Binge drinking and health behavior in medical students

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Abstract

Objectives: The objective of this study was to assess the prevalence of binge drinking and its relation to other health behaviors, drinking-related attitudes and perceived social norms among German medical students.

Methods: 271 first-year German medical students completed a cross-sectional, self-administered survey. A total of 252 (62% female and 38% male) students provided useable surveys. The mean age was 20.6 years (S.D. = 1.7).

Results: Most students reported heavy drinking with 24% having one episode in the past 2 weeks (Infrequent Bingers) and 28% having two or more episodes (Frequent Bingers). Men were more likely than women to have had a binge drinking episode. Frequent binge drinkers saw more pros of drinking and reported a higher temptation to drink than students in the other groups. Additionally, they were more likely to smoke, use cannabis, not exercise and not eat fruits and vegetables. All students overestimated their peers’ alcohol intake and binge drinking frequency.

Conclusions: Binge drinking was highly prevalent in this sample and clearly related to other health risk behaviors. Drinking rates were similar to college students in other Western countries. Future research needs to assess the consequences of this multiple risk behavior among medical students regarding academic and professional performance as well as personal health.

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1. Introduction

Excessive alcohol consumption and binge drinking behavior in adolescents and young adults has been recognized as an important risk behavior, increasing the likelihood of health problems, drunk driving, aggressive behavior, unsafe sexual activity, accidents etc. (Maddock, Laforge, Rossi, & O’Hare, 2001; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994; Wechsler et al., 2002; Wood, Sher, & McGowan, 2000). Heavy drinking during adolescence and young adulthood predicts future alcohol-related problems and academic failure in certain groups (Jennison, 2004).

Heavy drinking is highly prevalent amongst college and university students (Hingson, Heeren, Winter, & Wechsler, 2005; Hingson & Howland, 2002; O’Malley & Johnston, 2002), including medical students (Delnevo, Abatemarco, & Gotsch, 1996; Granville-Chapman, Yu, & White, 2003; Pickard, Bates, Dorian, Greig, & Saint, 2000). For a number of medical students, alcohol consumption seems to function as a way to cope with the stress of medical education (Kjobli et al., 2004; Tyssen, Vaglum, Aasland, Gronvold, & Ekeberg, 1996). The known interaction between binge drinking and behaviors like cannabis use and cigarette smoking in adolescence (Johnson, Boles, Vaughan, & Kleber, 2000) continues into adulthood and is also prevalent in medical students (Newbury-Birch, Walshaw, & Kamali, 2001). Even though there are surprisingly few empirical studies on this issue, data indicate that alcohol consumption increases from medical school into the early professional career (Newbury-Birch et al., 2001) and that there may be a trend toward an increase in alcohol consumption in physicians (Harrison & Chick, 1994). Even if recent studies indicate that overall alcohol consumption and alcohol-related problems may still be lower in practising physicians than in the general population and in other health professions, there is a subgroup who will suffer from minor and major alcohol-related dysfunctions (Kenna & Wood, 2004).

Among the constructs that contribute to binge drinking behavior are the individuals’ perceived social norms as well as drinking-related attitudes. Researchers have proposed that misperceptions about the social norms regarding heavy drinking may contribute to the development or maintenance of problematic drinking behavior, and intervention programs for college students have been designed to reduce these normative misperceptions (Neighbors, Larimer, & Lewis, 2004). Many studies have found that college students overestimate the level of heavy drinking by peers (Baer, Stacy, & Larimer, 1991; Kypri & Langley, 2003; Perkins & Wechsler, 1996), but no studies have documented this phenomenon among medical students.

