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 [1]

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ABSTRACT

Introduction: Research conducted in North America suggests students tend to overestimate tobacco use among their peers. This perceived norm may impact personal tobacco use. It remains unclear how these perceptions influence tobacco use among European students. The two aims were to investigate possible self-other discrepancies regarding personal use and attitudes towards use and to evaluate if perceptions of peer use and peer approval of use are associated with personal use and approval of tobacco use.

Methods: The EU-funded 'Social Norms Intervention for the prevention of Polydrug usE' study was conducted in Belgium, Denmark, Germany, Slovak Republic, Spain, Turkey and United Kingdom. In total, 4,482 students (71% female) answered an online survey including questions on personal and perceived tobacco use and personal and perceived attitudes towards tobacco use.

Results: Across all countries, the majority of students perceived tobacco use of their peers to be higher than their own use. The perception that the majority (>51%) of peers used tobacco regularly in the past two months was significantly associated with higher odds for personal regular use (OR: 2.66, 95% CI: 1.90-3.73). The perception that the majority of peers approve of tobacco use was significantly associated with higher odds for personal approval of tobacco use (OR: 6.49, 95% CI: 4.54-9.28).

Conclusions: Perceived norms are an important predictor of personal tobacco use and attitudes towards use. Interventions addressing perceived norms may be a viable method to change attitudes and tobacco use among European students, and may be a component of future tobacco control policy.

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1.1 INTRODUCTION

Despite the large reduction in global smoking prevalence rates for both men and women in the past three decades, the number of daily smokers is still on the rise worldwide (Wipfli & Samet, 2009). Currently, 1.3 billion people are estimated to smoke (Wipfli & Samet, 2009). Smoking and second-hand tobacco smoke exposure is associated with adverse health outcomes, such as cancer, respiratory or cardiovascular diseases (Eriksen, Mackay, & Ross, 2012). Six million deaths worldwide are attributable to tobacco use every year (World Health Organization, 2014). Low and middle-income countries are disproportionally affected as 80% of all tobacco users live and two thirds of all tobacco-related deaths occur in these countries (World Health Organization, 2014). Even in high-income countries, where substantial financial resources are allocated by governments towards the implementation of population-based tobacco-control strategies (Gallet & Catlin, 2009), rates of smoking remain relatively high (Lortet-Tieulent et al., 2013; Gallus et al., 2014). This is true for European countries and tends to be particularly true for younger populations (Huisman, Kunst, & Mackenbach, 2005). Approximately one in three males and one in four females in Europe under the age of 25 years is a smoker (Huisman, Kunst, & Mackenbach, 2005).

The lack of harmonization of implementation of tobacco-control strategies across Europe could explain the relatively high tobacco use in the region. There are considerable variations in the strategies (e.g., smoking bans, tobacco taxation, anti-tobacco media campaigns) adopted by individual countries and differences in the degree to which these strategies are enforced (Gallus et al., 2014). In some countries, such as Ireland, public smoking bans were introduced (starting in 2004) and strictly enforced and led to immediate reductions in tobacco-related mortality and morbidity (Stallings-Smith, Zeka, Goodman, Kabir, & Clancy, 2013; Stallings-Smith, Goodman, Kabir, Clancy, & Zeka, 2014). In contrast, in Germany, while federal smoke-free laws to ban smoking in public places were passed in 2007 (Federal non-smokers protection Act , 2007; Law to protect against the dangers of passive smoking, 2007), smoking ban exemptions of the introduced law were subsequently passed at the state level. As a consequence, reductions in smoking rates (from 2005-2009) were only noted

in those states with an early ratification of the law (Kohler & Minkner, 2014). Initiatives to harmonize tobacco control efforts across Europe, for example MPOWER (World Health Organization, 2014) which was launched in 2013, may result in more consistent reductions in smoking rates and associated morbidity and mortality in the decades to come.

National and local social norms regarding tobacco use may change when European countries begin to implement and enforce tobacco control strategies more stringently. These new strategies may lead to smoking becoming less visible in public and may weaken approval towards smoking. In the U.S. now several decades after the implementation of smoking bans the approval of smoking has progressively decreased (Robert Wood Johnson Foundation, 2014). Americans now endorse smoking bans and limits on advertisements for tobacco products more today than 20 years ago. In the younger segment of society (under 25 years) rates of smoking fell to under 20% in recent years and disapproval of tobacco use appeared to increase (Robert Wood Johnson Foundation, 2014). Such changes in social norms may manifest themselves in several decades in Europe. Efforts to change social norms in closed settings targeting groups at risk for smoking initiation or at risk for increased smoking might help address currently high rates of smoking among young European adults.

