potential determinants of NPSSP use/attitude towards NPSSP use.

2.3 Statistical analysis

First, frequencies of personal NPSSP use and attitudes towards NPSSP use were calculated and 95% bootstrap confidence intervals based on 1,000 bootstrap samples were estimated for each country, separately. Second, participants' self-other discrepancies were classified into three groups to differentiate between students who perceived the NPSSP use and approval of NPSSP use of the majority of their same-sex peers as higher, identical or lower as their personal use and approval of use. Third, two binary multivariable logistic regression analyses were conducted to examine associations between perceived and personal NPSSP use (descriptive norms model), and perceived and personal attitudes towards NPSSP use (injunctive norms model). In the descriptive norms model, country, sex, age, year of study, living situation, perceived NPSSP use, and personal attitude towards NPSSP use were included as independent variables. In the injunctive norms model, all demographic variables, perceived attitude towards NPSSP use, and personal NPSSP use were included as independent variables. All variables were entered simultaneously (enter method).

Age was included as a continuous variable, and all other variables were considered as categorical variables. Both models were checked for the presence of multicollinearity. Tolerance (TOL) values for both models ranged from 0.90 to 1.00 indicating absence of multicollinearity between independent variables. To investigate whether sex or country moderates the associations between perception and personal NPSSP use/attitude towards NPSSP use, the two relevant interaction terms were added to both regression models. For significant interaction terms ($p < 0.05$), stratified analyses were conducted. All statistical analyses were performed using SPSS for windows, version 22.0.

3. Results

The SNIPE study included a total of 4,482 university students (71.4% female, mean age: 22.4 years). The Slovak Republic (n=1,938, 43.2%) contributed the highest number of students, followed by Turkey (n=858, 19.1%), Germany (n=504, 11.2%), Denmark (n=464, 10.4%), Belgium (n=426, 9.5%), Spain (n=185, 4.1%), and the UK (n=107, 2.4%). A detailed description of the sample characteristics is provided by Helmer et al. (2014). Information on sex and NPSSP use was provided by 4,412 students, and 4,284 additionally answered the question regarding their attitude towards using NPSSP.

Across all participating countries, 9.1% of the students reported having used NPSSP at least once in life. Lifetime prevalence rates of NPSSP use varied from 4.0% of females and 2.3% of males in Belgium to 12.5% of females and 18.2% of males in the UK. Across all countries, most students

stated that ‘it is never okay to use’ NPSSP with rates varying from 56.8% of females in Germany and 62.5% of males in the UK to 84.7% of females and 91.2% of males in Turkey (Table 1).

Table 1 Personal NPSSP use and attitude towards NPSSP use by country and sex (% and 95% bootstrap CI)

	Belgium		Denmark		Germany		Slovak Republic	
NPSSP use (*n*=4,412)	*Male* (*n*=86)	*Female* (*n*=321)	*Male* (*n*=100)	*Female* (*n*=353)	*Male* (*n*=207)	*Female* (*n*=295)	*Male* (*n*=393)	*Female* (*n*=1,524)
Used in the last two months	1.2 (0.0-3.8)	1.2 (0.3-2.6)	1.0 (0.0-3.3)	1.7 (0.6-3.3)	2.9 (0.9-5.4)	3.1 (1.2-5.2)	1.5 (0.5-2.9)	2.7 (1.9-3.5)
Used at least once in life	2.3 (0.0-5.8)	4.0 (2.1-6.3)	9.0 (3.6-14.7)	5.9 (3.4-8.6)	11.1 (6.7-15.6)	10.2 (6.6-13.7)	6.4 (3.9-8.9)	11.6 (10.0-13.2)
Attitude towards NPSSP use (*n*=4,284)	*Male* (*n*=85)	*Female* (*n*=316)	*Male* (*n*=95)	*Female* (*n*=348)	*Male* (*n*=203)	*Female* (*n*=292)	*Male* (*n*=384)	*Female* (*n*=1,489)
Never ok to use	83.5 (75.0-91.5)	72.2 (67.1-77.1)	65.3 (55.9-74.0)	75.3 (70.7-79.6)	64.0 (57.1-70.4)	56.8 (51.0-62.6)	83.3 (79.4-86.9)	73.1 (70.8-75.4)
Ok to use if it doesn't interfere with work or study[a]	15.3 (7.9-23.5)	26.2 (21.6-31.6)	28.4 (20.6-37.5)	21.3 (17.3-25.9)	30.0 (23.9-37.0)	38.0 (32.4-43.7)	15.1 (11.7-18.8)	25.6 (23.4-27.8)
Ok to use[b]	1.2 (0.0-3.8)	1.3 (0.3-2.8)	6.3 (2.0-11.8)	3.4 (1.7-5.3)	5.9 (2.7-9.5)	5.1 (2.7-7.9)	1.6 (0.5-3.1)	1.3 (0.8-2.0)

