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Substance use in young Swiss men: The interplay of perceived social support and dispositional characteristics

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Abstract

Background. Social environment plays a central role in substance use behaviours. However, it is not clear whether its role varies as a function of individual dispositional characteristics.

Objectives. To investigate the interaction between dispositional characteristics (i.e. sensation seeking, anxiety/neuroticism) and social environment (i.e. perceived social support [PSS]) in association with substance use.

Methods. A representative sample of 5,377 young Swiss males completed a questionnaire assessing substance use, sensation seeking, anxiety/neuroticism, and PSS from friends and from a significant other.

Results. Sensation seeking and anxiety/neuroticism were positively related to most substance use outcomes. PSS from friends was significantly and positively related to most alcohol and cannabis use outcomes, and significantly and negatively associated with the use of hard drugs. PSS from a significant other was significantly and negatively associated with most alcohol and cannabis use outcomes. The associations of sensation seeking with drinking volume, alcohol use disorder and the use of illicit drugs other than cannabis were stronger in individuals reporting high levels of PSS from friends than those with low levels. The associations of sensation seeking with risky single-occasion drinking and the use of hard drugs were weaker in participants reporting high levels of PSS from a significant other than in those with low levels.

Conclusions. Sensation seeking and anxiety/neuroticism may constitute risk factors for substance use and misuse. PSS from friends may amplify the risk for alcohol and illicit drug use (other than cannabis) associated with high sensation seeking, whereas the PSS from a significant other may reduce it.

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Background

Substance use is the leading cause of young adult mortality (Rehm, Taylor, & Room, 2006) and is associated with various high-risk behaviours such as violence, injuries, suicide (Kokotailo, 1995; Osgood, Johnston, O'Malley, & Bachman, 1988). It constitutes a major public health problem that is most prevalent in young men (Gmel, Kuendig, Notari, & Gmel, 2015). There is a consensus among researchers that substance use results from a complex interplay between biological, psychological and social factors (Griffiths, 2005; Hesselbrock & Hesselbrock, 2006; Skewes & Gonzalez, 2013), where the role of some dispositional characteristics (i.e. sensation seeking, anxiety/neuroticism) and social support may be particularly important. However, to date, studies investigating the associations of alcohol and substance use with dispositional characteristics such as sensation seeking and anxiety/neuroticism, and social support have generally examined the contribution of these factors only separately, or, when they tested them simultaneously, most studies did not investigate possible interactions between these factors (but see Knyazev, 2010). The present study sought to fill this gap.

A large body of research shows that sensation seeking (Hittner & Swickert, 2006; Kopstein, Crum, Celentano, & Martin, 2001; Sher, Bartholow, & Wood, 2000; Trocki, Drabble, & Midanik, 2009) and anxiety/neuroticism (Goodwin & Hamilton, 2002; Lahey, 2009; Terracciano & Costa, 2004) may predispose individuals to develop and maintain substance use and misuse. These two dispositional characteristics are thought to be related to substance use for distinct reasons (Comeau, Stewart, & Loba, 2001; Cox & Klinger, 2011; Woicik, Stewart, Pihl, & Conrod, 2009). High sensation seekers tend to be easily bored because they have low levels of arousal or because their optimal level of arousal is higher than that of low sensation seekers

(Zuckerman, 2006). Thus, they may be more inclined to choose exciting and thrilling activities (including substance use) in order to reach optimal levels of arousal and pleasure (Hittner & Swickert, 2006; Zuckerman, 2006). As a consequence, in high sensation seekers, substances may be used for enhancement reasons, in order to reach sufficient levels of excitement and positive affects (Comeau et al., 2001; Cox & Klinger, 2011; Woicik et al., 2009). By contrast, individuals scoring highly on anxiety/neuroticism are characterised by high levels of arousal and are predisposed to enhanced hopelessness, distress and anxiety (Clark & Watson, 1991; Lahey, 2009; Middeldorp et al., 2006). They are thought to use substance in order to dampen their negative emotions and cope with high levels of stress and anxiety (i.e. tension reduction) to reach lower levels of arousal (Comeau et al., 2001; Simons, Gaher, Correia, Hansen, & Christopher, 2005; Woicik et al., 2009). Despite strong evidence that dispositional characteristics such as sensation seeking and anxiety/neuroticism constitute risk factors for substance use, other factors also contribute to the development and maintenance of substance use behaviours.

The social environment, in particular the quality of relationships with family, friends and significant others, also plays a central role in substance use behaviours (Borsari & Carey, 2006; Hesselbrock & Hesselbrock, 2006). Social support, i.e. "the resources provided by other persons" (Cohen & Syme, 1985, p. 4) is an important aspect of the quality of relationships. It has beneficial effects on mental and physical health (Cohen & Wills, 1985) because it helps individuals to cope with traumatic and stressful life events and maintain good quality of life (Helgeson, 2003; Schwarzer & Knoll, 2007). With regard to substance use, results of previous studies suggested that the beneficial effect of social support depends on the source of the support (Kristjansson, Sigfusdottir, James, Allegrante, & Helgason, 2010; Tartaglia, 2014; Wills, Resko, Ainette, & Mendoza, 2004). In young adults more specifically, results of Tartaglia (2014)

suggest that support from friends constitutes a risk factor for alcohol use, whereas support from a significant other may constitute a protective factor (Tartaglia, 2014). The protective effect of social support from a significant other may reflect the support of close and intimate relationships that may help to deal with stress and maintain well-being (Tartaglia, 2014), or the influence of a romantic partner on controlling problematic behaviours such as substance use (Simon & Barrett, 2010). By contrast, the negative impact of social support from friends may indicate the propensity of peer relationships to focus on social activities with positive hedonic qualities and to engage in spontaneous impulsive behaviours such as substance use (Wills et al., 2004). Thus, both dispositional characteristics (e.g. sensation seeking and anxiety/neuroticism) and social support are important to consider when studying factors associated with substance use. Moreover, as substance use results from the complex interactions between biological, psychological and social factors, it is also important to consider the interactions between dispositional characteristics and social environment (Hesselbrock & Hesselbrock, 2006; Hill et al., 2010; Zucker, 2008).

However, with regard to substance use, the interactive effects of social support with dispositional characteristics such as sensation seeking and anxiety/neuroticism have been rarely studied. One notable exception is a study of Knyazev (2010) showing that peer and parental support buffered the association between behavioural activation, i.e. a dispositional characteristic encompassing sensation seeking, and drug use. Interestingly, this effect was significant only in females. The study, however, used a composite score of illicit drug use as the outcome variable, which did not include alcohol and tobacco. Yet, different results may be expected for alcohol and tobacco, since their use is more prevalent, more widely available and legal for young adults. Moreover, this study was conducted on college students only, and did not examine whether there

were interactions between social support and dispositional characteristics such as anxiety/neuroticism.