One promising closed setting to target social norms is universities. Students are faced with social and academic challenges and pressures when entering university. Strategies to cope with these pressures and to alleviate stress also include smoking (Nichter, Nichter, & Carkoglu, 2007; Kassel, Stroud, Paronis, 2003). . The role of both, *descriptive norms* (i.e., the perception of quantity and frequency of substance use in the peer group) as well as *injunctive* norms (i.e., the perception of approval of substance use in the peer group) (Borsari & Carey, 2003) in predicting personal tobacco use has been extensively researched at U.S. and Canadian college campuses (e.g., Edwards et al., 2008; Arbour-Nicitopoulos, Kwan, Lowe, Taman, Faulkner, 2010; Perkins, Meilman, Leichliter, Cashin, & Presley, 1999). For example, Perkins and colleagues (1999) conducted surveys on substance use, including tobacco, at 100 different college campuses and found that respondents substantially overestimated how often average students consumed the respective substance. On campuses where

no use was predominantly reported by students, only 6.6% of students accurately perceived that the average student did not consume any tobacco products. Conversely, more than three thirds of students falsely believed that the typical student consumed tobacco weekly; approximately 50% thought that students at their campus consumed tobacco daily. Interestingly, inflated misperceptions were also evident at campuses where monthly use of tobacco was common (i.e., median response). Here, ca. 90% of students perceived weekly or daily use as the most typical. Similar patterns were observed on campuses of historically black colleges and universities. In a sample of 2.277 African-American students, 90% overestimated the rate of smoking among their peers and this overestimation was associated with a >80% increased risk of smoking (Edwards et al., 2008). Arbour-Nicitopoulos and colleagues (2010) surveyed 1.203 Canadian students to assess campus substance use norms. Their results paralleled those in the U.S. The majority of respondents reported that the typical student on their campus had used cigarettes in the past month (86.6%). Further, this perception was associated with a three times increased likelihood to use cigarettes. Thus, at North-American campuses, students tend to overestimate smoking in their peers and these descriptive norms appear to influence personal use as well as initiation of use.

Injunctive norms have been widely researched in regard to alcohol use (e.g., Borsari & Carey, 2003; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Garnett, Crane, West, Michie, Brown, & Winstock, 2015), however; studies investigating their role regarding tobacco use remain sparse. One French study looked at the association between *proximal* (friends' approval) and *distal* (students' approval) *injunctive peer norms* and smoking status and quantity of cigarettes smoked by smokers (Riou Franca, Dautzenberg, Falissard, & Reynaud, 2009). The perception that friends approve of regular smoking was not associated with smoking status, but with a greater quantity of cigarettes consumed by current smokers (Riou Franca, Dautzenberg, Falissard, & Reynaud, 2009)..

In sum, data on descriptive and injunctive tobacco norms among European students remain sparse and there is a lack of work addressing social norms on tobacco use (McAlaney, Hughes, & Bewick, 2011). Hence, the current paper aimed to investigate descriptive and injunctive norms among college and university students and their association with personal tobacco use comparing baseline data of the 'Social Norms Intervention for the prevention of Polydrug usE' (SNIPE) study, a feasibility study conducted in seven European countries (for further detail, see below). Specifically, we investigated possible self-other discrepancies regarding personal use and attitudes towards use and evaluated if perceptions of peer use and peer approval of use were associated with personal use and approval of tobacco use. Based on the literature (Riou Franca, Dautzenberg, Falissard, & Reynaud, 2009; Arbour-Nicitopoulos, Kwan, Lowe, Taman, & Faulkner, 2010), we expected to find self-other discrepancies of perceptions of use and approval of tobacco among European university students and higher odds for engaging in smoking behavior in students with a perception that the majority of their peers uses and/or approves of tobacco use.