Several cognitive constructs have been identified as corresponding with or predicting binge drinking behavior, among them the perceived pros and cons of drinking (e.g. Migneault, Velicer, Prochaska, & Stevenson, 1999; Noar, Laforge, Maddock, & Wood, 2003) and the perceived temptation to drink across different situations (Maddock et al., 2000). These latter constructs are an integral part of the Transtheoretical Model of Change which describes mechanisms of behavior change and serves as a theoretical basis for successful interventions targeting various health risk behaviors, including drinking behavior (Laforge et al., 2006; Prochaska & DiClemente, 1983; Prochaska et al., 2004; Prochaska & Velicer, 1997; Velasquez, von Stemberg, Dodrill, Kan, & Parsons, 2005).

While numerous international studies have reported data on drinking behavior in college and university students, hardly any data exist regarding drinking behavior and determining conditions for this behavior in German student populations. Two smaller German studies reported higher alcohol consumption in German students compared to American students, and binge rates (defined as five or more drinks on one occasion in the previous month) of approx. 47% (Cox et al., 2001; Hanewinkel & Wiborg, 2005). No data have been published that specifically refer to German medical students. Medical students are a special
group due to their future function as health promoters and role models in the health care system. Additionally, their perception of the importance of preventive care seems to be linked to their own health behavior (Delnevo et al., 1996). Therefore, more information about the relationship between binge drinking and other behaviors is needed for this group. Consequently, this study has three aims: to assess patterns of binge drinking in German medical students, to analyze how perceived social norms and attitudes toward drinking relate to binge drinking patterns, and to determine the extent to which binge drinking is related to multiple health risk behavior patterns.

2. Methods

In a cross-sectional study, we collected data from a cohort of first-year medical students at the University of Marburg, Germany. Out of 340 first-year students, \( n = 271 \) (80%) participated in a non-mandatory introductory lecture on Medical Psychology toward the end of their first year in medical school and anonymously completed a four-page questionnaire. Data collection followed the protocol required by the local IRB for this type of study.

The questionnaire included the assessment of several parameters related to alcohol consumption (number of drinking days/week; number of drinks on a typical drinking day; maximum number of drinks on one occasion during the previous 30 days; number of occasions with \( \geq 4 \) drinks during the previous 2 weeks and during the previous year; changes in drinking patterns; number of days of feeling drunk; typical bingeing occasions). Alcohol dependency was screened with the Lübeck Alcohol Dependence and Abuse Scale (LAST), a validated German 7-item instrument that is based on the internationally validated CAGE (Ewing, 1984) and MAST (Selzer, 1971) scales. A cut off score of \( \geq 2 \) indicates an elevated risk for alcohol dependence according to DSM-IV criteria (Rumpf, Hapke, Meyer, & John, 2002).

A standard drink was defined in the questionnaire as the equivalent of approx. 14 g of alcohol (e.g. 0.33 l beer, 0.15 l wine or 0.04 l liquor). The definition of a binge was based on the recommendations by Wechsler and colleagues (Wechsler, Dowdall, Davenport, & Rimm, 1995), i.e. occasions of consuming \( \geq 4 \) drinks for women (approx. 56 g alcohol) or \( \geq 5 \) drinks for men (approx. 70 g alcohol) at one drinking session within the previous 14-day period. Students were categorized according to their binge drinking behavior. Group 1 consisted of individuals who drank alcohol but had not binged within the previous 14 days (Non-bingers), Group 2 consisted of individuals who had had one binge drinking episode within the previous 14 days (Infrequent Bingers), and Group 3 included all subjects with two or more binges in the previous 14 days (Frequent Bingers). Additionally, we identified “Severe Binges”, defined as occasions of drinking more than eight drinks (approx. 112 g alcohol) during the past 2 weeks as well as the previous year.

