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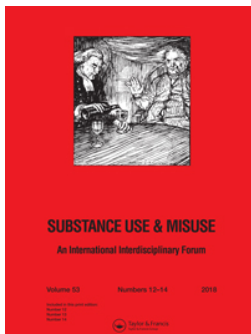
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Prevalence and Psychosocial Correlates of Party-Drug Use and Associated Problems among University Students in the Netherlands

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ABSTRACT

Background: Recent developments in drug use patterns call for an investigation of current party-drug use and associated problems among college students, who appear to be an important target population for harm reduction interventions. **Objectives:** In addition to reporting on party-drug use prevalence, we investigated whether initial use and continuation of party-drug use among students was associated with demographic, personality and psychosocial factors. **Methods:** An online questionnaire was administered to 446 students from a Dutch university, inquiring about party-drug use, demographic characteristics, social norms and personality (big five, impulsiveness, aggression). Univariate and multivariate bootstrapped linear regression analyses were used. **Results:** Of all students, 22.9% indicated having used party-drugs at least once, with a notable sex difference (39.2% of men vs. 16.2% of women). In contrast to the reported trends in Dutch nightlife, GHB was used rarely (lifetime 1.6%) and new psychoactive substances (NPS; 6.7%) appeared almost equally popular as amphetamines (7.6%) and cocaine (7%). Mild health/psychosocial problems (e.g., doing embarrassing things, feeling unwell) were common (65%), whereas serious problems (e.g., being hospitalized) were rare. Neuroticism, extraversion, conscientiousness and impulsiveness were associated with lifetime but not regular party-drug use. Of all predictors, lifetime and regular party-drug use were most strongly related to lenient injunctive and descriptive norms in friends, and a low motivation to comply with parents. **Conclusions:** Our findings indicate that harm reduction/preventive interventions might profit from focusing on social norms, and targeting students who are highly involved in a pro-party-drug environment while experiencing less parental influence.

KEYWORDS


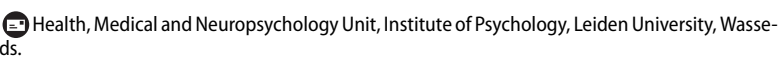
Party-drugs; college students; new psychoactive substances; social norms; personality


Introduction

Drug use in Dutch nightlife is constantly developing, with recent increases in use of GHB, ecstasy (MDMA) and the so-called “new psychoactive substances” (NPS; Van Goossens, Frijns, Hasselt, & Van Laar, 2013; Linsen et al., 2015; Van Amsterdam, Nabben, Keiman, Haanschoten, & Korf, 2015). There is evidence suggesting a “normalization” of hard drug use in various Western countries (e.g., Australia; Duff, 2005), including the Netherlands (Goossens et al., 2013; Van der Poel, Rodenburg, Dijkstra, Stoele, & Van de Mheen, 2009; Van Van der Sar et al., 2012). A recent study showed that 61% of Dutch people under 35 who frequently visit clubs or festivals, have used ecstasy at least once in the past year (Goossens et al., 2013). Collectively, these hard drugs used predominantly in clubs or festivals are referred to as “party-drugs” (Maxwell, 2009). The category often includes stimulants (i.e., ecstasy, MDMA, amphetamines, cocaine, crystal

meth, and most NPS) as well as sedatives (e.g., GHB, ketamine), but the included drugs vary per study (e.g., Maxwell, 2009; Van Van Havere, Vanderplassen, Broekaert, & De Bourdeaudhui, 2009; White et al., 2006).

These developments in party-drug use coincide with an increased observation of drug-related health problems that require immediate medical attention (Goossens et al., 2013; Krul, Girbes, & Sanou, 2012). The majority of party-drugs are associated with adverse health effects, both short-term as well as long-term (e.g., Devlin & Henry, 2008; Schep, Knudsen, Slaughter, Vale, & Megarbane, 2012). On short-term, party-drugs can cause a variety of acute health problems, including coma and respiratory failure (e.g., GHB; Schep et al., 2012) or cardiac arrest (Devlin & Henry, 2008; Trimbos Institute, 2015). On long-term, stimulant use has been linked to heart conditions (e.g., cocaine; Phillips et al., 2009), neurotoxic effects (e.g., serotonergic neurotoxicity in

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ecstasy use; Parrott, 2013), as well as psychological and cognitive complaints (Parrott, 2013; Trimbo Institute, 2015). Although intoxicated individuals seeking help at first aid posts in the Netherlands predominantly seek relief for undesired ecstasy effects, mild to severe GHB intoxication in these individuals has risen from 34% in 2009 to 73% in 2015 (Trimbo Institute, 2015).

In order to prevent (party-)drug use or reduce its harmful effects, interventions are often targeted at young adults, most notably vocational, college, and university students, as drug initiation and regular use peak around young adulthood (Arria et al., 2008; Arria, Vincent, & Caldeira, 2009; Dennhardt & Murphy, 2013; Wittchen et al., 2008). However, descriptions of party-drug use among students, including the use of trending party-drugs such as NPS, are lacking. Compared with research on alcohol and cannabis use, in students, relatively little research has been done on psychosocial predictors and adverse consequences of party-drug use (Dennhardt & Murphy, 2013; Martens et al., 2006). Yet, given the high prevalence of party-drug use in people who frequently visit clubs (Goossens et al., 2013) and known health and psychosocial consequences of drug use, an examination of party-drug use and possible adverse consequences among students seems important. Additionally, it is unclear which groups of students may be more at risk for lifetime or subsequent regular party-drugs (Dennhardt & Murphy, 2013). Identifying psychosocial correlates of the latter group may be especially relevant in light of harm reduction strategies.