	Spain		Turkey		UK	
NPSSP use (*n*=4,412)	*Male* (*n*=52)	*Female* (*n*=132)	*Male* (*n*=398)	*Female* (*n*=446)	*Male* (*n*=33)	*Female* (*n*=72)
Used in the last two months	1.9 (0.0-6.7)	4.5 (1.5-8.3)	2.0 (0.8-3.5)	2.5 (1.1-3.9)	12.1 (2.9-24.2)	4.2 (0.0-9.2)
Used at least once in life	11.5 (3.8-20.5)	12.1 (6.4-18.2)	5.5 (3.6-7.9)	9.9 (7.2-12.6)	18.2 (6.5-31.4)	12.5 (5.5-21.1)
Attitude towards NPSSP use (*n*=4,284)	*Male* (*n*=51)	*Female* (*n*=126)	*Male* (*n*=375)	*Female* (*n*=419)	*Male* (*n*=32)	*Female* (*n*=69)
Never ok to use	64.7 (51.1-78.3)	65.9 (57.6-73.8)	91.2 (88.4-93.9)	84.7 (81.1-88.1)	62.5 (45.7-80.0)	73.9 (62.9-83.8)
Ok to use if it doesn't interfere with work or study[a]	33.3 (20.0-46.9)	31.7 (23.7-39.8)	6.1 (3.9-8.8)	13.6 (10.3-17.1)	34.4 (17.7-51.9)	24.6(15.2-34.8)
Ok to use[b]	2.0 (0.0-6.9)	2.4 (0.0-5.5)	2.7 (1.0-4.5)	1.7 (0.5-3.0)	3.1 (0.0-10.0)	1.4 (0.0-4.6)

[a] 'Ok to use occasionally if it doesn't interfere with work or study' and 'Ok to use frequently if it doesn't interfere with work or study' were collapsed into 'Ok to use if it doesn't interfere with work or study'.

[b] 'Ok to use occasionally even if it does interfere with work or study' and 'Ok to use frequently if that is what the person wants to do' were combined into 'Ok to use'.

In all countries, except for Denmark (45.4%) and Turkey (43.9%), more than half (54.8%) of the students thought that at least 51% of their same sex-peers had used NPSSP at least once in their life. Overall, 51.0% perceived their peers' NPSSP use to be higher than their personal NPSSP use, 46.0% to be identical, and 3.0% to be lower. With regard to attitudes towards NPSSP use, 45.1% perceived that the majority of their peers approved of NPSSP use. Overall, the majority of students perceived that the peer approval towards NPSSP use was identical (62.9%) or higher (29.7%) than their personal approval (Table 2).