Using a representative sample of young Swiss men, the objective of the present study was twofold. First, it sought to investigate the associations of alcohol, tobacco, cannabis and other illicit drug use with two dispositional characteristics, i.e. sensation seeking, and anxiety/neuroticism, and with two aspects of perceived social support (PSS; i.e. from friends [PSS-F]; from a significant other [PSS-SO]). Second, it examined whether social support moderated the associations of substance use with sensation seeking and anxiety/neuroticism. In line with the results of previous studies, we expected positive associations of substance use with sensation seeking, anxiety/neuroticism traits and PSS-F, and negative associations with PSS-SO. Finally, we expected that social support would moderate the associations of substance use with sensation seeking and anxiety/neuroticism, namely that PSS-SO would act as a buffer, whereas PSS-F would amplify the associations.

Methods

Study design and participants

We analysed data from the Cohort Study on Substance Use Risk Factors (C-SURF), a longitudinal study designed to investigate risk and protective factors related to substance use in emerging adulthood. The research protocol (15/07) was approved by the ethics committee for clinical research at Lausanne University Medical School. Enrolment took place in three of the six army recruitment centres, covering twenty-one of the twenty-six Swiss cantons. As army recruitment is mandatory for twenty-year-old males in Switzerland, virtually all young males of this age were eligible for participation. Army recruitment centres were used to inform and enrol participants, but the study was kept independent of the army. Since questionnaires were

completed at home, participants were not influenced by army procedures when filling them out. More information on enrolment procedure was described in previous studies (Gmel, Akre, et al., 2015; Studer, Baggio, et al., 2013; Studer, Mohler-Kuo, et al., 2013).

A total of 7,556 participants gave written consent to participate and, of them, 5,987 (79.2%) completed the baseline questionnaire between September 2010 and March 2012, and 6,020 (79.7%) completed the follow-up questionnaire between March 2012 and April 2013. A total of 5,479 (91.5% of baseline respondents) responded to both baseline and follow-up. Missing values were listwise deleted. The final analytical sample comprised 5,377 respondents (98.1% of respondents to baseline and follow-up).

Measures

Alcohol. Three questions were used at the follow-up stage to assess alcohol use in the previous twelve months: usual quantity (i.e. usual number of standard drinks on drinking days) and frequency (i.e. number of days per week on which alcohol was usually consumed), and frequency of risky single occasion drinking (RSOD; i.e. consuming at least six standard drinks on a single occasion). Pictures of standard drinks containing 10-12g of pure alcohol were provided. Weekly drinking volume was computed by multiplying quantity and frequency. The definition of RSOD, i.e. approximately 66g of pure alcohol (six drinks containing 10-12g of pure alcohol) corresponds approximately to the definition of the National Institute on Alcohol Abuse and Alcoholism (NIAAA), i.e. for men, approximately 70g of pure alcohol (five drinks containing 14g of pure alcohol) (NIAAA, n.d.-a, n.d.-b). Monthly or more frequent RSOD was coded 1 and less than monthly RSOD was coded 0. Drinking status differentiated between abstainers (coded 0) and drinkers (coded 1).

The eleven criteria for alcohol use disorders (AUD), based on the fifth edition of the diagnostic and statistical manual of mental disorders (DSM-5; American Psychiatric Association, 2013) were used to assess AUD at follow-up. Questions taken from Knight et al. (2002) as well as an additional criterion for craving were translated into French and German. Participants were asked at the follow-up stage whether they had experienced any criterion in the previous twelve months. AUD was coded 1 when at least four DSM-5 criteria were met, reflecting at least moderate AUD (American Psychiatric Association, 2013). When less than four criteria were met, AUD was coded 0.

Cigarettes. Participants were asked at the follow-up stage whether they had smoked cigarettes in the previous twelve months, and, if they smoked, how often they had done so in the previous twelve months. Based on this question, two variables were created. Smoking status differentiated between smokers (coded 1) and non-smokers (coded 0). Daily smoking differentiated between daily smokers (coded 1) and occasional or non-smokers (coded 0). Nicotine dependence was assessed at the follow-up stage using the Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). This is a six-item questionnaire yielding a continuous score ranging from 0 to 10. Nicotine dependence was coded 1 for scores of four or above. With a score below four, it was coded 0 (Huang, Lin, & Wang, 2008).

Cannabis. The frequency of cannabis use in the previous twelve months was measured at the follow-up stage with the categories ‘never’ ‘once a month or less often’, ‘2–4 times a month’, ‘2–3 times a week’, and ‘4 times or more often a week’. Cannabis use status differentiated between non-users (coded 0) and users (coded 1). At-risk cannabis use was defined as using cannabis more than once a week (coded 1) as opposed to once a week or less often (coded 0).

Cannabis use disorders were evaluated at follow-up using the Cannabis Use Disorder Identification Test (Adamsom & Sellman, 2003). This is a ten-item assessment tool asking participants about symptoms of cannabis use disorder during the previous twelve months, yielding a score ranging from 0 to 40. Cannabis use disorders were coded 1 for a score of eight or above. With a score below eight, it was coded 0 (Adamsom & Sellman, 2003).

Other illicit drugs. At the follow-up stage, fifteen questions measured the use of illicit drugs other than cannabis in the previous twelve months. Participants indicated whether they had used any substance in the previous twelve months. As shown by Baggio, Studer, Mohler-Kuo, Daeppen, and Gmel (2013), these drugs were clustered in two distinct groups of illicit drugs, i.e. 'soft drugs', including magic mushrooms, psylocibin, peyote, mescalin; other hallucinogens; Salvia divinorum; speed; cocaine, crack, freebase; ecstasy, MDMA; amphetamine, metamphetamine, amphetaminsulfate; poppers; solvent sniffing; and 'hard drugs', including ketamine, dextromethorphan; GHB/GBL/I-4 Butandiol; heroin; research chemicals; crystal meth; spices or similar substances. Two dichotomous variables were created: the use of at least one soft drug, and the use of at least one hard drug.

Sensation seeking. The eight-item Brief Sensation Seeking Scale (BSSS; Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002) was used to assess individual differences in sensation seeking at the baseline stage. Each item (e.g. 'I like to do frightening things') was evaluated on a five-point scale ranging from 1–'strongly disagree' to 5–'strongly agree'. Cronbach's alpha in the present study (α=.81) was slightly higher than that observed in the validation study of the BSSS (α=.76) and was indicative of good scale score reliability. A mean score ranging from 1 to 5 was computed, so that high scores reflect high levels of sensation seeking.