Given the varying definition of party-drugs and the limited number of studies on psychosocial correlates of illicit drug use in students, we here include studies on a variety of party-drugs (within our definition) in order to formulate our hypotheses. Factors associated with initiation of drug use among college students were recently reviewed by Dennhardt and Murphy (2013). Being male is highly predictive of drug use (Compton, Thomas, Stinson, & Grant, 2007; Kunst, Bachrach, & Bekker, 2015; Nolen-Hoeksema, 2012; Seedat et al., 2009), although some evidence exists that female drug users progress faster to becoming addicted than male users (e.g., Becker, Perry, & Westenbroek, 2012). Belonging to a fraternity or sorority has also been found to predict lifetime drug use (e.g., Dennhardt & Murphy, 2013; Maggs, Williams, & Lee, 2011; McCabe et al., 2005; Yacoubian, 2003), and may also be associated with regular drug use, but this has not been previously examined. Additionally, students who live alone or in student homes have been found to binge drink alcohol more frequently than those who still live with their parents (e.g., Kypri et al., 2009; Wicki, Kuntsche, & Gmel, 2010), but as yet it is unknown whether this effect also exists for (party-)drug use.

A meta-analysis on the role of personality factors in drug use (Kotov, Gamez, Schmidt, & Watson, 2010) indicated that drug users are on average more neurotic and less extravert, conscientious, and agreeable than non-drug users. In students, the relation between neuroticism and drug use has been confirmed, but differences in the other personality traits are small or absent (Dennhardt & Murphy, 2013; Kashdan, Vetter, & Collins, 2005). Accumulating evidence further suggests that impulsivity precedes as well as follows substance abuse, playing a role in drug use initiation as well as development of drug related problems (Verdejo-Garcia, Lawrence, & Clark, 2008). In addition, substance abuse has been associated with anti-social personality traits (Compton et al., 2007). Results on whether anti-social personality traits are also associated with more frequent substance use are mixed (e.g., Pietrzak & Petry, 2005; Westermeyer & Thuras, 2005) and this has not been investigated in student populations (Dennhardt & Murphy, 2013).

In light of social factors, the prominent motives for ecstasy (Peters, Kok, & Schaalma, 2008) and cocaine (Van Van der Poel et al., 2009) initiation and continuation included curiosity and social factors, respectively (Van der Poel et al., 2009; Vervaeke, Van Deursen, & Kof, 2008). Many authors report that social norms regarding substance use highly affect adolescents and young adults (Dennhardt & Murphy, 2013). College students who overestimate the extent to which their social environment uses a substance (the descriptive norm), tend to use that substance more themselves (e.g., Larimer et al., 2011; Lewis et al., 2011; Martens et al., 2006; McMillan & Conner, 2003). Subjective norms, the extent to which an individual feels it is expected of them to (not) take a substance, can be subdivided into injunctive norms, i.e., the perceived (dis)approval by others regarding substance use, and motivation to comply, i.e., the wish (not) to comply with this norm (Ajzen, 1991). Both norms have been found to predict students' use of ecstasy (e.g., Peters, Kok, & Abraham, 2007; Umeh & Patel, 2004) and other illicit substances (e.g., McMillan & Conner, 2003). However, in comparison with studies on alcohol and cannabis, relatively little research has been done on the role of social norms in party-drug use (Dennhardt & Murphy, 2013; Martens et al., 2006). Also, information is missing on which social factors predict drug use intensification to regular use (Dennhardt & Murphy, 2013).

In sum, the rapid developments within drug use patterns call for a more in-depth examination of the current drug use and associated problems among student populations, including trending party-drugs such as GHB and NPS. While many factors have been elucidated that predict which students will likely initiate (party-)drug use, much less effort has been devoted to distinguishing which

students are likely to continue their use after initial use (Dennhardt & Murphy, 2013). Regular use may increase their chance to experience serious negative consequences from use, and/or develop health and psychosocial problems as a result. Furthermore, most studies in students have so far focused on alcohol and cannabis use. The current study addresses these issues by answering the following research questions:

- RQ1: What is the prevalence of (lifetime and past-year) party-drug use and associated acute health/psychosocial problems among Dutch university students?
- RQ2: Which psychological and social factors are associated with lifetime party-drug use?
- RQ3: Which psychological and social factors are associated with regular party-drug use?

Regular party-drug use was defined in the present study as using any kind of party-drugs twice or more in the last 12 months, based on the distribution of party-drug use in this sample (see Method) and to reflect a usage pattern that is more than sporadically (excluding students who have used party-drugs for the first time in the last year). We hypothesize that demographic factors (age, sex, living situation, member of fraternity/sorority), personality (big five personality traits, impulsiveness, trait aggression), and social norms (of friends and parents) are related to individuals' initial as well as regular party-drug use.