Table 2 Differences between personal NPSSP use/attitude towards NPSSP use and perceived NPSSP use/ attitude towards NPSSP use of the majority of peers of the same sex and university (self-other discrepancies)

	Lifetime NPSSSP use (%) (*n*=4,310)	Positive attitude towards NPSSP use[a] (%) (*n*=4,178)
Majority of same-sex peers < personal	3.0	7.4
Majority of same-sex peers = personal	46.0	62.9
Majority of same-sex peers > personal	51.0	29.7

[a] 'okay to use' and 'okay to use if it doesn't interfere with work or study'

After controlling for students` country, sex, age, year of study, living situation, and attitude towards NPSSP use, the perception that the majority of same-sex peers had used NPSSP at least once in their life was significantly associated with a higher likelihood for personal lifetime NPSSP use (OR: 1.95, 95% CI: 1.49-2.55) (Table 3).. Moreover, after controlling for all demographic variables and NPSSP use, perceived peer approval of NPSSP use was associated with higher odds for personal approval of NPSSP use (OR: 5.49, 95% CI: 4.63-6.51) (Table 4)

Table 3 Associations between personal NPSSP use and perceived lifetime NPSSP use of peers, personal attitude of NPSSP use, country, age, sex, year of study, and living situation – results of a binary logistic regression

Variables	Ever personally used NPSSP	
	OR	(95% CI)
Perceived peer behavior: never used NPSSP (reference)	1.00	
Perceived peer behavior: ever used NPSSP	1.95	(1.49-2.55)
Never ok to use NPSSP (reference)	1.00	
Ok to use NPSSP	7.42	(5.81-9.49)
Country		
Slovak Republic (reference)	1.00	
Belgium	0.24	(0.14-0.43)
Denmark	0.32	(0.20-0.52)
Germany	0.47	(0.32-0.70)
Spain	0.70	(0.41-1.22)
Turkey	0.99	(0.70-1.40)
UK	1.01	(0.52-1.94)
Age (in years)	1.04	(1.01-1.07)
Sex		
Female (reference)	1.00	
Male	0.82	(0.63-1.09)
Year of study		
1st (reference)	1.00	
2nd	0.78	(0.57-1.07)
3rd	1.13	(0.83-1.54)
4th	0.89	(0.60-1.31)
5th	0.66	(0.39-1.10)
> 5th	0.70	(0.35-1.41)
Living situation		
With other students (reference)	1.00	
Alone or with partner	2.04	(1.45-2.85)
With parents	1.06	(0.80-1.40)
Other	1.74	(0.94-3.23)

Table 4 Associations between personal attitude towards NPSSP use and perceived attitude of peers, personal NPSSP use, country, age, sex, year of study, and living situation – results of a binary logistic regression

Variables	Positive attitude towards NPSSP use[a]	
	OR	(95% CI)
Perceived peer attitude towards NPSSP use: never ok to use (reference)	1.00	
Perceived peer attitude towards NPSSP use: ok to use	5.49	(4.63-6.51)
Never used NPSSP (reference)	1.00	
Ever used NPSSP	7.03	(5.45-9.06)
Country		
Slovak Republic (reference)	1.00	
Belgium	0.99	(0.74-1.30)
Denmark	2.04	(1.49-2.80)
Germany	2.59	(2.00-3.36)
Spain	1.59	(1.09-2.34)
Turkey	0.54	(0.41-0.71)
UK	1.20	(0.72-1.99)
Age (in years)	0.97	(0.95-0.99)
Sex		
Female (reference)	1.00	
Male	0.84	(0.70-1.02)
Year of study		
1st(reference)	1.00	
2nd	0.84	(0.68-1.04)
3rd	0.99	(0.78-1.24)
4th	1.02	(0.77-1.37)
5th	1.04	(0.73-1.47)
> 5th	0.97	(0.60-1.54)
Living situation		
With other students (reference)	1.00	
Alone or with partner	0.82	(0.64-1.06)
With parents	1.06	(0.87-1.28)
Other	0.63	(0.39-1.02)

[a] 'okay to use' and 'okay to use if it doesn't interfere with work or study'

Interaction terms in the descriptive norms model provided no evidence that the effect of perception on personal lifetime NPSSP use was modified by country or sex. In terms of injunctive norms, significant interaction terms suggested that the effect of perception on personal attitude towards NPSSP use was significantly modified by country, but not by sex. A stratified analysis of injunctive norms by country showed that the association between perception of peer approval and personal approval was significant for all countries, except for the UK (Table 5).