Anxiety/neuroticism. The Anxiety/Neuroticism scale of the shortened Zuckerman-Kuhlman Personality Questionnaire (ZKPQ-50-cc; Aluja et al., 2006) was used to assess individual differences in anxiety/neuroticism traits at the baseline stage. This scale comprised ten items (e.g. 'I often feel unsure of myself') in a true/false format. Cronbach's alpha was lower in the present study (α=.70) than in the Swiss sample of the validation of the ZKPQ (α=.83) but is nevertheless indicative of acceptable scale score reliability. A summary score ranging from 0 to 10 was computed, so that high scores reflect high levels of anxiety/neuroticism.

PSS. Two aspects of PSS were evaluated using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988), namely PSS-F and PSS-SO. As PSS from family was previously found to be unrelated to substance use in young adults (Tartaglia, 2014), it was not measured. With regard to PSS-SO, the significant other was defined as a special person, as in the original MSPSS, which may refer to e.g. a close supportive friend, a romantic partner, a teacher or even to a family member (as PSS from family was not directly measured). Since only about 5% of the sample reported being married or living with a romantic partner (Vogel et al., 2016), a large proportion of young adults may not yet be engaged in a long-term or committed romantic relationship. As a consequence, it is important that the definition of the significant other goes beyond a strict romantic partner and includes close and significant relationships. Four items (e.g. ´My friends really try to help me´, for PSS-F; ´I have a special person who is a real source of comfort to me´, for PSS-SO) were used to evaluate each aspect of PSS using a seven-point Likert scale ranging from 1-"very strongly disagree" to 7-"very strongly agree". Cronbach's alphas for PSS-F and PSS-SO were high in both the original validation study of Zimet et al. (1988) ($\alpha_{PSS\text{-}F}$=.91; $\alpha_{PSS\text{-}SO}$=.85) and in the current study ($\alpha_{PSS\text{-}F}$=.95; $\alpha_{PSS\text{-}SO}$=.96), indicating excellent scale score reliabilities. In the present study, there was a strong correlation

between PSS-F and PSS-SO (r=.67), as there was in the original validation study (r=.63). Mean scores ranging from 1 to 7 were computed for PSS-F and PSS-SO, so that high score means high levels of PSS.

Covariates. Socio-demographic variables including age, linguistic region and highest completed level of education at the follow-up stage were assessed. The highest completed level of education consisted of three categories of schooling: primary schooling (9 years); vocational training (>9–12); post-secondary schooling (thirteen years or more including high school which can be only twelve years in some cantons). Linguistic region differentiated between French- and German-speaking regions. Since differences in culture and substance use prevalence exist between Swiss linguistic regions (Gmel, Kuendig, et al., 2015), it is important to take this variable into account in the analyses.

Statistical analyses

Descriptive statistics were computed to characterise the sample. Associations of substance use outcomes with dispositional characteristics, social support and the two-way interactions between dispositional characteristics and social support were tested using logistic regression for all substance use outcomes. The only exception was for drinking volume, where negative binomial regression was used because it is recommended for overdispersed count variables with variances greater than their means (Long, 1997). For each outcome, three models were tested. Model 1 tested the associations of sensation seeking, anxiety/neuroticism, PSS-F and PSS-SO with substance use outcomes in separate regression models, one model for each predictor of interest, whereas model 2 tested the simultaneous associations. Model 3 tested variables entered in model 2 plus the two-way interactions involving dispositional characteristics and PSS (i.e. sensation seeking by PSS-F, sensation seeking by PSS-SO, anxiety/neuroticism by

PSS-F, anxiety/neuroticism by PSS-SO). All models were adjusted for age, linguistic region and highest completed level of education. Dispositional characteristics and social support variables were centred before running regressions. Unstandardised (b) and partially standardized (β; i.e. only predictors were standardized) coefficients, and odds ratios (OR, for logistic regression), incidence rate ratios (IRR, for negative binomial regression) and 95% confidence interval (CI) based on partially standardized coefficients are reported. Before analyses, multicollinearity was checked using the variance inflation factor (VIF) for each explanatory variable and interaction. No problems of multicollinearity were detected, as the highest VIF value (all VIFs < 1.94) was well below the values (VIF≥5 or VIF≥10) that are generally considered as evidence of multicollinearity (see O'brien, 2007). When significant, interactions were decomposed by testing simple slopes of dispositional characteristics at low (i.e. 25th percentile) and high (i.e. 75th percentile) levels of PSS variables. All analyses were conducted using SPSS 22 and the MODPROBE tool (Hayes & Matthes, 2009) was used to decompose interactions.

Results

Descriptive characteristics of the sample

The mean age of participants was 21.31 years (*SD*=1.27) at the follow-up stage. Three thousand and thirteen (56.0%) participants were French-speaking, whereas 2,364 (44.0%) were German-speaking. Three hundred and ninety-eight (7.4%), 2,512 (46.7%), and 2,467 (45.9%) participants reported primary schooling, vocational training, and post-secondary schooling as their highest completed level of education, respectively. On average, participants reported drinking 7.76 (*SD*=10.69) standard drinks by week. Rates of substance use are reported in Table 1. Means and standard deviations for sensation seeking, anxiety/neuroticism, and PSS-F and PSS-SO are reported in Table 2.

Associations with substance use outcomes

Results of regression analyses for all substance use outcomes are reported in Tables 3 to 6. With regard to alcohol use outcomes (see Table 3), both model 1 (bivariate associations, adjusted for socio-demographics) and model 2 (simultaneous associations, adjusted for socio-demographics) yielded significant positive associations of sensation seeking with twelve-month alcohol use, drinking volume, RSOD and AUD. By contrast, anxiety/neuroticism was only significantly and positively related to AUD. PSS-F was significantly and positively associated with twelve-month alcohol use, drinking volume, and RSOD (see model 1 and 2). Interestingly, while PSS-F and AUD were significantly and negatively associated in model 1, they were positively, yet not significantly, associated in model 2, where all variables were tested simultaneously. Furthermore, significant interactions were found between sensation seeking and PSS-F, in association with drinking volume and AUD (model 3). Follow-up analyses examining the moderating effect of PSS-F showed that the associations of sensation seeking with drinking volume and AUD were stronger for participants reporting high levels of PSS-F (*b*=0.36, *SE*=0.02, β=0.31, IRR=1.36, 95%CI 1.31, 1.42, *p*<.001, for drinking volume; *b*=0.79, *SE*=0.08, β=0.68, OR=1.98, 95%CI 1.72, 2.28, *p*<.001, for AUD) than for those reporting low levels (*b*=0.29, *SE*=0.18, β=0.25, IRR=1.28, 95%CI 1.24, 1.32, *p*<.001, for drinking volume; *b*=0.61, *SE*=0.07, β=0.53, OR=1.70, 95%CI 1.51, 1.90, *p*<.001, for AUD).