Method

Procedure

A web-based survey was distributed among college students attending a large urban Dutch university (Leiden

University) by means of social media and face-to-face recruitment at the university campus. The sample's characteristics were aimed to match to the overall Leiden student population, regarding age, sex, faculty and membership of a fraternity or sorority. In order to prevent self-selection bias, we masked the study aims by introducing the questionnaire as investigating general characteristics of Leiden University students. The substance use questions were also placed between general questions on nightlife and musical preference. The study was approved by the Psychology Research Ethics Committee on March 11th 2015 (PREC15-0224/10).

Respondents

Of the 584 individuals who clicked the link to the questionnaire, 448 (76.7%) completed the items on substance use. Respondents included 448 students ($M_{age} = 21.6$, $SD = 3.5$, 70.4% female), enrolled at the faculties of social sciences (41.9%), humanities (23.3%), law (16.1%), governance and global affairs (6.1%), medicine (5.4%), science (5.4%) and archaeology (1.8%). A minority of the students lived with their parents (23.3%) and almost half (44.4%) belonged to a fraternity or sorority. The sample contained more women (70.4%) than the Leiden student population (59.5%; VSNU, 2017) and a larger proportion of social sciences students (41.9% vs. 21.6%; Leiden University, 2014). Due to partial data, part of the analysis was carried out for 418 respondents.

Measures

Party-drug use was assessed using a list of substances (Table 1), on which participants could indicate which substances they had used at least once, and how many

Table 1. Prevalence of alcohol, cannabis and party-drug use among students ($N = 446$); men (132) and women (314).

	Lifetime						$\chi^2(1)$	Monthly drinks/joints						$U(z)$
	Men		Women		Total			Men		Women		Total		
	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Alcohol	97.0	128	91.1	286	92.8	414	4.84*	45.4	42.6	19.9	25.5	27.44	33.6	11,454.5 (-7.47)***
Cannabis	60.6	80	34.1	107	41.9	187	26.86***	4.6	16.3	0.3	1.5	1.59	9.1	13,711.0 (-7.39)***
	Lifetime							Last year ≥ 2 (%)						
	Men		Women		Total		$\chi^2(1)$	Men		Women		Total		$\chi^2(1)$
	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>		%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	
Party-drugs	38.6	51	16.2	51	22.9	102	26.42***	22.7	30	11.1	35	14.6	65	10.01**
Ecstasy	34.8	46	14.3	45	20.4	91	24.10***	15.9	21	9.2	29	11.2	50	4.16*
MDMA	23.5	31	9.2	29	13.5	60	16.21***	3.8	5	3.5	11	3.6	16	‡
Amphetamine	12.9	17	5.4	17	7.6	34	7.35**	6.1	8	1.3	4	2.7	12	‡
Cocaine	15.2	20	3.5	11	7.0	31	19.50***	8.3	11	1.6	5	3.6	16	‡
Crystal meth	1.5	2	0	0	0.4	2	‡	0	0	0	0	0	0	‡
GHB	0.8	1	1.9	6	1.6	7	‡	0.8	1	0	0	0.2	1	‡
NPS	9.8	13	5.4	17	6.7	30	2.91	3.0	4	3.2	10	3.1	14	‡

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; ‡ Could not be calculated: Expected cell count less than 5.

MDMA = 3,4-Methylenedioxyamphetamine; GHB = Gamma-hydroxybutyric acid; NPS = New psychoactive substances.

times they had used it in the last 12 months (“not,” “once,” “2 to 4 times,” “5 to 8 times,” “9 to 13 times,” “14 to 20 times,” or “more than 20 times”). Amongst lifetime party-drug users, two categories (“low” and “regular” users) were created based on the variable distributions. For each substance, 50% or more party-drug users indicated to have “not” or “once” used the substance in the last 12 months. In all substances except ecstasy/MDMA, more than 75% of party-drug users indicated not having used the substance in the last 12 months. “Regular” use was therefore defined as having used any type of party-drugs twice or more in the last 12 months; using “once or more” as criterion would not be appropriate, as individuals who have only once used any type of party-drugs in their lives (in the last 12 months) would therefore be categorized as a “regular” user.

Participants were also asked whether they ever combine party-drug use with alcohol use, and whether they ever take multiple types of drugs on one occasion. Alcohol and cannabis use were assessed by asking respondents to indicate their average use per month (alcohol in units of glasses, cannabis in number of “cannabis joints”).

As predictor variables, we included demographic (age, sex, living situation, member of fraternities/sororities), personality and social aspects. Personality was subdivided into the “big five” traits, impulsivity and aggressive personality traits. The Dutch Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) assessed the big five traits (Openness to experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism) on items ranging from 1 (*completely disagree*) to 7 (*completely agree*), e.g., “I see myself as someone who is – extravert, enthusiastic.” Each scale ranges from 2 to 14.

Lower than reported by Gosling et al. (2003), the TIPI’s internal consistency in this sample was $\alpha = .23$ for the factor Agreeableness, $\alpha = .33$ for Openness, $\alpha = .55$ for Conscientiousness, $\alpha = .64$ for Neuroticism and $\alpha = .67$ for Extraversion. A post-hoc investigation of the literature on the TIPI indicates that the subscales Neuroticism and Extraversion seem to capture the corresponding big five concepts very well, whereas Conscientiousness, Agreeableness and most notably Openness perform worse (Hofmans, Kuppens, & Allik, 2008) and are less reliable (Ehrhart et al., 2009). Due to the unacceptable psychometric qualities, the scales Agreeableness and Openness were excluded from further analysis.