Table 5 Association between personal attitude towards NPSSP use and perceived attitude of peers stratified by country (OR and 95% CI) adjusted for personal NPSSP use, age, sex, year of study, and living situation

Country	Positive attitude towards NPSSP use[a]	
	OR	(95% CI)
Slovak Republic	6.02	(4.64-7.81)
Belgium	2.79	(1.60-4.87)
Denmark	16.40	(9.37-28.73)
Germany	4.11	(2.69-6.29)
Spain	3.52	(1.66-7.47)
Turkey	6.41	(3.80-10.80)
UK	1.79	(0.52-6.10)

[a] 'okay to use' and 'okay to use if it doesn't interfere with work or study'

4. Discussion

In the present study with European students, we investigated self-other discrepancies regarding the use and attitudes towards the use of NPSSP. In addition, we evaluated whether perceptions of peer use (perceived descriptive norm) and peer approval of use (perceived injunctive norm) were associated with personal use and approval of NPSSP use. In our study, students on average perceived the NPSSP use of their peers to be higher than their personal use and attitudes towards the use to be identical or more positive than their personal attitudes. Both, perceived descriptive and injunctive norms of peers, were associated with students' personal use and attitudes towards the use of NPSSP, respectively.

To date, there are few studies on the use of non-prescribed sedatives and sleeping pills among students. The only study that examined perceptions with respect to sedatives by Sanders and colleagues (2014) found that 65.7% of students perceived the recreational non-medical use of prescription sedatives to be the norm among their peers despite only 2.6% of the sample reporting recreational use of these substances during the last month. More than a third of participants overestimated (26.3%) or extremely overestimated (10.2%) their peers' use, and recreational users of prescription sedatives were more likely to overestimate their peers' use of these substances (Sanders, et al., 2014). These findings are in line with our study. The results reported by Sanders and colleagues (2014), however, are based on bivariate analyses and thus did not account for further potential determinants of students' personal sedative use, such as sex or age.

Our study extends the limited evidence regarding the association of perceived descriptive norms of peers with university students' personal use of NPSSP. Indeed, our study adds to the existing evidence by revealing self-other discrepancies regarding NPSSP use in a large sample of university students from various universities across Europe. Across all countries participating in the SNIPE study, the majority of students perceived their peers' use to be higher than their personal use. Furthermore, we

demonstrated associations between perceived peer use and students' personal use while controlling for other potential determinants of NPSSP use ensuring further methodological rigor to our study.

The present study is the first to demonstrate discrepancies between personal and perceived peer injunctive norms regarding NPSSP use by investigating self-other discrepancies and associations between perceived injunctive norms and students' personal approval of NPSSP use. To date, associations between perceived injunctive norms and personal approval of using non-prescribed substances have only been investigated for stimulants (Helmer, et al., 2016; Silvestri & Correia, 2016), not for sedatives or sleeping pills. Silvestri and Correia (2016), analyzing data from 959 U.S. undergraduate students, found that students' personal approval of non-medical prescription stimulant use was positively correlated with perceived approval among what students perceived to be a typical university student, close friends, as well as parents. However, the correlations between perceived parental and close friend approval with personal approval were moderate in strength with weak associations between perceived typical student approval and personal approval. This suggests that more proximal referent groups, rather than students' broader group affiliations, could be important in determining personal approval of stimulant use. Another study by Helmer and colleagues (2016), also using data from the SNIPE study, found that 38.7% of students perceived their peers to be more approving of using non-prescribed stimulants to improve their academic performance than themselves. Their multivariable analysis also revealed an association between perceived peer and personal approval of using these substances. In our study, an association between perceived injunctive norms of peers and students' personal approval of using NPSSP was found for all countries participating in the SNIPE project, except for the UK, with its comparatively small sample size.