As far as RSOD is concerned, a significant interaction was found between sensation seeking and PSS-SO (model 3). Follow-up analyses testing the moderating effect of PSS-SO showed that the sensation seeking–RSOD association was stronger for participants reporting low levels of PSS-SO (*b*=0.63, *SE*=0.04, β=0.55, OR=1.73, 95%CI 1.62, 1.85, *p*<.001), than for those reporting high levels (*b*=0.52, *SE*=0.05, β=0.45, OR=1.58, 95%CI 1.45, 1.72, *p*<.001).

With regard to cigarette use outcomes (see Table 4), both simple (model 1) and simultaneous (model 2) associations of sensation seeking and anxiety/neuroticism were significant and positive with twelve-month cigarette use, daily smoking, and nicotine dependence. When tested separately (model 1), PSS-F was also significantly and positively related to twelve-month cigarette use. However, this association did not remain significant when all variables were tested simultaneously (model 2). Neither the associations of PSS-SO (model 1 and 2) with cigarette use outcomes nor the two-way interactions (model 3) between PSS (PSS-F, PSS-SO) and dispositional characteristics (sensation seeking, anxiety/neuroticism) reached significance.

In respect to cannabis use outcomes (see Table 5), twelve-month cannabis use, cannabis use more than once a week, and cannabis use disorders were significantly and positively associated with sensation seeking and anxiety/neuroticism, both when tested separately (model 1) and simultaneously (model 2). When all variables were tested simultaneously (model 2), PSS-F was significantly and positively associated with twelve-month use and more than weekly cannabis use. Significant and negative associations of PSS-SO were found not only with twelve-month cannabis use (only significant in model 2), but also with cannabis use more than once a week and cannabis use disorders (significant in both model 1 and model 2).

Concerning the use of illicit drugs (see Table 6) other than cannabis, the use of soft and hard drugs were significantly and positively associated with sensation seeking and anxiety/neuroticism, both when tested separately (model 1) and simultaneously (model 2). The use of hard drugs was significantly and negatively related to PSS-F (significant in both model 1 and model 2) and PSS-SO (only significant in model 1). Moreover, significant sensation seeking by PSS-F interactions were found to be associated with use of soft and hard drugs (model 3).

Follow-up analyses examining the moderating effect of PSS-F showed that the positive associations of sensation seeking with the use of soft and hard drugs were stronger for participants reporting high levels of PSS-F (*b*=1.07, *SE*=0.08, β=0.93, OR=2.52. 95%CI 2.20, 2.90, *p*<.001, for soft drugs; *b*=1.31, *SE*=0.18, β=1.14, OR=3.12, 95%CI 2.30, 4.24, *p*<.001, for hard drugs) than for those reporting low levels (*b*=0.83, *SE*=0.06, β=0.72, OR=2.05, 95%CI 1.85, 2.28, *p*<.001, for soft drugs; *b*=0.73, *SE*=0.14, β=0.64, OR=1.89, 95%CI 1.50, 2.38, *p*<.001, for hard drugs). With regard to the use of hard drugs, significant sensation seeking by PSS-SO interaction was also found (model 3). Follow-up analyses examining the moderating effect of PSS-SO showed that the sensation seeking–use of hard drugs association was stronger for participants reporting low levels of PSS-SO (*b*=1.00, *SE* =0.15, β=0.87, OR=2.38, 95%CI 1.85, 3.06, *p*<.001) than for those reporting high levels (*b*=0.71, *SE*=0.17, β=0.62, OR=1.85, 95%CI 1.39, 2.47, *p*<.001).

Discussion

The aim of the present study was to investigate the associations of substance use with two dispositional characteristics, (i.e. sensation seeking, anxiety/neuroticism) and two aspects of PSS (i.e. PSS-F, PSS-SO), and to examine the interactions between these dispositional characteristics and PSS.

Results showed that sensation seeking and anxiety/neuroticism were positively associated with all substance use outcomes. The only exception was for alcohol outcomes, where a significant association of anxiety/neuroticism was found with AUD only, whereas associations with drinking status, drinking volume and RSOD failed to reach significance. These results are in line with several previous studies showing that dispositional characteristics related to sensation seeking (Hittner & Swickert, 2006; Kopstein et al., 2001; Sher et al., 2000) and

anxiety/neuroticism (see e.g. Kotov, Gamez, Schmidt, & Watson, 2010; Malouff, Thorsteinsson, Rooke, & Schutte, 2007; Sher et al., 2000) predispose individuals to substance use and misuse, and thus constitute risk factors for substance use. Our finding that anxiety/neuroticism was significantly associated with AUD, but not with drinking status, drinking volume and RSOD, as opposed to sensation seeking that was related with all alcohol use outcomes, is also consistent with results of previous studies (Ruiz, Pincus, & Dickinson, 2003; Sher, Wood, Crews, & Vandiver, 1995). For example, Sher et al. (1995) showed that high novelty seeking (a concept close to sensation seeking) was positively associated with both alcohol use and alcohol-related problems, whereas high harm avoidance (a concept close to anxiety/neuroticism) was significantly associated with alcohol-related problems, but not with alcohol use. Accordingly, anxiety/neuroticism may constitute a risk factor for the development of AUD and chronic consequences of alcohol use, but may not predispose individuals to more "normative" alcohol use behaviours.

With regard to PSS-SO and PSS-F, coefficients of associations were often stronger in simultaneous than in bivariate analyses or the direction of associations changed between bivariate and simultaneous associations (i.e. for drinking volume, RSOD, 12-month cannabis use, more than weekly cannabis use). Since PSS-F and PSS-SO were also strongly correlated, the difference between bivariate and simultaneous associations is probably indicative of a suppressor situation (see Paulhus, Robins, Trzesniewski, & Tracy, 2004, for more information on suppression). This suggests that there is redundant information in PSS-F that is shared with PSS-SO and vice-versa, so that it reduces the strength of associations in bivariate analyses because redundant information is not taken over (suppressed). By contrast, in simultaneous models, the joint real associations of both PSS-F and PSS-SO are more accurately accounted for, because

this redundant information is taken over (suppressed). Findings regarding PSS-SO replicated the negative associations with alcohol use previously found by Tartaglia (2014) in an Italian sample of young adults, and showed a similar pattern of association with cannabis use outcomes. Accordingly, PSS-SO constitutes a protective factor with regard to alcohol and cannabis use and misuse. In line with Tartaglia (2014, see also Simon and Barrett, 2010), this protective effect may be a consequence of the increased well-being and reduced stress (both negatively related to lower substance abuse) provided by supportive, close and intimate relationships. This may also reflect the control exerted by the partner over the individual's problematic behaviours, such as substance use, e.g. reminding them that substance use should be avoided, imposing sanctions (Simon & Barrett, 2010). By contrast, no evidence of significant associations of PSS-SO with cigarette and other illicit drug use outcomes was found, suggesting that the protective role may be specific to alcohol and cannabis use.