Cognitive variables included the perceived pros and cons of drinking (Decisional Balance Inventory; Velicer, DiClemente, Prochaska, & Brandenberg, 1985); the items for both scales were adapted from previously developed instruments (Migneault, et al., 1999; Noar et al., 2003). For decisional balance, items were rated on a five-point Likert scale regarding their importance for the decision to drink or not to drink. The pros of drinking scale (example: “Drinking helps me to have more fun with my friends.”) and the cons of drinking scale (example: “I am setting a bad example for others when I drink.”) both consisted of six items. Based on previous work (Maddock, Laforge, & Rossi, 2000; Velicer, DiClemente, Rossi, & Prochaska, 1990), the Situational Temptations Inventory was defined as the temptation to drink across a
variety of high risk situations (example: “I am tempted to drink when I am at a party”). The scale consisted of 11 items (five-point Likert scale answer format).

To measure perceived social norms, the participants were asked to estimate their peers’ number of drinking days per week, average number of drinks on a drinking day, and number of occasions they expect their peers to drink four or more drinks in a typical 2 week period (Perkins, Haynes, & Rice, 2005; Presley, Meilman, & Cashin, 1996).

In addition to drinking-related variables, we asked about the students’ tobacco use, drug use, fruit and vegetable consumption as an indicator of diet quality, and exercise behavior. Measures in this context had been shown to be valid and reliable in previous studies in German populations (e.g. Keller, Kreis, & Huck, 2001; Keller, Nigg, Jäkle, Baum, & Basler, 1999). Finally, gender, age, living arrangements, and fraternity membership were assessed.

In the Results section we report means/proportions of study variables across the three binge drinking groups. Mean differences between groups were analyzed by non-parametrical Kruskal–Wallis procedures. Differences in proportions were analyzed using Chi-Square-Tests. Predictors for binge drinking patterns were identified by using logistic regression models. Data analysis was performed with the SPSS 13.0 package.

3. Results

Of the \(n=271\) questionnaires, two were excluded due to highly implausible data and four due to missing data in the binge drinking variable. Thirteen individuals (4.8%) indicated that they never drink alcohol; because the majority of their questionnaires had additional missing data in other variables, this group had to be excluded from further analysis. Overall, data from \(n=252\) (93%) medical students were included in the main analysis. The mean age was 20.6 years (S.D.=1.7), 62% were female and 38% male. The majority shared an apartment with other students (39%) or lived alone in their own apartment (30%). Only 2% were members of a fraternity. The mean body mass index (BMI) for the sample was 21.6 (S.D. =2.3), only 6.2% were overweight with a BMI>25.

While 48% of all medical students did not binge drink in the past 2 weeks (Non-bingers), approx. 24% reported one episode of binge drinking (Infrequent Bingers), and approx. 28% had had two or more binge episodes (Frequent Bingers) during the 2 weeks prior to the assessment. The binge drinking categories were related to gender (\(\chi^2 (2)=9.13, p<.05\)) (see Table 1) but not to age (data not presented). A larger proportion of females (55%) were non-bingers than males (36%). Binge drinking frequency was significantly related to the students’ living situation: for participants in a communal living situation (sharing an apartment with peers or living in a dormitory), the proportion of frequent bingers was three times higher than for those who lived with their parents or a partner (see Table 1).

The number of drinks in a typical week (calculated as number of drinking days in a typical week \(\times\) number of drinks on a typical drinking day) increased linearly with significant differences between the three groups (\(\chi^2 (2)=119.15, p<.001\); see Table 1). An almost identical pattern of significant differences (\(\chi^2 (2)=138.97, p<.001\)) was found for “peak drinking”, i.e. the highest number of drinks at one occasion during the previous 30 days. Regarding severe binge drinking, 20.4% of all women and 45.3% of all men reported at least one episode of drinking eight or more drinks at one occasion in the previous 14 days. Across the previous year, the number of days of severe bingeing (i.e. \(\geq\)eight drinks) significantly differed (\(\chi^2 (2)=108.81, p<.001\)) across binge groups (see Table 1): On average, men
reported 15.1 (S.D. = 17.5, range 0–80; median = 10) binge drinking occasions in the previous year, and women reported 12.4 (S.D. = 19.8, range 0–100; median = 5) occasions.