The findings of this study align with previous observations that university students' exaggerated perceptions of peer norms also exist for prescription substances which are less commonly used and socially accepted than, for example alcohol, tobacco, or cannabis (Helmer, et al., 2016; Kilmer, et al., 2015; McCabe, 2008; Perkins, et al., 1999; Sanders, et al., 2014; Silvestri & Correia, 2016). Increased interest in the non-medical use of prescription drugs to the public and the media (Partridge, et al., 2011) may create the impression that approving and using these substances is much more common than it is in reality (McCabe, 2008; Sanders, et al., 2014). Perceiving prescription drugs to be safer, and socially acceptable because of their production by pharmaceutical companies and their prescription by physicians (Bodenlos, et al., 2014; Compton & Volkow, 2006; Hildt, et al., 2011; Martins & Ghandour, 2017) may also explain exaggerated peer norms.

The identification of perceived descriptive and injunctive norms of peers as significant predictors of students' NPSSP use and approval of use provides empirical arguments for the important role of social norms for personal behaviors and approval of behaviors. In line with social norms theory (Berkowitz, 2005; Perkins, 2003), our findings may indicate that exaggerated perceptions of

descriptive norms of peers may increase students' willingness to use NPSSP themselves. Moreover, exaggerated perceptions of injunctive norms of peers may also lead to an increased approval of using NPSSP in order to match personal attitudes to the perceived peer norms. Social norms interventions that challenge perceptions of descriptive and injunctive peer norms through, for example, mass media campaigns, social marketing strategies or the provision of online personalized feedback (McAlaney, et al., 2011; Perkins, 2003), may be a viable approach to prevent or reduce NPSSP use among European university students.

There are certain limitations to the present study. The analyses are based on self-reported data collected via a confidential online survey. This is a commonly used survey technique in substance use research among university students to minimize the risk of socially desirable response behavior (Kypri, Gallagher, & Cashell-Smith, 2004). However, in general, an under- or overestimation of NPSSP use and approval of use due to social expectation bias cannot be ruled out. Moreover, it is also possible that herbal products that are available without prescription have also been understood as non-prescription by participating students. Even if only registered local trade names have been provided to narrow down the scope, possible misunderstandings may have led to an over reporting bias.

Furthermore, it is to be noted that individual email addresses were collected for the intervention provided within the study and students may have perceived that they can be identified. The SNIPE questionnaire included only a selection of active ingredients (e.g., diazepam, alprazolam, flunitrazepam, midazolam, stilnoct) as examples for NPSSP which likewise may have led to an underestimation of use and approval rates. In addition, the number of participating students differed between countries, ranging from 107 individuals in the UK to 1,938 in the Slovak Republic. Therefore, selection bias may have differentially affected the sample composition in different countries. Finally, since the analyses are based on cross-sectional survey data, no causal relationships between perceived descriptive and injunctive norms and personal behavior and attitudes towards behavior can be deduced.

5. Conclusions

This study suggests that European university students perceive the use of NPSSP among their peers to be higher than their personal use and peer attitudes towards the use to be identical or more positive than their personal attitudes. Furthermore, both perceived descriptive and injunctive norms of peers were shown to be associated with students' personal use and attitudes towards the use of NPSSP, respectively. Social norms interventions may be useful to change exaggerated perceptions regarding the use and attitudes towards NPSSP use und may prevent or reduce NPSSP use among European university students.

Declarations of interest: none

References

Arbour-Nicitopoulos, K. P., Kwan, M. Y., Lowe, D., Taman, S., & Faulkner, G. E. (2010). Social norms of alcohol, smoking, and marijuana use within a Canadian university setting. *Journal of American College Health, 59*, 191-196.

Berkowitz, A. D. (2005). An overview of the social norms approach. In L. C. Ledermann & L. P. Steward (Eds.), *Changing the culture of college drinking: a socially situated prevention campaign* (pp. 193-214). Cresskill, NJ: Hampton Press.