Contrary to PSS-SO, and in line with results of previous studies regarding alcohol use (Kristjansson et al., 2010; Tartaglia, 2014; Wills et al., 2004), PSS-F was significantly and positively associated with alcohol and cannabis use outcomes (except with AUD and cannabis use disorders). Accordingly, this suggests that PSS-F constitutes a risk factor for substance use. This finding is in line with the peer socialisation risk model (Brady, Dolcini, Harper, & Pollack, 2009; Jessor, 1984; Telzer, Fuligni, Lieberman, Miernicki, & Galván, 2015), which suggests that individuals with high levels of support from peers may engage in greater levels of risk-taking behaviours, because peer relationships tend to focus on social activities with positive hedonic qualities and to engage in spontaneous impulsive behaviours (Wills et al., 2004). Moreover, as they have strong connections with peers, they also have more opportunities to engage in risky behaviours (Brady et al., 2009; Jessor, 1984; Telzer et al., 2015). However, the fact that the

significant positive associations of PSS-F were limited to the more normative alcohol and cannabis use outcomes (as opposed to more severe outcomes such as alcohol and cannabis use disorders that were not significantly related with PSS-F), may indicate that individuals reporting high levels of PSS-F use alcohol and cannabis for social recreation and its effects on social functioning. Interestingly, a protective effect of PSS-F was found for use of hard drugs, that are generally perceived as particularly negative and detrimental, and not well accepted socially. Taken together the findings suggest that PSS-F may promote substance use with the more normative outcomes, but prevent the use of drugs that are socially less accepted.

In line with previous studies showing that social environment variables moderated the association of dispositional characteristics with substance use (e.g. Grekin & Sher, 2006; Hill et al., 2010; Knyazev, 2010), the results of the present study showed that PSS moderated the associations of sensation seeking with substance use. However, no evidence for a moderation of anxiety/neuroticism associations was found. Interestingly, to our knowledge this is the first study showing that the moderating effect of PSS on the associations of sensation seeking was specific to alcohol and soft and hard drugs (excluding cannabis). Indeed, to date, the only study investigating a similar research question focused exclusively on the use of illicit drugs (using a composite score), excluding alcohol and tobacco use (Knyazev, 2010). Consistent with the idea that individuals with high quality peer relationships tend to focus on social activities with positive hedonic qualities and to engage in spontaneous impulsive behaviours (Wills et al., 2004), associations of sensation seeking with drinking volume, AUD and the use of soft and hard drugs were stronger in individuals reporting high levels of PSS-F than in those reporting low levels. This suggests that high levels of PSS-F amplify the risk associated with sensation seeking. By contrast, PSS-SO was found to moderate the associations of sensation seeking with RSOD and

use of hard drugs, such that these associations were toned down in participants reporting high levels of PSS-SO. Accordingly, this result suggests that PSS-SO may provide resources for sensation seekers to deal with their need for excitation without using substances.

The present study is not without limitations. First, although representative, the sample was limited to male young adults. Further studies should be conducted to examine whether the results observed in the present study may be extended to females and older individuals. Second, the standard instruments used were based on self-reported data, which may be biased (e.g. social desirability). Accordingly, more controlled studies should be conducted to test whether our results are replicable. Finally, although evidence of interactive effects between sensation seeking and PSS was found, these were specific to alcohol, and soft and hard drug use outcomes. Moreover, no evidence of any interaction between anxiety/neuroticism and PSS was found. Further studies should be conducted to confirm the specificity of these associations and to better understand the mechanisms lying behind these associations. The present study nevertheless has several strengths, including a large sample comprising all socio-economic and educational levels and measures of use and misuse of several different substances.

To conclude, our hypothesis that social support would moderate the associations of sensation seeking and anxiety/neuroticism with substance use received only partial support. None of the interactions involving anxiety/neuroticism traits reached significance. By contrast, social support was a significant moderator of the associations of sensation seeking with five out of the twelve outcomes tested, i.e. alcohol and illicit drugs other than cannabis. Therefore, the moderating role of social support may be less important than expected or at least specific only to certain types of substances (i.e. alcohol, illicit drugs other than cannabis) and to certain dispositional characteristics (i.e. sensation seeking). Nevertheless, as far as the use of alcohol and

illicit drugs other than cannabis is concerned, this study showed that, depending on the source of social support, PSS may amplify (PSS-F) or buffer (PSS-SO) the risk associated with sensation seeking. Dispositional characteristics such as sensation seeking constitute distal factors that are relatively stable and hard to change over time (Zuckerman, 2007), as opposed to PSS, a more proximal factor that is more subject to change. Therefore, from a preventive perspective, interventions focusing on preventing social support from friends and on promoting social support from close relationships may alter the behavioural expression of sensation seeking for the benefit of healthier behaviours instead of risky behaviours such as substance use. Such interventions should also be considered in promising prevention programmes targeting dispositional risk factors (see e.g. Conrod, Castellanos-Ryan, & Strang, 2010; Conrod, Stewart, Comeau, & Maclean, 2006).

Declaration of interest

The authors report no conflicts of interest.

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Table 1. Descriptive statistics of substance use outcomes

	N	%
Alcohol		
Twelve-month use	4981	92.6
RSOD	2390	44.4
AUD	496	9.2
Cigarette		
Twelve-month use	2530	47.1
Daily smoking	1155	21.5
ND	536	10.0
Cannabis		
Twelve-month use	1689	31.4
More-than-once-a-week use	449	8.4
CUD	467	8.7
Other illicit drugs		
Twelve-month use of soft drugs	617	11.5
Twelve-month use of hard drugs	101	1.9

Note. RSOD: risky single-occasion drinking, AUD: Alcohol use disorder, ND: nicotine dependence, CUD: cannabis use disorder.

Table 2. Mean, standard deviation and range of personality and perceived social support variables.

	Mean	SD	Range
Personality			
Sensation seeking	3.05	0.87	1-5
Anxiety/neuroticism	1.96	1.98	0-10
Perceived social support			
From friends	5.89	1.21	1-7
From a significant other	5.93	1.39	1-7

Note. SD: standard deviation.