1.2 MATERIALS AND METHODS

1.2.1 Data:

This paper focuses on baseline data regarding tobacco use assessed in the SNIPE study, a multi-national cluster-controlled intervention trial to examine the feasibility of a web-based, personalized social norms feedback intervention for polydrug use in university students. An overview of the entire study, including a description of all work packages, the recruitment (including settings and locations) for the study, the registration process and the intervention, is provided elsewhere (Pischke et al., 2012; Helmer et al., 2014). Study registration started October 25th 2011. Students could fill in the baseline survey from mid-January – mid February 2012. Baseline recruitment was completed in all countries by mid-June 2012. Students were eligible for the study if they were over 18 years of age,

enrolled at their respective university and if they had an e-mail address. All students were invited to participate in the study via a website. Those agreeing to participate self-selected to the study. Briefly, the SNIPE study involved the development of a personalised feedback website for substance use for students from universities in Belgium, Denmark, Germany, the Slovak Republic, Spain, Turkey and the United Kingdom. The survey included questions on the student's personal use of tobacco and other licit and illicit substances, their attitudes towards the use of these substances and their perceptions of their peers' substance use behaviours and attitudes. Demographic data, including participant's age, gender, migrant status, year of study and living situation (with other students or not) were also collected. Study participation was voluntary. Research ethical approval was obtained from each site involved in the study.

1.2.2 Measurements:

To measure personal use of tobacco products, students were asked in an online survey how often they used tobacco (cigarettes, chewing tobacco, cigars, etc.). Response options ranged from 'never in my life' to 'every day or nearly every day in the last two months'. For this analysis, four categories of tobacco use were created: *Never* ('never in my life'), *not in the last two months* ('have used but not in the last two months'), *smoked in the last two months: At most twice a week (*from 'once or twice in the last two months' to 'twice every week in the last two months')*, smoked in the last two months: Three times a week or more often* (from 'three times every week in the last two months' to 'every day or nearly every day in the last two months').

Perceptions of rates of peer tobacco use were assessed using sex-specific items based on the corresponding personal use categories. The respondents were asked "How often in the last two months do you think most (at least 51%) of the [female/male] students at your university have used tobacco?" (*descriptive norm*). Data on personal and perceived peer attitudes towards tobacco use were collected with the following questions: "Which of the following best describes your attitude to

using tobacco?", "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 tobacco?" The latter question assesses the *injunctive norm* meaning the students' belief about the approval or disapproval of smoking in the peer group. Response options included 'Never ok to use', 'Ok to use occasionally if it doesn't interfere with study or work', 'Ok to use frequently if it doesn't interfere with study or work', 'Ok to use occasionally even if it does interfere with study or work', and 'Ok to use frequently if that is what the person wants to do'. The response option regarding potential interference with work might be surprising in the context of tobacco use. Tobacco use may interfere less with study or work (e.g., smoking breaks) than the use of other substances which were assessed in the SNIPE survey. However, the decision was to keep the response options consistent across all substances for comparison purposes. For the analysis examining the association between perceived attitudes of peers and own attitudes towards tobacco use in this paper, personal and perceived attitudes towards tobacco use were summarized into the two categories 'never ok to use' and 'ok to use'.

1.3 STATISTICAL ANALYSIS

Firstly, estimates for personal and perceived tobacco use by country and sex were generated. Secondly, the percentages of respondents who perceived the tobacco use of the majority of students of their own sex and university as higher/as identical/as lower as the report of the corresponding own behavior estimate were calculated. Subsequently, multinomial (for personal tobacco use) and binary logistic regression (for attitude towards tobacco use) analyses were performed to examine associations between perceived and personal tobacco use and attitudes towards tobacco use. Sex, age, year of study, and living situation (possible confounders) and perceived substance use/attitude towards tobacco use (independent variables) were included in the models. In the model with the outcome variable 'attitude towards tobacco use', personal tobacco use was also added as an independent covariate. Only persons with complete data in the variables above were included in the

analyses. To investigate whether sex or country moderates the association between perception and personal behaviour/attitude, the two relevant interaction terms were added to the regression models. Stratified analyses by variables were planned for those interactions that were significant at the $p<0.05$ level. Data analysis was performed using SPSS for windows, version 20.0.

1.4 RESULTS

The web-based questionnaire was completed by 4,482 university students (71.4% female) in 2012 choosing to participate in the survey. Overall, 39% of the male and 27% of the female students were using tobacco. A minority of participants in each country (5.2%) were foreign born. In the overall sample, participants from the Slovak Republic (43.2%, n=1,938) and Turkey (19.1%, n=858) accounted for more than half of the sample, followed by Germany (11.2%, n=504), Denmark (10.4%, n=464), Belgium (9.5% n=426), Spain (4.1%, n=185) and the UK (2.4%, n=107). A detailed description of sample characteristics is provided in Table A.1.

TABLE A.1 Sample characteristics by country *.