Impulsivity was assessed using the 8-item Barratt Impulsiveness Scale Brief (BIS-brief; Fields et al., 2015; Patton, Stanford, & Barratt, 1995). It showed acceptable internal consistency in the current sample (Cronbach’s $\alpha = .76$) and scores could range from 0 to 8. As an indicator of anti-social tendencies, a Dutch (Meester, Muris, Bosman, Schouten, & Beuving, 1996) abbreviated

(Hornsveld, Muris, Kraaimaat, & Meesters, 2009) version of the Agression Questionnaire (AQ; Buss & Perry, 1992) was used. AQ scores could range from 12 to 60 and the AQ had a good internal consistency in this sample, Cronbach’s $\alpha = .80$.

As factors related to the social environment, injunctive and descriptive norms of the Theory of Planned Behavior (Ajzen, 1991) were assessed regarding party-drug use, with parents and peers as reference groups (e.g., injunctive norm: “My parents/peers would approve of me using party-drugs”; descriptive norms: “How many of your friends/parents would you say use party-drugs?”). Further, we assessed respondents’ motivation to comply with the injunctive norm (e.g., “Regarding party-drug use, to what extent do you want to do what your friends/parents would want you to do?”). All social norm variables were scored from 0 to 100, with higher levels representing more lenient social norms towards party-drugs.

In absence of a validated questionnaire on party-drug related problems, we adapted the Dutch version of the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler, Strong, & Read, 2005) to measure adverse consequences of party-drug use (see Table 2). As some items of the B-YAACQ included alcohol-specific effects (e.g., nausea), we only included subscales on risky behavior, social/interpersonal functioning and academic/occupational functioning. In addition, we created items on adverse sexual situations, physical harm, and delinquency related to party-drug use, and driving under the influence of party-drugs (see Table 2). All items could be answered by indicating *never*, *once* or *more than once* (in the last 12 months).

Statistical analysis

Statistical analysis was performed using SPSS 20.0. In all analyses an α of .05 with two-tailed hypothesis testing was used. Of the 448 respondents, data of two respondents were removed due to invalid responses (total $N = 446$ for prevalence statistics and $N = 418$ for the ANOVA and logistic regression analyses, due to partial data). The variable “descriptive norms of parents” was excluded, because only three respondents indicated that one of their parents used party-drugs.

In reporting the prevalence of party-drugs use (RQ1), Chi squared and Mann–Whitney tests were used to assess sex differences in substance use, due to skewed distributions. Regarding the mean psychological and social correlates (RQ2 and RQ3), the statistical assumptions for the ANOVA’s (Table 3) were also violated due to skewed variable distributions per group and heterogeneity of variances (Neal & Simon, 2007). As transforming these

Table 2. Frequency of health and psychosocial problems due to party-drug use ($N = 99^*$).

In the last year ...	Once		≥ 2	
	N	%	N	%
After taking party-drugs, I have felt sick or unwell (e.g., feeling nauseated, passing out).	20	20.2	10	10.1
While taking party-drugs, I have said or done embarrassing things.	17	17.2	8	8.1
I have not gone to work or missed classes at school because of party-drug use, a hangover (including the "Tuesday blues") or illness caused by taking party-drugs.	17	17.2	7	7.1
I have taken foolish risks when I have been taking party-drugs.	17	17.2	4	4
When taking party-drugs, I have done impulsive things I regretted later.	11	11.1	5	5.1
The quality of my work or school work has suffered because of my party-drug use.	10	10.1	5	5.1
I have neglected my obligations to family, work, or school because of party-drug use.	9	9.1	3	3
I have had unprotected sex (e.g., without condom) under the influence of party-drugs.	6	6.1	4	4
I have become very rude, obnoxious, or insulting after taking party-drugs.	4	3	4	3
When taking party-drugs, I had sex with someone I would normally not have sex with.	6	6.1	1	1
My party-drug use has gotten me into sexual situations I later regretted.	5	5.1	1	1
My taking party-drugs has created problems between myself and my boyfriend/girlfriend/spouse, parents, or other near relatives.	4	4	2	2
When taking party-drugs, I have been verbally abusive or have threatened someone.	2	2	1	1
I got into contact with the police after taking party-drugs.	2	2	0	0
When taking party-drugs, I have been physically abusive (e.g., slap or push someone).	2	2	0	0
I was taken to a hospital after taking party-drugs.	1	1	0	0
I have had sex while I did not want to, under the influence of party-drugs.	1	1	0	0
I was involved in an accident after taking party-drugs.	1	1	0	0
I have driven a car when I knew I had taken too much party-drugs to drive safely.	0	0	0	0
Total	22	22.2	42	42.4

Note. *Of the 102 lifetime party-drug users, 3 did not fill out the items on health and psychosocial problems.

variables proved insufficient, all ANOVA's were bootstrapped (1000 repetitions, bias corrected accelerated (BCA) confidence intervals (CI), stratified sampling) in line with recommendations of Barber & Thompson, 2000; Neal & Simon, 2007; and Parra-Frutos, 2014.