Bertholet, N., Faouzi, M., Studer, J., Daeppen, J. B., & Gmel, G. (2013). Perception of tobacco, cannabis, and alcohol use of others is associated with one's own use. *Addiction Science & Clinical Practice, 8*, 15.

Bodenlos, J. S., Malordy, A., Noonan, M., Mayrsohn, A., & Mistler, B. (2014). Prescription drug attitudes questionnaire: development and validation. *Psychology, 05*, 1687-1693.

Borsari, B., & Carey, K. B. (2001). Peer influences on college drinking: A review of the research. *Journal of Substance Abuse, 13*, 391-424.

Compton, W. M., & Volkow, N. D. (2006). Abuse of prescription drugs and the risk of addiction. *Drug and Alcohol Dependence, 83 Suppl 1*, S4-7.

Dempsey, R. C., McAlaney, J., Helmer, S. M., Pischke, C. R., Akvardar, Y., Bewick, B. M., Fawkner, H. J., Guillen-Grima, F., Stock, C., Vriesacker, B., Van Hal, G., Salonna, F., Kalina, O., Orosova, O., & Mikolajczyk, R. T. (2016). Normative perceptions of cannabis use among European university students: associations of perceived peer use and peer attitudes with personal use and attitudes. *Journal of Studies on Alcohol and Drugs, 77*, 740-748.

Helmer, S. M., Mikolajczyk, R. T., McAlaney, J., Vriesacker, B., Van Hal, G., Akvardar, Y., Guillen-Grima, F., Salonna, F., Stock, C., Dempsey, R. C., Bewick, B. M., & Zeeb, H. (2014). Illicit substance use among university students from seven European countries: a comparison of personal and perceived peer use and attitudes towards illicit substance use. *Preventive Medicine, 67*, 204-209.

Helmer, S. M., Pischke, C. R., Van Hal, G., Vriesacker, B., Dempsey, R. C., Akvardar, Y., Guillen-Grima, F., Salonna, F., Stock, C., & Zeeb, H. (2016). Personal and perceived peer use and attitudes towards the use of nonmedical prescription stimulants to improve academic performance among university students in seven European countries. *Drug and Alcohol Dependence, 168*, 128-134.

Hildt, E., Franke, A. G., & Lieb, K. (2011). Pharmakologisches Neuroenhancement. Informationsquellen und Akzeptanz unter Studierenden. *Nervenheilkunde, 10*, 833-837.

Hildt, E., Lieb, K., & Franke, A. G. (2014). Life context of pharmacological academic performance enhancement among university students - a qualitative approach. *BMC Medical Ethics, 15*, 23.

Jensen, C., Forlini, C., Partridge, B., & Hall, W. (2016). Australian university students' coping strategies and use of pharmaceutical stimulants as cognitive enhancers. *Frontiers in Psychology, 7*, 277.

Kilmer, J. R., Geisner, I. M., Gasser, M. L., & Lindgren, K. P. (2015). Normative perceptions of non-medical stimulant use: associations with actual use and hazardous drinking. *Addictive Behaviors, 42*, 51-56.

Kilmer, J. R., Walker, D. D., Lee, C. M., Palmer, R. S., Mallett, K. A., Fabiano, P., & Larimer, M. E. (2006). Misperceptions of college student marijuana use: implications for prevention. *Journal of Studies on Alcohol and Drugs, 67*, 277-281.

Kypri, K., Gallagher, S. J., & Cashell-Smith, M. L. (2004). An internet-based survey method for college student drinking research. *Drug and Alcohol Dependence, 76*, 45-53.

Maier, L. J., Liechti, M. E., Herzig, F., & Schaub, M. P. (2013). To dope or not to dope: neuroenhancement with prescription drugs and drugs of abuse among Swiss university students. *PLoS One, 8*, e77967.

Maier, L. J., & Schaub, M. P. (2015). The use of prescription drugs and drugs of abuse for neuroenhancement in Europe. *European Psychologist, 20*, 155-166.