	Belgium (n = 424)	Denmark (n = 461)	Germany (n=503)	Slovak Republic (n =1931)	Spain (n=184)	Turkey (n=855)	United Kingdom (n=107)
Sex (%)							
Female	79.2	78.1	58.8	79.5	71.7	53.1	69.2
Male	20.8	21.9	41.2	20.5	28.3	46.9	30.8
Age Categories (%)							
<20	53.1	11.9	11.1	30.5	38.6	40.7	39.3
21-25	38.7	60.1	57.1	66.7	41.8	54.0	29.9
26-30	4.5	17.1	23.5	2.3	9.2	3.9	12.1
31+ years	3.8	10.8	8.3	0.5	10.3	1.4	18.7
**Foreign Student (%) ** **	7.5	11.7	7.0	1.1	9.2	4.2	33.6
Residence (% living with other students)	21.6	12.1	35.8	51.5	22.3	26.2	50.5
Religion (%)							
Christian	58.6	55.7	48.3	81.4	53.3	0.5	30.2
Muslim	3.1	1.7	1.6	0.1	0.5	85.1	24.5
Jewish	0.7	0.0	0.2	0.1	0.0	0.4	0.0

Hindu	0.0	0.2	0.0	0.1	0.5	0.0	0.9
Buddhist	1.6	0.9	2.2	0.7	0.5	0.1	2.8
Other	3.1	6.0	4.2	2.7	3.3	4.4	9.4
No religious beliefs	32.9	35.4	43.5	15.0	41.8	9.6	32.1

***** *n indicates number of participants who have given information on sex.*

*** Measured by the question about country of birth.*

Percentages of students who never smoked varied from 30.1% in Germany to 60.6% in Belgium. Students from the Slovak Republic (31.1%), Spain (31.0%) and Denmark (30.0%) showed the highest percentages of former smokers. As shown in Table A.2, the highest percentages of regular smokers (at least three times a week) were found among Turkish students (27.8%) and the lowest among Belgian students (9.0%).

The approval of tobacco use (*injunctive norm*) was highest in Danish and German students with 25.8% and 27.5% of students, respectively, responding that it is ok to use tobacco, even if it does interfere with study or work (see Table A.3). Disapproval rates varied from 48.4% in the Slovak Republic to 25.1% in Denmark. In Turkey, the majority of respondents (56.0%) reported that it is never ok to smoke.

Table A.2 Frequency of personal tobacco use by sex (female%/male%)

	Personal tobacco use (%) (f/m)			
	Never	Not in the last two months	Smoked in the last two months: at most twice a week	Smoked in the last two months: three times a week or more often
Belgium	61.4/57.0	21.3/20.9	8.6/11.6	8.6/10.5
Denmark	47.3/36.0	29.7/31.0	11.9/16.0	11.0/17.0
Germany	34.6/23.7	26.8/32.9	16.6/21.7	22.0/21.7
Slovak Republic	42.8/35.7	31.3/30.1	13.5/15.7	12.4/18.5

Spain	44.7/44.2	28.8/36.5	15.2/1.9	11.4/17.3
Turkey	44.3/35.0	18.0/15.3	15.4/15.8	22.3/34.0
UK	61.1/39.4	16.7/21.2	12.5/9.1	9.7/30.3

Table A.3 Personal attitude towards tobacco use by sex (female%/male%)

	Personal attitude towards tobacco use (%) (f/m)		
	Never ok to use	Ok to use if it doesn't interfere with work or study*	Ok to use**
Belgium	41.7/40.7	43.5/46.5	14.8/12.8
Denmark	25.5/22.4	49.3/49.0	25.2/28.6
Germany	24.5/27.9	45.9/47.5	29.6/24.5
Slovak Republic	47.7/50.6	41.5/36.7	10.8/12.7
Spain	46.0/41.2	42.9/45.1	11.1/13.7
Turkey	53.2/58.8	33.6/25.3	13.2/15.8
UK	44.4/37.5	38.9/43.8	16.7/18.8

** Response options 'Ok to use occasionally if it doesn't interfere with study or work' and 'Ok to use frequently if it doesn't interfere with study or work' were combined into 'Ok to use if it doesn't interfere with work or study'*

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

The majority of students (74.9%) viewed their peers to be more frequent users of tobacco than themselves (78.5% female, 66.1% male) *(descriptive norm)*. Fifteen percent (13% female, 20.1% male) thought that their peers behaved similar to themselves and 10% (8.5% female, 13.8% male) believed that students in their peer group consumed tobacco less frequently than themselves. In addition, more than half of the students (58.2%; 58.3% female, 57.9% male) perceived their peers to be more accepting of smoking than themselves. Thirty-two percent believed approval to be equal (32.6% female, 31% male) and 9.7% (9.1% female, 11.2% male) thought that the peer group approved of tobacco use less than themselves (*injunctive norm*).