To investigate RQ2 and RQ3, two logistic regression analyses were carried out, both including the following predictors: Demographic factors (age, sex, living situation, fraternity/sorority membership), personality (big five traits, impulsivity, aggressiveness) and social norms (injunctive and descriptive norms, motivation to comply). Predictors were assessed in univariate and multivariate analyses. No multicollinearity problems were detected. In line with recommendations by Vittinghoff and McCulloch (2006), bootstrapping was used in

order to obtain bias-corrected confidence intervals, as the analyses included less than 10 events per predictor variable (1000 repetitions, BCA CI's and stratified sampling).

For RQ2, the logistic regression analysis contained lifetime party-drug use (no or yes) as dependent variable and it was carried out for all participants who had completed the questionnaire ($N = 418$). The logistic regression analysis for RQ3 was carried out for respondents who had used party-drugs at least once in their lives and who also completed the questionnaire ($N = 95$). The dependent variable was a dummy variable indicating low use (once or less in the last 12 months) or regular use (twice or more in the last 12 months). To prevent overfitting problems, in this logistic regression analysis only univariate

Table 3. Bootstrapped means and standard deviations of characteristics among never-party-drug users, low frequent (≤ 1 last year) party-drug users and regular (≥ 2 last year) party-drug users.

	Never-users $N = 323$	Low frequent users $N = 30$	Regular users $N = 65$	Total $N = 418$	F	Games-Howell Post-hoc
Age	21.4 (3.4)	21.9 (2.6)	21.7 (1.9)	21.5 (3.1)	.59	
Monthly alcohol units	19.4 (22.5)	55.8 (55.9)	51.9 (45.7)	27.1 (33.6)	44.91***	Never < low, regular
Monthly cannabis units	0.8 (7.1)	2.5 (5.7)	3.9 (12.2)	1.4 (8.1)	4.23*	Never < regular
Injunctive norm parents	6.3 (12.7)	13.2 (17.8)	18.5 (22.9)	8.6 (15.8)	19.03***	Never < low, regular
Injunctive norm friends	28.5 (28.6)	54.8 (29.1)	71.1 (22.7)	37.0 (32.1)	70.48***	Never < low < regular
Descriptive norm friends	15.15 (19.9)	34.9 (21)	50.9 (22.9)	22.1 (24.4)	88.73***	Never < low < regular
Motivation to comply parents	63.3 (35)	51.1 (27.7)	28.2 (24.3)	57.0 (35.4)	31.04***	Never > low > regular
Motivation to comply friends	39.9 (33.5)	42.8 (25)	45.1 (26.8)	40.9 (31.9)	.78	
Neuroticism	6.4 (2.7)	5.5 (2.1)	5.5 (2.4)	6.2 (2.6)	4.26*	Never > low, regular
Extraversion	8.1 (2.8)	9.6 (2.3)	9.7 (2.4)	8.5 (2.8)	11.99***	Never < low, regular
Conscientiousness	10.8 (2.3)	9.9 (2)	9.6 (2.9)	10.5 (2.4)	8.19***	Never > low, regular
Impulsiveness	2.1 (2)	2.9 (2.6)	2.7 (2.3)	2.3 (2.1)	3.51*	Never < regular
Aggressiveness	12.1 (7.1)	13.1 (7.4)	11.5 (8.5)	12.1 (7.3)	.47	

Note. $df = 2, 421$; * $p < .05$; ** $p < .01$; *** $p < .001$.

predictors with $p < .10$ were entered in the multivariate analysis.

Results

Prevalence of party-drug use and associated problems

Of all 446 students, 22.9% ($N = 102$) had used at least one type of party-drugs at least once in their lives (Table 1). A larger proportion of males reported to have tried one or more party-drugs (38.6%) than women (16.2%), and men generally reported more substance use (Table 1). Alcohol and cannabis were used at least once by a large majority (92.8%) and almost half (41.9%) of the participants respectively. Considering the “trending” party-drugs GHB and NPS, as expected, some use was detected in our sample, although GHB use was rare (1.6%; Table 1). Among the NPS, 4-Fluoroamphetamine (4-FA) appeared to be most popular: Lifetime 4-FA use was 5.4%, whereas lifetime use of other NPS were 1.6% or less. Only two respondents reported having used crystal meth, and none reported using it in the last 12 months.

Among party-drug users, half (51%) reported sometimes drinking alcohol while being under the influence of any drugs (combined use with ecstasy 28.4%, cannabis 22.5%, cocaine 14.7%, MDMA 12.7%, amphetamine 6.9%, NPS 3.9%, and GHB 1%). Additionally, 31.4% of users reported sometimes combining different drugs on one occasion. Almost all possible combinations between cannabis, ecstasy, MDMA, amphetamine, cocaine, GHB, and NPS were reported at least once. Ecstasy was combined with other drugs most frequently (with cannabis 10.8%, NPS 8.8%, amphetamine 7.8%, MDMA 6.9%, cocaine 3.9%, and GHB 1%).

Over half (64.6%) of party-drug users reported to have experienced at least one acute health or psychosocial problem in the last 12 months. The most reported events were feeling ill after taking party-drugs (30.3%), doing embarrassing things (25.3%), missing classes or work due to a hangover (24.2%), and taking foolish risks (21.1%; Table 2). Least frequently reported negative events were being taken to the hospital (1%), having sex against one's will (1%), and being involved in an accident (1%). No one reported to have driven a car after having taken “too much” party-drugs (0%; Table 2), but seven individuals (6.9%) reported having driven a car after taking party-drugs at least once.