Approximately 23% of the non-bingers, 42% of the infrequent bingers and 52% of the frequent bingers were at an elevated risk for developing an alcohol dependency (i.e. LAST score ≥ 2). Of the male frequent binge drinkers, an alarming rate of approx 73% had a LAST score ≥ 2. Overall, 30% of all participants reported feeling drunk at least “several times per month”. Approximately 34% of all students in the frequent bingeing group, but only 10% in the infrequent bingeing group and 8% in the non-bingeing group reported that they had increased their alcohol consumption in the previous 3 months (i.e. during the second semester of medical school). The most frequently reported occasions for binge drinking were social occasions like parties (97%), festivals (e.g. Mardi Gras; 73%), weekends in general (73%), or at home with friends (62%). Only 4% reported bingeing when alone, and 2% reported bingeing when under stress.

| Table 1 | Socio-demographic, behavioral and cognitive variables across binge drinking categories |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                  | Non-bingers N=121 (48.0%) | Infrequent Bingers N=60 (23.8%) | Frequent Bingers N=71 (28.2%) | Differences |
| Gender           | Female (%)       | 55.4            | 20.4            | 24.2           | χ² (2) = 9.13, p < .05 |
|                  | Males (%)        | 35.8            | 29.5            | 34.7           |                 |
| Living situation | Family (%)       | 60.6            | 27.3            | 12.1           | χ² (4) = 10.94, p < .05 |
|                  | Alone (%)        | 53.5            | 25.4            | 21.1           |                 |
|                  | Communal (%)     | 41.2            | 22.1            | 36.8           |                 |
| Drinks in a typical week Mean (S.D.) | 2.04 (2.02) | 4.73 (2.75) | 9.28 (5.41) | χ² (2) = 119.15, p < .001 b |
| Max. drinks at one occasion (previous 30 days) Mean (S.D.) | 3.05 (2.49) | 6.95 (3.08) | 8.76 (3.08) | χ² (2) = 138.97, p < .001 b |
| Days with ≥8 drinks in previous year Mean (S.D.) | 1.39 (3.30) | 9.12 (16.92) | 15.39 (14.19) | χ² (2) = 108.81, p < .001 b |
| Feeling drunk several times (%) | 5.0            | 32.8            | 70.0            | χ² (2) = 90.15, p < .001 |
| LAST dependence score ≥ 2 (%) | 23.1            | 41.7            | 52.0            | χ² (2) = 17.57, p < .001 |
| Current smoker (%) | 13.3            | 40.0            | 50.7            | χ² (2) = 33.04, p < .001 |
| Cannabis use (%) | 15.7            | 23.3            | 52.2            | χ² (2) = 29.97, p < .001 |
| ≥3 servings of fruits & vegetables/day (%) | 24.0            | 25.0            | 11.4            | χ² (2) = 5.13, p ≥ .05 |
| Exercise ≥3/week (%) | 29.2            | 47.5            | 32.9            | χ² (2) = 5.98, p < .05 |
| Pros of drinking Mean (S.D.) | 1.88 (0.72) | 2.03 (0.73) | 2.44 (0.74) | χ² (2) = 24.08, p < .001 b |
| Cons of drinking Mean (S.D.) | 2.37 (0.83) | 2.30 (0.76) | 2.12 (0.77) | χ² (2) = 4.56, p > .05 b |
| Temptations Mean (S.D.) | 1.95 (0.61) | 2.26 (0.55) | 2.55 (0.58) | χ² (2) = 44.92, p < .001 b |
| Estimated number of peers' drinks on a typical day Mean (S.D.) | 3.73 (1.24) | 4.11 (1.83) | 3.89 (1.29) | χ² (2) = 1.35, p > .05 b |
| Estimated number of peers' drinking days Mean (S.D.) | 2.92 (1.08) | 2.93 (1.24) | 3.06 (1.17) | χ² (2) = 0.93, p > .05 b |
| Estimated % of frequent-bingeing peers | 71.7            | 63.3            | 90.1            | χ² (2) = 13.71, p < .001 |