Perceived peer use of tobacco was associated with a higher likelihood for regular personal smoking (see Table A.4). Students who thought that the majority of their peers smoked at least three times a week had a 2.66 (95% CI: 1.90-3.73) times higher likelihood to smoke at least three times every week (in the past two months) themselves compared with students who never smoked. The odds for reporting tobacco use at most twice a week instead of never use was 2.52 (95% CI: 1.68-3.79) if students perceived that the majority of students smoked at most twice a week. Male (OR: 1.77, 95% CI: 1.45-2.15) and older students (OR: 1.02, 95% CI: 1.00-1.05) were more likely to report smoking at least three times a week compared to those reporting that they never smoked.

Table A.4 Association between perceived behavior of peers and own tobacco use adjusted for country, age, sex, study year and living situation – Results of a multinomial logistic regression*.

Variables		Smoked in the last two months: three times a week or more often vs. Never	Smoked in the last two months: at most twice a week vs. Never	Not in the last two months vs. Never
	Proportion n (%)	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)
Perceived peer tobacco use				
Not in the last two months/Never	440 (10.1)	1.00	1.00	1.00
Smoked in the last two months: At most twice a week	1235 (28.4)	1.82 (1.25-2.64)	4.07 (2.68-6.18)	1.24 (0.95-1.61)
Smoked in the last two months: Three times a week or more often	2673 (61.5)	**2.66 (1.90-3.73)**	2.52 (1.68-3.79)	1.05 (0.82-1.34)
Country				
Slovak Republic	1894 (43.6)	1.00	1.00	1.00
Belgium	401 (9.3)	0.52 (0.35-0.77)	0.39 (0.27-0.58)	0.47 (0.35-0.62)
Denmark	448 (10.3)	0.68 (0.46-0.99)	0.72 (0.48-1.06)	0.74 (0.54-0.99)
Germany	492 (11.3)	1.70 (1.25-2.33)	1.65 (1.20-2.29)	1.01 (0.77-1.33)
Spain	181 (4.2)	0.82 (0.50-1.34)	0.69 (0.41-1.15)	0.81 (0.56-1.17)
Turkey	827 (19.0)	1.84 (1.45-2.34)	1.11 (0.85-1.45)	0.53 (0.42-0.68)
United Kingdom	103 (2.4)	0.80 (0.45-1.45)	0.58 (0.30-1.12)	0.38 (0.22-0.66)
Age [per year]		1.02 (1.00-1.05)	0.97 (0.94-1.01)	1.04 (1.02-1.06)
Sex				
Female	3104 (71.4)	1.00	1.00	1.00
Male	1244 (28.6)	1.77 (1.45-2.15)	1.42 (1.15-1.75)	1.20 (1.01-1.43)

*Results for year of study and living situation are not shown in the table.

Perceived approval of tobacco use of peers (OR: 6.49, CI: 4.54-9.28) was associated with own approval of tobacco use. Personal smoking in the last two months (OR: 7.85, 95% CI 6.55-9.41) was associated with a higher likelihood of personal approval regarding tobacco use (Table A.5). Assessment of interaction in both models showed that the effect of perception on the outcome variable was not modified by country or sex.

Table A.5 Association between perceived attitudes of peers and own attitudes towards tobacco use adjusted for personal tobacco use, country, age, sex, study year and living situation- Results of a binary logistic regression*.

Variables		**Positive attitude towards tobacco use (okay to use even if it does interfere with study or work)**
	Proportion n (%)	OR (95% C.I.)
Perceived peer attitude to tobacco use		
Never okay to use	266 (6.3)	1.00
Okay to use	3932 (93.7)	**6.49 (4.54-9.28)**
Personal tobacco use		
Not in the last two months/Never	2909 (69.3)	1.00
Smoked in the last two months	1289 (30.7)	**7.85 (6.55-9.41)**
Country		
Slovak Republic	1843 (43.9)	1.00
Belgium	396 (9.4)	1.61 (1.26-2.05)
Denmark	442 (10.5)	3.29 (2.46-4.41)
Germany	485 (11.6)	2.45 (1.89-3.16)
Spain	172 (4.1)	1.29 (0.91-1.81)
Turkey	761 (18.1)	0.57 (0.46-0.70)
United Kingdom	99 (2.4)	1.53 (0.97-2.44)
Age [per year]		0.98 (0.96-0.99)
Sex		
Female	2998 (71.4)	1.00
Male	1200 (28.6)	0.79 (0.67-0.93)