Prediction of initial and regular party-drug use

Next, we investigated in two regression analyses which of the demographic, personality and social factors could

distinguish whether a student would be classified as a (1) lifetime never-user or lifetime user (RQ2), and (2) low frequent (≤ 1 last year) or regular (≥ 2 last year) party-drugs user (RQ3). The means and standard deviations of the predictors by group are displayed in Table 3. Group differences were found in almost all predictors, except for age, motivation to comply with friends regarding party-drug use and aggressiveness. Games-Howell post hoc comparisons (Table 3) revealed that most differences occurred between the never-user group and the (low and/or regular) user groups. Compared to the never-user group, user groups also contained relatively more men, $\chi^2(2) = 27.69, p < .001$, students of fraternities/sororities, $\chi^2(2) = 14.43, p < .001$, and students who do not live with their parents, $\chi^2(2) = 8.29, p < .05$. The low frequent and regular user groups only differed with respect to injunctive and descriptive norms of friends, and motivation to comply with parents (Table 3).

Table 4 displays the first logistic regression analysis, in which lifetime party-drug use was predicted in univariate and multivariate analyses (RQ2). The univariate predictors revealed male students and individuals who consume more alcohol monthly, were also more likely to be classified as lifetime party-drug users. The same applies to individuals who do not live with parents, who

Table 4. Predictors of lifetime party-drug use (no/yes; $N = 418$).

	Univariate model	Multivariate model
	OR (95% BCA CI)	
Age ^a	1.06 (0.86–1.30)	1.02 (0.75–1.39)
Male sex	3.25 (2.05–5.15)***	2.72 (1.22–6.04)*
Alcohol ^a	2.78 (2.09–3.70)***	1.44 (0.97–2.13)
Cannabis ^a	1.41 (1.05–1.90)	0.93 (0.66–1.30)
Not living with parents	2.46 (1.31–4.62)**	1.19 (0.50–2.84)
Fraternity/sorority member	2.37 (1.51–3.73)***	0.72 (0.34–1.50)
Injunctive norm parents ^a	1.75 (1.43–2.15)***	1.27 (0.96–1.67)
Injunctive norm friends ^a	3.46 (2.61–4.58)***	1.59 (1.03–2.46)*
Descriptive norm friends ^a	3.59 (2.74–4.70)***	2.39 (1.60–3.58)***
Motivation to comply parents ^a	0.45 (0.35–0.58)***	0.44 (0.31–0.62)***
Motivation to comply friends ^a	1.12 (0.89–1.39)	1.78 (1.22–2.60)*
Neuroticism ^a	0.69 (0.54–0.88)***	1.23 (0.84–1.81)
Extraversion ^a	1.83 (1.42–2.37)***	1.41 (0.95–2.09)
Conscientiousness ^a	0.64 (0.51–0.80)***	0.76 (0.50–1.14)
Impulsiveness ^a	1.34 (1.07–1.67)*	0.79 (0.51–1.23)
Aggressiveness ^a	0.99 (0.79–1.25)	1.01 (0.72–1.41)

Note. Multivariate model $\chi^2(16) = 187.531, p < .001, R^2 = .36$ (Cox & Snell); $R^2 = .55$ (Nagelkerke). ^aPer SD increase; Age SD = 3.5; Alcohol SD = 33.6; Cannabis SD = 8.1; Injunctive norm parents SD = 15.8; injunctive norm friends SD = 32.1; Descriptive norm friends SD = 24.2; Motivation to comply parents SD = 35.4; Motivation to comply friends SD = 31.9; Neuroticism SD = 2.6; Extraversion SD = 2.8; Conscientiousness SD = 2.4; Impulsiveness SD = 2.1; Aggressiveness SD = 7.3. *bootstrapped $p < .05$; **bootstrapped $p < .01$; ***bootstrapped $p \leq .001$.

Table 5. Predictors of regular (≥ 2 last year) party-drug use ($N = 95$).

	Univariate model	Multivariate model ^b
	OR (95% BCA CI)	
Age	1.02 (0.52–1.98)	
Male sex	0.65 (0.29–1.47)	
Alcohol	0.95 (0.72–1.25)	
Cannabis	0.96 (0.74–1.24)	
Not living with parents	1.11 (0.34–3.69)	
Fraternity/sorority member	1.09 (0.48–2.49)	
Injunctive norm parents	1.22 (0.88–1.69)	
Injunctive norm friends	2.39 (1.41–4.06)**	1.85 (0.97–3.51)*
Descriptive norm friends	2.24 (1.36–3.66)***	1.92 (1.03–3.56)*
Motivation to comply parents	0.31 (0.17–0.57)***	0.27 (0.14–0.54)***
Motivation to comply friends	1.26 (0.76–2.07)	
Neuroticism	1.05 (0.64–1.72)	
Extraversion	1.09 (0.65–1.80)	
Conscientiousness	0.89 (0.60–1.33)	
Impulsiveness	0.95 (0.65–1.39)	
Aggressiveness	0.84 (0.57–1.24)	