Table 3. Logistic and negative binomial regression models for alcohol use outcomes on sensation seeking, anxiety/neuroticism, social support from friends and from a significant other

	Model 1			Model 2			Model 3		
	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)	b(SE)	β	OR/IRR(95% CI)[l]
Twelve-month alcohol use									
Sensation seeking (SS)	0.50(0.06)***	0.44	1.55(1.40, 1.72)	0.49(0.06)***	0.43	1.53(1.38, 1.69)	0.49(0.06)***	0.43	1.53(1.38, 1.70)
Anxiety/neuroticism (AN)	-0.03(0.03)	-0.05	0.95(0.86, 1.05)	-0.00(0.03)[a]	-0.01	0.99(0.90, 1.10)	0.00(0.03)[b]	0.04	1.00(0.90, 1.12)
Social support from friends (PSS-F)	0.22(0.04)***	0.26	1.30(1.19, 1.41)	0.27(0.05)***	0.33	1.39(1.23, 1.58)	0.27(0.06)***	0.32	1.38(1.20, 1.58)
Social support from significant other (PSS-SO)	0.09(0.03)**	0.13	1.14(1.04, 1.25)	-0.09(0.05)	-0.12	0.88(0.77, 1.01)	-0.08(0.05)	-0.11	0.89(0.77, 1.03)
SS by PSS-F							0.01(0.06)	0.01	1.01(0.89, 1.14)
SS by PSS-SO							-0.01(0.05)	-0.01	0.99(0.87, 1.13)
AN by PSS-F							0.02(0.02)	0.04	1.04(0.94, 1.15)
AN by PSS-SO							-0.01(0.02)	-0.04	0.96(0.85, 1.08)
Drinking volume									
Sensation seeking (SS)	0.30(0.02)***	0.26	1.30(1.26, 1.34)	0.30(0.02)***	0.26	1.30(1.26, 1.34)	0.31(0.02)***	0.27	1.31(1.27, 1.35)
Anxiety/neuroticism (AN)	0.00(0.01)[c]	0.01	1.01(0.98, 1.04)	0.01(0.01)	0.02	1.02(0.99, 1.05)	0.01(0.01)	0.01	1.01(0.98, 1.04)
Social support from friends (PSS-F)	0.04(0.01)***	0.05	1.05(1.02, 1.08)	0.09(0.02)***	0.11	1.12(1.07, 1.16)	0.10(0.02)***	0.13	1.13(1.09, 1.18)
Social support from significant other (PSS-SO)	-0.02(0.01)	-0.03	0.97(0.95, 1.00)	-0.09(0.02)***	-0.13	0.88(0.85, 0.92)	-0.09(0.02)***	-0.13	0.88(0.85, 0.92)
SS by PSS-F							0.06(0.02)**	0.06	1.06(1.02, 1.10)
SS by PSS-SO							0.01(0.02)	0.01	1.01(0.97, 1.05)
AN by PSS-F							-0.01(0.01)	-0.02	0.98(0.94, 1.01)
AN by PSS-SO							-0.00(0.01)[d]	-0.01	0.99(0.95, 1.03)
RSOD									
Sensation seeking (SS)	0.60(0.03)***	0.52	1.68(1.59, 1.79)	0.60(0.03)***	0.52	1.68(1.59, 1.79)	0.60(0.03)***	0.52	1.68(1.58, 1.79)
Anxiety/neuroticism (AN)	-0.01(0.01)	-0.01	0.99(0.94, 1.04)	0.01(0.01)	0.01	1.01(0.95, 1.07)	0.01(0.01)	0.01	1.01(0.96, 1.07)
Social support from friends (PSS-F)	0.13(0.02)***	0.16	1.17(1.10, 1.24)	0.23(0.03)***	0.27	1.31(1.21, 1.42)	0.23(0.03)***	0.27	1.32(1.21, 1.43)
Social support from significant other (PSS-SO)	0.01(0.02)	0.01	1.00(0.95, 1.06)	-0.14(0.03)***	-0.19	0.82(0.76, 0.89)	-0.14(0.03)***	-0.20	0.82(0.76, 0.89)
SS by PSS-F							0.06(0.04)	0.06	1.07(0.98, 1.16)
SS by PSS-SO							-0.07(0.03)*	-0.09	0.92(0.85, 0.99)
AN by PSS-F							-0.00(0.01)[e]	-0.00[g]	1.00(0.93, 1.07)
AN by PSS-SO							0.00(0.01)[f]	0.01	1.01(0.94, 1.09)

Table 3. (continued)

	Model 1			Model 2			Model 3		
	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)	b(SE)	β	OR/IRR(95% CI)[l]
AUD									
Sensation seeking (SS)	0.62(0.06)***	0.54	1.72(1.55, 1.91)	0.64(0.06)***	0.55	1.74(1.60, 1.93)	0.66(0.06)***	0.58	1.78(1.60, 1.98)
Anxiety/neuroticism (AN)	0.16(0.02)***	0.32	1.38(1.28, 1.50)	0.16(0.02)***	0.32	1.38(1.27, 1.50)	0.16(0.02)***	0.32	1.38(1.27, 1.51)
Social support from friends (PSS-F)	-0.08(0.04)*	-0.10	0.90(0.83, 0.99)	0.08(0.05)	0.09	1.10(0.97, 1.24)	0.04(0.06)	0.05	1.06(0.92, 1.21)
Social support from significant other (PSS-SO)	-0.14(0.03)***	-0.19	0.83(0.76, 0.90)	-0.18(0.04)***	-0.25	0.78(0.69, 0.88)	-0.18(0.05)***	-0.25	0.78(0.68, 0.89)
SS by PSS-F							0.14(0.06)*	0.15	1.16(1.03, 1.32)
SS by PSS-SO							-0.01(0.05)	-0.01	0.99(0.88, 1.12)
AN by PSS-F							-0.00(0.02)[h]	-0.00[j]	1.00(0.90, 1.10)
AN by PSS-SO							0.00(0.02)[i]	0.00[k]	1.00(0.91, 1.10)

Note. $*p < .05$, $**p < .01$, $***p < .001$. Model 1 examined the associations of SS, AN, PSS-F, PSS-SO separately. Model 2 examined the simultaneous associations of SS, AN, PSS-F, PSS-SO. Model 3 is model 2 plus the two-way interactions between dispositional characteristics and social support (i.e. SS by PSS-F, SS by PSS-SO, AN by PSS-F, AN by PSS-SO. All models were adjusted for age, linguistic region, and highest completed level of education. b = unstandardized coefficient. β = partially standardized coefficient. [a] before rounding b = -0.003473. [b] before rounding b = 0.001882. [c] before rounding b = 0.003991. [d] before rounding b = -0.004. [e] before rounding b = -0.000924. [f] before rounding b = 0.004819. [g] before rounding β = -0.002217. [h] before rounding b = -0.001580. [i] before rounding b = 0.000754. [j] before rounding β = -0.003791. [k] before rounding β = 0.002076. [l] OR for logistic regression for all outcomes except drinking volume, IRR for negative binomial regression for drinking volume. SE = standard error. OR = odds ratio. IRR = incidence rate ratio. CI = confidence interval. RSOD = risky single occasion drinking. AUD = alcohol use disorder.

Table 4. Logistic regression models for cigarette use on sensation seeking, anxiety/neuroticism, social support from friends and from a significant other.