a Category “other” was excluded, n = 240 for this analysis.
b Kruskal–Wallis χ².
The newly adopted scales for the cognitive variables (decisional balance, self-efficacy) were analyzed for their psychometric properties. For the decisional balance scales, an explanatory factor analysis clearly differentiated between the two scales, with an explained variance of 30% for the pro scale and 19.7% of the con scale. The subscale reliabilities were good to satisfactory with Cronbach’s $\alpha = .85$ for the pros and $\alpha = .70$ for the cons. The reliability for the 11-item temptation scale was good with $\alpha = .82$. Students with frequent binges weighted the pros of drinking significantly more than individuals in the other two groups. At the same time, drinking temptation increased linearly across the binge drinking categories. While the differences in means were in the expected direction, there were no significant differences between the three groups for the perceived cons of drinking (see Table 1).

With regard to social norms, medical students overestimated their peers’ number of drinking days per week (estimate: 3.0, actual: 2.7) as well as the number of drinks on a typical drinking day (estimate: 3.9, actual: 1.6), but there were no significant differences ($p > .05$) across binge categories regarding these estimates. Frequency of binge drinking was, however, related to increasing misperceptions of peer drinking norms ($\chi^2 (2) = 13.71, p < .001$): Frequent bingers estimated that approx. 90% of their peers have a minimum of two bingeing episodes in a typical 2-week period, compared to 63% of the infrequent bingers and 72% of the non-bingers. All groups significantly overestimated the occurrence of frequent bingeing behavior (actual rate: 28%; see Table 1).

Finally, binge drinking behavior was clearly related to other health behaviors (see Table 1): there were significant differences between the three binge groups for smoking ($\chi^2 (2) = 33.04, p < .001$), cannabis use ($\chi^2 (2) = 29.97, p < .001$), and exercise ($\chi^2 (2) = 5.98, p < .05$). More than half of all students in the frequent bingeing group were current cigarette smokers and more than 52% consumed cannabis products at least once every 6 months. In the frequent bingeing group, cigarette smoking was approx. four times and cannabis consumption three times more frequent than in the non-bingeing group. Other drugs did not play an important role: approx. 2% ($n = 5$) indicated taking ecstasy or related products, and approx. 5% ($n = 14$) reported taking prescription drugs.

Only 2% (all female) of the total sample met the recommendations of 5 servings of fruit and vegetables per day. There was a trend for group differences, indicating that more frequent bingeing corresponds with lower fruit and vegetable consumption but the differences failed to reach significance ($p > .05$). While the relation between bingeing and exercise behavior was less systematic, a trend was found for group differences, indicating that more of the infrequent bingers showed the recommended exercise behavior than participants in the other two groups. Additional gender-specific analyses (not reported in detail) revealed that especially men in the frequent bingeing group reported an alarmingly unhealthy behavior pattern: 55% of them are current smokers (62% of those smoke 10–20 cigarettes per day), 61% consume cannabis at least once every 6 months, 0% consume three or more servings of fruit and vegetables per day, and only 33% exercise regularly.

In order to explore the relative predictive value of the reported variables for infrequent and frequent binge drinking we performed two logistic regression analyses. Predictor variables included gender, living situation, smoking status, cannabis use, alcohol dependence (LAST score $\geq 2$), perceiving peers as frequent binge drinkers (all as categorical measures) and pros, cons, and temptations of drinking (continuous measures). Exp(B) was interpreted as odds ratio. In the first analysis (non-bingers vs. infrequent bingers), the resulting model showed a satisfactory fit (Hosmer and Lemeshow $\chi^2 (8) = 5.64$, n.s.) and categorized 75% of all individuals correctly (43% of infrequent bingers and 90% of non-bingers). The model explained 17.8% of the variance (Cox and Snell $R^2$). In the final model, with non-
bingers as reference group, infrequent binge drinking was predicted only by being a current smoker (OR 3.91, \( p < .01 \)) and by the temptation to drink (OR 4.76, \( p < .01 \)).