Note: Multivariate model $\chi^2(3) = 31,170$, $p < .001$, $R^2 = .27$ (Cox & Snell); $R^2 = .37$ (Nagelkerke). ^a Per SD increase; Age $SD = 3.5$; Alcohol $SD = 33.6$; Cannabis $SD = 8.1$; Injunctive norm parents $SD = 15.8$; injunctive norm friends $SD = 32.1$; Motivation to comply parents $SD = 35.4$; Motivation to comply friends $SD = 31.9$; Neuroticism $SD = 2.6$; Extraversion $SD = 2.8$; Conscientiousness $SD = 2.4$; Impulsiveness $SD = 2.1$; Aggressiveness $SD = 7.3$. ^bTo prevent overfitting problems, only variables with $p < .10$ in the univariate analysis were included. *Bootstrapped $p < .05$; **Bootstrapped $p < .01$; ***Bootstrapped $p < .001$.

are member of a fraternity or sorority and whose parents and friends seem more lenient towards party-drugs. Inversely, higher motivation to comply with parents was associated with a smaller chance to be a lifetime party-drug user. In light of personality, higher levels of extraversion and impulsiveness were positively associated with lifetime party-drug use, whereas higher levels of neuroticism and conscientiousness lowered the chance to be classified as a party-drug user. Contrary to our hypotheses, age, monthly cannabis use, motivation to comply with friends and aggressiveness were not associated with lifetime party-drug use. When entered together in the multivariate model, only (male) sex and several social norms (most regarding friends) emerged as significant predictors of lifetime party-drug use.

In the second logistic regression analysis (Table 5), low frequent or regular party-drug use was predicted (RQ3). In both the univariate and multivariate analyses, only three social norms emerged as significant predictors: The injunctive norm of friends, the descriptive norm of friends, and the motivation to comply with parents regarding party-drug use. Thus, party-drug users who report more lenient injunctive norms among friends and whose friends are perceived to use party-drugs, are more likely to be classified as regular party-drug users. Individuals who have a stronger wish to comply with their parents regarding party-drugs, seem to use party-drugs less frequently.

Discussion

The aims of the current study were to report on prevalence of party-drug use and associated psychosocial problems among Dutch university students, and to identify psychosocial correlates of lifetime and regular party-drug use. Of all students, 22.9% had ever used party-drugs, and 14.6% at least twice in the last 12 months. In line with earlier reports (Goossens et al., 2013; Dorsselaer & Goossens, 2015), the party-drug ecstasy/MDMA was by far the most popular, followed by amphetamines, cocaine and NPS. The prevalence statistics are similar to other Dutch (De Hoogh, & De Jong, 2014; Universiteitskrant Groningen, 2014) and USA studies (Dennhardt & Murphy, 2013). Only a handful of students reporting lifetime GHB use. In contrast, NPS were used as frequently as more well-known hard drugs, such as amphetamines and cocaine.

The acute health and psychosocial problems assessed in this study do not seem alarming: Few students reported serious impairment in social or academic functioning, acute health problems, or severe consequences (e.g., violence, accidents, hospitalization). Although experiencing some psychosocial or health problem due to party-drugs was common (64.6%), most were “mild” (feeling unwell, doing embarrassing things). Somewhat worrisome are the relatively high rates of poly drug-use (31.4%) and the occurrence (6.9%) of driving under the influence of party-drugs.

In order to inform preventive/harm reduction strategies, the second aim of this study was to identify psychosocial correlates of lifetime and regular party-drug use. Males more frequently reported to have ever used party-drug than females (39% vs. 16 %; conform results by, e.g., Seedat et al., 2009). However, male sex was not a significant predictor for *regular* party-drug use, indicating that male students may not necessarily continue their party-drug use more frequently than females (Becker et al., 2012). Age was not associated with lifetime or regular use, even though older students were expected to have experienced more opportunities to initiate (party-)drug use (Arria et al., 2008).

Lifetime and regular party-drug users appeared to be less neurotic and conscientious, and more extravert and impulsive compared with never-users; aggressiveness was not significantly associated. These results are not entirely consistent with studies on personality of individuals with substance abuse disorders, who are often found to be *more* neurotic and *less* extravert compared with never-users (Kotov et al., 2010). One might speculate that substance use is differently related to personality in patients than in students: In some students, being highly sociable (low in neuroticism, high in extraversion) might contribute to more “partying” and thereby more

opportunities to come into contact with (party-)drugs; whereas in patients, vulnerability for mental disorders such as depression and anxiety (higher neuroticism and introversion) might contribute to drug use susceptibility. Similarly, party-drug use in this student sample may not be embedded in a criminal setting, thereby not producing a significant correlation between party-drug use and aggression (Compton et al., 2007).

Additionally, it should be noted that personality traits may also change as a consequence of prolonged exposure to psychoactive substances. Impulsivity, for instance, has been found to increase in substance abuse patients (Verdejo-Garcia et al., 2008). However, longitudinal studies on personality and substance use provide more evidence for a model in which development of personality factors precedes substance use initiation and continuation (Verheul & Van den Brink, 2005). Indicators of behavioral disinhibition and novelty seeking, for instance, can be observed during childhood and have been shown to predict later substance use. This indicates that development of personality either precedes substance use and abuse (“primary personality disorder model”), or that third factors affect both early personality development as well as later substance use and abuse (“common factor model”; Verheul & Van den Brink, 2005).