	Model 1			Model 2			Model 3		
	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)
Twelve-month cigarette use									
Sensation seeking (SS)	0.52(0.03)***	0.45	1.57(1.48, 1.67)	0.52(0.03)***	0.45	1.57(1.48, 1.67)	0.52(0.03)***	0.45	1.57(1.48, 1.67)
Anxiety/neuroticism (AN)	0.03(0.01)*	0.06	1.07(1.01, 1.12)	0.04(0.01)**	0.08	1.08(1.02, 1.14)	0.04(0.01)**	0.08	1.08(1.02, 1.15)
Social support from friends (PSS-F)	0.05(0.02)*	0.06	1.06(1.01, 1.12)	0.06(0.03)	0.07	1.07(0.99, 1.16)	0.05(0.03)	0.07	1.07(0.99, 1.15)
Social support from significant other (PSS-SO)	0.01(0.02)	0.02	1.02(0.97, 1.08)	-0.02(0.03)	-0.03	0.97(0.90, 1.04)	-0.02(0.03)	-0.03	0.97(0.90, 1.04)
SS by PSS-F							0.04(0.04)	0.04	1.05(0.97, 1.13)
SS by PSS-SO							-0.04(0.03)	-0.05	0.95(0.88, 1.03)
AN by PSS-F							0.01(0.01)	0.03	1.03(0.96, 1.10)
AN by PSS-SO							-0.00(0.01)[a]	-0.01	0.99(0.93, 1.06)
Daily smoking									
Sensation seeking (SS)	0.52(0.04)***	0.45	1.57(1.46, 1.68)	0.52(0.04)***	0.45	1.57(1.46, 1.68)	0.52(0.04)***	0.45	1.57(1.46, 1.69)
Anxiety/neuroticism (AN)	0.04(0.02)*	0.07	1.07(1.01, 1.15)	0.04(0.02)*	0.08	1.08(1.01, 1.15)	0.04(0.02)*	0.08	1.08(1.01, 1.15)
Social support from friends (PSS-F)	0.01(0.03)	0.01	1.01(0.95, 1.08)	-0.02(0.04)	-0.02	0.98(0.89, 1.07)	-0.03(0.04)	-0.03	0.97(0.88, 1.06)
Social support from significant other (PSS-SO)	0.02(0.02)	0.03	1.03(0.96, 1.10)	0.03(0.03)	0.04	1.04(0.95, 1.14)	0.03(0.03)	0.05	1.05(0.95, 1.15)
SS by PSS-F							0.03(0.04)	0.03	1.03(0.94, 1.13)
SS by PSS-SO							-0.01(0.04)	-0.02	0.98(0.89, 1.08)
AN by PSS-F							0.01(0.02)	0.03	1.03(0.95, 1.11)
AN by PSS-SO							-0.01(0.01)	-0.04	0.96(0.89, 1.05)
ND									
Sensation seeking (SS)	0.32(0.06)***	0.28	1.32(1.20, 1.45)	0.32(0.05)***	0.28	1.32(1.20, 1.45)	0.33(0.06)***	0.28	1.33(1.20, 1.46)
Anxiety/neuroticism (AN)	0.09(0.02)***	0.18	1.19(1.10, 1.30)	0.09(0.02)***	0.17	1.19(1.09, 1.30)	0.09(0.02)***	0.18	1.20(1.10, 1.30)
Social support from friends (PSS-F)	-0.02(0.04)	-0.02	0.97(0.89, 1.06)	-0.06(0.05)	-0.07	0.93(0.83, 1.05)	-0.08(0.05)	-0.09	0.91(0.80, 1.03)
Social support from significant other (PSS-SO)	0.02(0.03)	0.03	1.03(0.94, 1.13)	0.06(0.05)	0.09	1.09(0.96, 1.23)	0.08(0.05)	0.11	1.11(0.98, 1.27)
SS by PSS-F							0.08(0.06)	0.08	1.08(0.96, 1.22)
SS by PSS-SO							-0.02(0.05)	-0.02	0.98(0.86, 1.11)
AN by PSS-F							0.02(0.02)	0.04	1.04(0.95, 1.15)
AN by PSS-SO							-0.02(0.02)	-0.05	0.95(0.86, 1.05)

Note. $*p < .05$, $**p < .01$, $***p < .001$. Model 1 examined the associations of SS, AN, PSS-F, PSS-SO separately. Model 2 examined the simultaneous associations of SS, AN, PSS-F, PSS-SO. Model 3 is model 2 plus the two-way interactions between dispositional characteristics and social support (i.e. SS by PSS-F, SS by PSS-SO, AN by PSS-F, AN by PSS-SO. All models were adjusted for age, linguistic region, and highest completed level of education. b = unstandardized coefficient. β = partially standardized coefficient. [a] before rounding b = -0.002418. SE = standard error. OR = odds ratio. CI = confidence interval. ND = nicotine dependence.

Table 5. Logistic regression models for cannabis use on sensation seeking, anxiety/neuroticism, social support from friends and from a significant other