For the second model (non-bingers vs. frequent bingers), the model fit was satisfactory (Hosmer and Lemeshow \( \chi^2 (8)=11.84 \), n.s.). The model explained 37.2\% of the variance (Cox and Snell \( R^2 \)) and categorized 81\% of the individuals correctly (72\% of frequent bingers and 87\% of non-bingers). Frequent binge drinking was predicted by living in a communal living situation (OR 4.47, \( p < .01 \)), scoring 2 or more points in the LAST screening questionnaire for alcohol dependence (OR 2.95, \( p < .05 \)), being a current smoker (OR 4.24, \( p < .01 \)), having smoked cannabis at least once in the previous 6 months (OR 2.60, \( p < .05 \)), perceiving the cons of drinking as less important (OR 0.48, \( p < .05 \)), and by perceiving peers to be frequent binge drinkers (OR 3.64, \( p < .05 \)).

4. Discussion

The results of this study of binge drinking in German medical students indicated that this behavior is highly prevalent. More than 50\% of all alcohol-drinking medical students in this cohort showed binge drinking behavior, approx. 28\% \( \geq \) twice in 14 days. Overall, male students drank larger amounts of alcohol than female students, and the prevalence of binge drinking based on gender-specific definitions was approximately 50\% higher in males than in females. Students who lived in a communal living situation had considerably higher proportions of frequent binge drinkers than students in other living situations.

Individuals with a higher binge drinking frequency gave the pros of drinking more weight and reported a higher perceived temptation for drinking, which confirms the importance of cognitive (attitude) variables for binge drinking behavior in this population (e.g. Noar et al., 2003). Students generally overestimated the occurrence of binge drinking which indicates a liberal perceived social norm toward this behavior that in turn has been identified as an important predictor for risky drinking behavior (Perkins et al., 2005). Especially frequent binge drinking was correlated with other negative health behaviors (cigarette smoking, cannabis use, insufficient fruit and vegetable consumption). Socio-demographic, behavioral and cognitive variables predicted frequent binge drinking, and to a lesser extent infrequent binge drinking in exploratory regression models. While gender was not a significant predictor, this study suggests that male medical students who frequently binge drink may be at especially high risk for developing abuse or dependency problems (according to DSM-IV criteria) as well as general health problems.

This is the first study to evaluate binge drinking in German medical students. It confirms some of the identified determinants of binge drinking from U.S. studies and shows the important interrelation between binge drinking and other relevant health behaviors. Additionally, this study identifies a high risk group which has not been recognized yet within the German university education system. A communal living situation, other substance abuse behaviors (smoking, cannabis consumption), favorable cognitions toward drinking, and seeing frequent binge drinking as the social norm determine this high risk group.

Limitations of the study are its comparatively small sample size and the fact that the study included only 74\% of the complete study year cohort. For the additional 26\% of the cohort it cannot be determined whether they do not drink or just refused study participation. This limits absolute statements about the drinking prevalence in this population. Additionally, the study neither provides data on socio-demographic characteristics nor on other health risk behaviors (smoking, drug use etc.) in those students.
who do not drink any alcohol. Due to its cross-sectional design, the study is also limited in that it cannot provide insight into whether changes of attitudes would result in changes of behavior. Finally, the relatively small sample size and the resulting limited power require a cautious interpretation of the reported regression models. They should be perceived as exploratory and the results should be confirmed in larger student samples.