Furthermore, students who do not live with parents and who are members of fraternities/sororities were more likely to have used party-drugs at some time in their lives. These findings coincide with studies on alcohol (e.g., Kypri et al., 2009; Maggs et al., 2011). However, party-drug users who do not live with their parents and who are members of fraternities/sororities were not more likely to be *regular* users. Furthermore, injunctive and descriptive norms of friends also related strongly to both lifetime party-drug use and regular party-drug use: Students who feel that their friends are lenient about party-drugs, and/or who think many friends use party-drugs, are more likely to use party-drugs themselves. It should be noted that the causality of this association may be reversed: Students who use party-drugs might also (erroneously) project favourable party-drug related attitudes onto their friends (Martens et al., 2006). However, longitudinal studies on the Theory of Planned Behavior (Ajzen, 1991) show that perceived social norms can also precede substance use, indicating that a causal pathway from perceived social norms to later substance use is plausible (e.g., Malmberg et al., 2012).

Surprisingly, motivation to comply with friends was in itself not associated with lifetime or regular party-drug use. A possible explanation is that compliance with friends may mean “not using party-drugs” in some instances, and “using (more) party-drugs” in other

instances. Alternatively, individuals may not experience their decision to initiate party-drugs to stem from adherence to others’ norms (i.e., “peer pressure”): In the Groningen study, only 3% of ecstasy users indicated having used ecstasy out of peer pressure, perhaps due to social desirability (De Hoogh & De Jong, 2014).

The injunctive norms of parents did not predict lifetime and regular party-drug use, possibly due to little variation in this variable: Most students indicated that their parents would disapprove of party-drug use. Similarly, only a handful of students indicated that their parent(s) used party-drugs. The motivation to comply with parents, though, was a significant (negative) predictor of both lifetime and regular party-drug use: Students who feel less urge to comply with their parents regarding party-drug use, have a larger chance to use party-drugs (lifetime and regular use).

Finally, we assessed the relative strength of these predictors in the multivariate analyses. Interestingly, only male sex, social norms regarding friends and the motivation to comply with parents distinguished lifetime users from never-users. A similar pattern emerged when looking at the prediction of regular party-drug use: only injunctive and descriptive norms regarding friends and motivation to comply with parents were predictors of regular party-drug use in the multivariate analysis. A possible interpretation of these findings is that party-drug use among students may be best predicted by a tendency to be close with other students who (also) enjoy substance use and “partying,” while being relatively distanced from parental influences (i.e., are less inclined to adhere to their standards). Students who show these tendencies may be relatively more extravert, impulsive, and emotionally stable, and thus open to exploring new and stimulating environments; to live in student homes and to be members of fraternities/sororities. Through these environments they may have a larger chance to come into contact with students who use party-drugs. In the same line, a recent study on alcohol consumption also found that proximate social factors were stronger predictors for drinking status than parental norms and personality (Lac & Donaldson, 2016).

Our findings suggest that both preventive and harm reduction interventions may profit from targeting proximate social norms. Several programs targeting these social norms have been developed. For instance, Stock, Vallentin-Holbeck, and Rasmussen (2016) created a program in which pupils first indicate their own substance use and perceived norms through online questionnaires, and subsequently receive corrective information about substance use rates and social norms of their peers. Similarly, Neighbors et al. (2011) found that college students in the control condition consumed more alcohol weekly

than participants receiving corrective information about peers' alcohol consumption. Social norms interventions adapted specifically for party-drugs may be promising to prevent or decrease party-drug use among college students.

Several limitations of the current study should be noted. First, there are obvious limitations related to the use of self-report measures (e.g., underreporting party-drug use out of social desirability). Second, despite our efforts, the sample was not entirely representative of the student population studied: There were fewer men, and most students were enrolled at the faculty of social sciences, possibly lowering the total estimated party-drug use prevalence. Notably, it seems unlikely that self-selection effects have clouded the results, as we carefully masked the aims of the study. Third, some of the utilized measurement instruments had inferior psychometric quality than expected, leading to the exclusion of two relevant big five dimensions (agreeableness and openness). Replication using a sounder instrument is therefore recommended. Similarly, universal agreed-upon definitions are lacking regarding “party-drugs” and “regular use.” Finally, as discussed, the correlational nature of our study prevents us from drawing strong conclusions regarding the causal relations between party-drug use and perceived social norms and personality traits. Longitudinal studies assessing the relation between social norms, personality and party-drug use may address this issue.

Within the scope of these limitations we highlight several strengths, conclusions and implications. To our knowledge, this is the most recent study in the Netherlands on current drug use among college students, including trending substances such as NPS and GHB. Our results indicate that party-drug use is not uncommon among students. Our findings extend previous research by reporting on consequences of drugs other than cannabis, a shortcoming in the current literature (Dennhardt & Murphy, 2013), and preliminarily investigating correlates of regular party-drug use, in addition to lifetime use.

Even though serious acute health and psychosocial problems seemed rare in students, party-drug use in this population nevertheless requires monitoring, as long-term health outcomes of party-drug use are largely unknown (Linsen et al., 2015). Some clusters of individuals seem at risk of developing a more regular drug use pattern, and possibly developing acute health or psychosocial problems. These individuals may be characterized by a tendency to be close to people who (also) enjoy “partying” and party-drugs, and relatively far away from parental influences. These results indicate that interventions among students may benefit from targeting proximate social influences (e.g., Helmer, Muellmann, Zeeb, & Pischke, 2016).

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article. This manuscript has not been published elsewhere and has not been submitted for publication somewhere else simultaneously.

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