	Model 1			Model 2			Model 3		
	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)
Twelve-month cannabis use									
Sensation seeking (SS)	0.80(0.04)***	0.69	2.00(1.87, 2.14)	0.80(0.04)***	0.70	2.01(1.87, 2.15)	0.80(0.04)***	0.70	2.00(1.87, 2.15)
Anxiety/neuroticism (AN)	0.06(0.01)***	0.11	1.12(1.06, 1.19)	0.07(0.01)***	0.13	1.14(1.07, 1.21)	0.07(0.02)***	0.13	1.14(1.07, 1.21)
Social support from friends (PSS-F)	0.03(0.02)	0.04	1.04(0.98, 1.10)	0.09(0.03)*	0.11	1.11(1.02, 1.21)	0.10(0.04)**	0.12	1.12(1.03, 1.22)
Social support from significant other (PSS-SO)	-0.02(0.02)	-0.02	0.98(0.92, 1.03)	-0.08(0.03)**	-0.11	0.90(0.83, 0.97)	-0.08(0.03)**	-0.12	0.89(0.82, 0.97)
SS by PSS-F							0.01(0.04)	0.01	1.00(0.92, 1.10)
SS by PSS-SO							-0.01(0.04)	-0.01	0.99(0.91, 1.08)
AN by PSS-F							-0.01(0.01)	-0.03	0.97(0.90, 1.04)
AN by PSS-SO							0.01(0.01)	0.04	1.04(0.97, 1.12)
Cannabis use more than once a week									
Sensation seeking (SS)	0.75(0.06)***	0.65	1.92(1.72, 2.15)	0.75(0.07)***	0.65	1.92(1.72, 2.15)	0.76(0.07)***	0.66	1.94(1.73, 2.17)
Anxiety/neuroticism (AN)	0.06(0.02)*	0.12	1.12(1.03, 1.23)	0.06(0.02)*	0.11	1.12(1.02, 1.23)	0.06(0.02)*	0.12	1.12(1.02, 1.24)
Social support from friends (PSS-F)	-0.00(0.04)[a]	-0.00[b]	1.00(0.91, 1.10)	0.12(0.06)*	0.14	1.15(1.01, 1.32)	0.09(0.06)	0.11	1.12(0.97, 1.29)
Social support from significant other (PSS-SO)	-0.08(0.03)*	-0.12	0.89(0.81, 0.97)	-0.16(0.05)**	-0.22	0.80(0.71, 0.91)	-0.16(0.05)**	-0.23	0.80(0.69, 0.92)
SS by PSS-F							0.12(0.07)	0.12	1.13(0.99, 0.30)
SS by PSS-SO							-0.02(0.06)	-0.03	0.97(0.85, 1.11)
AN by PSS-F							-0.02(0.02)	-0.05	0.95(0.85, 1.06)
AN by PSS-SO							0.02(0.02)	0.05	1.05(0.95, 1.18)
CUD									
Sensation seeking (SS)	0.78(0.06)***	0.68	1.97(1.77, 2.20)	0.79(0.06)***	0.68	1.98(1.77, 2.21)	0.80(0.07)***	0.69	2.00(1.79, 2.24)
Anxiety/neuroticism (AN)	0.11(0.02)***	0.21	1.24(1.13, 1.35)	0.10(0.02)***	0.21	1.23(1.12, 1.34)	0.11(0.02)***	0.21	1.23(1.13, 1.35)
Social support from friends (PSS-F)	-0.06(0.04)	-0.07	0.93(0.85, 1.02)	0.05(0.05)	0.06	1.06(0.93, 1.20)	0.03(0.06)	0.04	1.04(0.90, 1.20)
Social support from significant other (PSS-SO)	-0.10(0.03)**	-0.14	0.87(0.80, 0.95)	-0.13(0.04)**	-0.18	0.83(0.74, 0.94)	-0.14(0.05)**	-0.20	0.82(0.71, 0.94)
SS by PSS-F							0.08(0.06)	0.09	1.09(0.95, 1.24)
SS by PSS-SO							-0.01(0.06)	-0.01	0.99(0.87, 1.13)
AN by PSS-F							-0.02(0.02)	-0.04	0.96(0.87, 1.06)
AN by PSS-SO							0.02(0.02)	0.06	1.06(0.96, 1.18)

Note. *$p < .05$, **$p < .01$, ***$p < .001$. Model 1 examined the associations of SS, AN, PSS-F, PSS-SO separately. Model 2 examined the simultaneous associations of SS, AN, PSS-F, PSS-SO. Model 3 is model 2 plus the two-way interactions between dispositional characteristics and social support (i.e. SS by PSS-F, SS by PSS-SO, AN by PSS-F, AN by PSS-SO. All models were adjusted for age, linguistic region, and highest completed level of education. b = unstandardized coefficient. β = partially standardized coefficient. [a] before rounding b = -0.002260. [b] before rounding β = -0.002731. SE = standard error. OR = odds ratio. CI = confidence interval. CUD = cannabis use disorder.

Table 6. Logistic regression models for illicit drug use (other than cannabis) on sensation seeking, anxiety/neuroticism, social support from friends and from a significant other

	Model 1			Model 2			Model 3		
	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)	b(SE)	β	OR(95% CI)
Twelve-month soft drug use									
Sensation seeking (SS)	0.88(0.06)***	0.77	2.15(1.95, 2.38)	0.88(0.06)***	0.77	2.15(1.95, 2.38)	0.90(0.06)***	0.78	2.19(1.98, 2.42)
Anxiety/neuroticism (AN)	0.08(0.02)***	0.15	1.16(1.08, 1.26)	0.08(0.02)***	0.15	1.16(1.07, 1.26)	0.07(0.02)***	0.15	1.16(1.07, 1.26)
Social support from friends (PSS-F)	-0.02(0.03)	-0.03	0.97(0.89, 1.05)	0.00(0.05)[a]	0.00[b]	1.00(0.89, 1.13)	-0.04(0.05)	-0.05	0.95(0.84, 1.08)
Social support from significant other (PSS-SO)	-0.03(0.03)	-0.05	0.95(0.88, 1.03)	-0.04(0.04)	-0.06	0.94(0.84, 1.05)	-0.04(0.05)	-0.05	0.95(0.83, 1.08)
SS by PSS-F							0.19(0.06)**	0.20	1.22(1.08, 1.38)
SS by PSS-SO							-0.07(0.05)	-0.08	0.92, 0.81, 1.04)
AN by PSS-F							-0.03(0.02)	-0.07	0.93(0.85, 1.02)
AN by PSS-SO							0.03(0.02)	0.07	1.08(0.97, 1.19)
Twelve-month hard drug use									
Sensation seeking (SS)	0.68(0.13)***	0.59	1.81(1.45, 2.25)	0.69(0.13)***	0.60	1.18(1.46, 2.26)	0.92(0.14)***	0.80	2.22(1.74, 2.82)
Anxiety/neuroticism (AN)	0.16(0.04)***	0.31	1.37(1.16, 1.61)	0.14(0.04)**	0.27	1.31(1.11, 1.55)	0.12(0.05)*	0.24	1.27(1.05, 1.52)
Social support from friends (PSS-F)	-0.25(0.06)***	-0.30	0.74(0.64, 0.86)	-0.21(0.09)*	-0.25	0.87(0.62, 0.97)	-0.31(0.10)**	-0.38	0.68(0.53, 0.87)
Social support from significant other (PSS-SO)	-0.18(0.06)**	-0.24	0.78(0.67, 0.92)	-0.03(0.09)	-0.04	0.96(0.75, 1.21)	0.04(0.09)	0.06	1.06(0.82, 1.38)
SS by PSS-F							0.46(0.09)***	0.48	1.62(1.35, 1.95)
SS by PSS-SO							-0.19(0.09)*	-0.23	0.79(0.65, 0.97)
AN by PSS-F							0.00(0.03)[c]	0.00[d]	1.00(0.86, 1.17)
AN by PSS-SO							-0.03(0.03)	-0.09	0.91(0.77, 1.09)

Note. **p* < .05, ***p* < .01, ****p* < .001. Model 1 examined the associations of SS, AN, PSS-F, PSS-SO separately. Model 2 examined the simultaneous associations of SS, AN, PSS-F, PSS-SO. Model 3 is model 2 plus the two-way interactions between dispositional characteristics and social support (i.e. SS by PSS-F, SS by PSS-SO, AN by PSS-F, AN by PSS-SO. All models were adjusted for age, linguistic region, and highest completed level of education. b = unstandardized coefficient. β = partially standardized coefficient. [a] before rounding b = 0.003369. [b] before rounding β = 0.004072. [c] before rounding b = 0.001651. [d] before rounding β = 0.003960. SE = standard error. OR = odds ratio. CI = confidence interval.