Despite these limitations, the results indicate that even if all those students not included in the study were conservatively categorized as non-bingers, the overall binge drinking prevalence would still be approx. 40%. These rates show that binge drinking is as prevalent in German students as in American students (49% in males, 41% in females; Wechsler et al., 2002) and in British students (24–64% in males, 14–63% in females; Gill, 2002). However, the large variation in definitions complicates a direct comparison with British data, and some studies indicate that the prevalence among British medical students may be somewhat lower (31% in males, 24% in females; Webb, Ashton, Kelly, & Kamali, 1998). Compared to the general population in Germany, male medical students reported approx. the same number of binge drinking episodes per year (15.1) as the adult male population (14.3), whereas the rate for female medical students (12.4) was three times higher than in the general female population (4.0) (Gmel, Rehm, & Kuntsche, 2003). While this ratio may be an over-estimation (because the population numbers are not corrected for age), it has repeatedly been shown before that women especially frequently binge drink in a college/university environment compared to their non-college peers, even if the total alcohol consumption may be lower (Johnston, O’Malley, Bachman, & Schulenberg, 2004; Slutske et al., 2004). The study of Slutske et al. (2004) suggests that, for young women, college may be a risk environment for binge drinking even after controlling for demographic, genetic, and lifestyle variables. However, the exact determinants for this phenomenon remain unclear at this time.

To date, binge drinking among students has not yet been fully recognized as a problem at German universities. Moreover, the degree and impact of heavy drinking by medical students has not received much attention by the German health and research community. If these results are confirmed by future studies then it is clear that more attention needs to be given to alcohol misuse by German medical students, which may have important implications. From a public health perspective, even infrequent binge drinking can amount to a serious problem which Weitzman and Nelson (2004) labeled the “prevention paradox”: “While the heaviest drinkers are at greatest risk for harm, they are relatively few and generate proportionately small amounts of all drinking-harms. The risk of harms is not zero among lower level drinkers in college. Because they are numerous, they account for the majority of harms.” (p. 247). Consequently, medical students should be encouraged to actively reflect their own behavior on the background of their future role in health promotion.

Education about alcohol and drug abuse should receive more attention in the medical curriculum. German medical schools and universities should consider implementing comprehensive alcohol prevention policies as had been suggested previously for the U.S. and the U.K. (Gray, Bhupal, & White, 1998; Weitzman & Nelson, 2004). These policies will, however, have to be adapted to the specific German circumstances. For example, the legal drinking age for the most frequently consumed drinks (beer, wine etc.) is lower in Germany (16 years) than in the U.K. (18 years) or in the U.S.A. (21 years), and alcoholic beverages are easily accessible (e.g. in student cafeterias). The example from smoking policy illustrates the traditionally very liberal climate in Germany regarding the consumption of socially accepted substances (e.g. Poetschke-Langer & Schunk, 2001); the importance of perceived social norms for the students’ frequent binge drinking behavior indicates that this may be similar in this context. Consequently, alcohol prevention policies may find higher acceptance if they focus more on early education than on
stricter regulation strategies. If the findings of this study are confirmed, education should address the students’ unrealistic perceived social norms, their favorable attitudes toward drinking, the risk potential of a combination of substance abuse behaviors, and their living situation which seems to facilitate binge drinking behavior. While men consumed more alcohol overall, gender was not a predictor for binge drinking behavior which means that education modules may not necessarily have to be gender specific.

Future studies should focus in more detail on the relation of binge drinking to other health behaviors, on the adverse consequences of bingeing and multiple risk behavior in student populations, on students’ attitudes toward binge drinking, on the readiness to stop/reduce binge drinking and other health risk behaviors, on the generalizability of these findings to students from other faculties than medicine, on differences between students of different countries and different ethnic backgrounds, and on the processes that increase the likelihood of risk behavior change. Such studies are currently under way. Longitudinal studies will have to focus on the question whether the identified multiple risk behaviors among medical students create temporary transitional problems, or whether this subgroup of students is more likely to develop problems in the future, that negatively impact on their performance as the proprietors of health promotion and disease prevention.

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