*Results for year of study and living situation are not shown in the table

1.5 DISCUSSION & CONCLUSIONS

Our two main aims were to investigate possible self-other discrepancies regarding tobacco use and attitudes toward tobacco use and to evaluate whether perceptions of peer use and peer approval of tobacco use are associated with personal use and approval. In all countries, self-other discrepancies regarding tobacco use were found. In general, students perceived their peers to use tobacco more often than themselves. A majority of students believed that their peers were more accepting of tobacco use than themselves. The perception that the majority were using tobacco was associated with an increased likelihood of personal use. Perceived approval of tobacco use in the peer group was associated with higher personal approval, particularly among those with a recent history of smoking.

Only two previous studies have shown that European students tend to overestimate rates of smoking among their peers (e.g.,Riou Franca, Dautzenberg, Falissard, & Reynaud, 2009; Bertholet, Faouzi, Studer, Daeppen, & Gmel, 2013). In a Swiss study, Bertholet and colleagues (2013) reported that overestimations of tobacco use by others are frequent among young men and are associated with greater personal consumption (Bertholet, Faouzi, Studer, Daeppen, & Gmel, 2013). Our study included both men and women, was conducted in six European countries and Turkey and demonstrated a similar association. Bertholet and colleagues (2013) found that the overestimations varied by substances (Bertholet, Faouzi, Studer, Daeppen, & Gmel, 2013). In their study, more than 45% of their study participants overestimated tobacco and alcohol use compared to only 22% overestimating cannabis use. Bertholet et al. explain these differences with the differences in legal status of the substances in Switzerland suggesting that cannabis consumption appears less visible because it is illegal (Bertholet, Faouzi, Studer, Daeppen, & Gmel, 2013). Unfortunately, our data do not allow for such an analysis.

We did find variation in tobacco consumption by European country in our study. Turkey and Germany reported the highest levels of consumption with over 40% of students consuming tobacco

regularly compared to Belgium with under 20%. However, in some countries higher prevalence was not a reflection of a generally positive attitude towards tobacco use. For example, Turkey was the country with the highest rate of regular smokers compared to the other countries. However, approval of tobacco use was generally low. The majority of students (ca. 56%) did not approve of using tobacco. Social desirability may have contributed to reports of low approval in Turkey as recent media campaigns educating about the harms of tobacco may have made students more aware of the consequences of tobacco. Disapproval appears not to translate into non-smoking. Other factors not assessed in this study, such as availability of tobacco products in Turkey and pro-tobacco advertising, may be more powerful than personal approval or disapproval in influencing use. In all countries perceived approval of tobacco use in the peer group was associated with personal approval of using tobacco; especially among those that recently smoked. Students who smoke or approve of tobacco use may self-select into a network of friends at university who also smoke. Self-selection into a social environment with similar behavior has been previously demonstrated for binge drinking (Borsari & Carey, 1999). Tobacco use among close friends was not assessed in this study.

Limitations of the study include the use of self-report measures to assess tobacco use. We did not compare perceptions with actual consumption rates. Our comparison was with personal estimates of what the majority of the peers did. The number of cigarettes smoked per time period was not assessed. We could not analyze how many more cigarettes were smoked as a result of the perception that the majority of peers smoked. Factors not assessed in this study, such as family history of tobacco use or use among close friends, may have played a role in regard to tobacco norms. This is a limitation considering that previous research suggests that friends play a considerable role in modelling drug use behavior. For example, one study showed that students whose friends smoked were four times more likely to smoke (Deressa & Azazh, 2011). Due to the cross-sectional nature of our data no causal statements can be deduced. The number of participants varied by country with smaller sample sizes in the United Kingdom and Spain. Due to the relatively small numbers in these convenience samples it is likely that they are not representative of their

respective student populations. It may be that only students interested in the topic might have participated in the study; we can say little about the direction of this bias. The validity of data collected via online surveys is a further matter of discussion, but there are many advantages as well, in particular in a young and e-literate population.

This study suggests that tobacco use varies substantially in European student populations. Self-other discrepancies regarding rates of tobacco use are high, however; they are consistent throughout European student populations and perceived norms are an important predictor of personal tobacco use. A social norms intervention may be a viable method for changing perceptions of tobacco use among peers and attitudes toward tobacco and ultimately for changing smoking behaviour. If found to be effective, social norms approaches may become a novel component of tobacco control policies in Europe and beyond.

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

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