Martens, M. P., Page, J. C., Mowry, E. S., Damann, K. M., Taylor, K. K., & Cimini, M. D. (2006). Differences between actual and perceived student norms: an examination of alcohol use, drug use, and sexual behavior. *Journal of American College Health, 54*, 295-300.

Martins, S. S., & Ghandour, L. A. (2017). Nonmedical use of prescription drugs in adolescents and young adults: not just a Western phenomenon. *World Psychiatry, 16*, 102-104.

McAlaney, J., Bewick, B. M., & Hughes, C. (2011). The international development of the 'Social Norms' approach to drug education and prevention. *Drugs: Education Prevention and Policy, 18*, 81-89.

McAlaney, J., Helmer, S. M., Stock, C., Vriesacker, B., Van Hal, G., Dempsey, R. C., Akvardar, Y., Salonna, F., Kalina, O., Guillen-Grima, F., Bewick, B. M., & Mikolajczyk, R. T. (2015). Personal and perceived peer use of and attitudes toward alcohol among university and college students in seven EU countries: project SNIPE. *Journal of Studies on Alcohol and Drugs, 76*, 430-438.

McCabe, S. E. (2008). Misperceptions of non-medical prescription drug use: a web survey of college students. *Addictive Behaviors, 33*, 713-724.

Partridge, B. J., Bell, S. K., Lucke, J. C., Yeates, S., & Hall, W. D. (2011). Smart drugs "as common as coffee": media hype about neuroenhancement. *PLoS One, 6*, e28416.

Perkins, H. W. (2003). The emergence and evolution of the social norms approach to substance abuse prevention. In H. W. Perkins (Ed.), *The social norms approach to preventing school and college age substance abuse: a handbook for educators, counselors, and clinicians* (pp. 3-17). San Francisco: Jossey-Bass.

Perkins, H. W. (2014). Misperception is reality: the "reign of error" about peer risk behaviour norms among youth and young adults. In M. Xenitidou & B. Edmonds (Eds.), *The complexity of social norms* (pp. 11-36). Switzerland: Springer International Publishing.

Perkins, H. W., Meilman, P. W., Leichliter, J. S., Cashin, J. R., & Presley, C. A. (1999). Misperceptions of the norms for the frequency of alcohol and other drug use on college campuses. *Journal of American College Health, 47*, 253-258.

Pischke, C. R., Helmer, S. M., McAlaney, J., Bewick, B. M., Vriesacker, B., Van Hal, G., Mikolajczyk, R. T., Akvardar, Y., Guillen-Grima, F., Salonna, F., Orosova, O., Dohrmann, S., Dempsey, R. C., & Zeeb, H. (2015). Normative misperceptions of tobacco use among university students in seven European countries: baseline findings of the 'Social Norms Intervention for the prevention of Polydrug usE' study. *Addictive Behaviors, 51*, 158-164.

Pischke, C. R., Zeeb, H., Van Hal, G., Vriesacker, B., McAlaney, J., Bewick, B. M., Akvardar, Y., Guillen-Grima, F., Orosova, O., Salonna, F., Kalina, O., Stock, C., Helmer, S. M., & Mikolajczyk, R. T. (2012). A feasibility trial to examine the social norms approach for the prevention and reduction of licit and illicit drug use in European University and college students. *BMC Public Health, 12*.

Sanders, A., Stogner, J., Seibert, J., & Miller, B. L. (2014). Misperceptions of peer pill-popping: the prevalence, correlates, and effects of inaccurate assumptions about peer pharmaceutical misuse. *Substance Use & Misuse, 49*, 813-823.

Silvestri, M. M., & Correia, C. J. (2016). Normative influences on the nonmedical use of prescription stimulants among college students. *Psychology of Addictive Behaviors, 30*, 516-521.

United Nations Office on Drugs and Crime (2011). The non-medical use of prescription drugs: Policy direction issues. Vienna: United Nations. http://www.unodc.org/documents/drug-prevention-and-treatment/nonmedical-use-prescription-drugs.pdf Accessed 18 January 2018.