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Risky substance use and peer pressure in Swiss young men: Test of moderation effects

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Abstract

Background: Peer pressure (PP) toward misconduct is a well-known risk factor for substance use. However, the way it interacts with social factors and the associations of the aspects of PP other than PP toward misconduct were understudied. This study examined the associations of three aspects of PP with risky substance use and tested whether the associations of PP toward misconduct were moderated by social factors.

Method: A representative sample of 5,680 young Swiss males completed a questionnaire assessing risky alcohol, cigarette, and cannabis use, PP toward misconduct, toward peer involvement, and toward peer conformity, as well as social support (SS) and neighbourhood cohesion. Multinomial logistic regression models were used.

Results: PP toward misconduct was positively associated with all substance use outcomes. The PP toward misconduct–risky alcohol use association was stronger in individuals reporting high than in those reporting low levels of PP toward peer involvement, SS, and neighbourhood cohesion. The PP toward misconduct– risky cannabis use association was stronger in individuals reporting high than in those reporting low levels of SS and neighbourhood cohesion. The PP toward misconduct–smoking association was stronger in individuals reporting high than in those reporting low levels of PP toward peer involvement.

Conclusions: The risk for substance use associated with PP toward misconduct varies as a function of social factors. Being well connected with others (high level of PP toward peer involvement and SS), and living in a cohesive neighbourhood may amplify the risk for risky substance use associated with PP toward misconduct.

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1 Introduction

Peer pressure (PP), i.e. the "pressure to think or to behave along certain peer-prescribed guidelines" (Clasen and Brown, 1985) is one of the most important risk factor for the development and maintenance of substance use and misuse in adolescence and young adulthood (Dumas et al., 2012; Santor et al., 2000). However, PP is a multidimensional construct and some studies suggest that PP toward misconduct is associated with substance use, whereas other aspects of PP may have a protective influence on substance use (Studer et al., 2014). Moreover, peers' influence does not affect the substance use of all adolescents and young adults in the same way (Marschall-Lévesque et al., 2014). From a preventive perspective, it is important to point to individuals who are more at risk regarding this influence. The present study examined the associations of risky substance use with three aspects of PP and tested whether the associations between PP toward misconduct and at-risk substance use were moderated by social factors.

Peers play a major role in the development of adolescents and young adults: they shape their sense of identity (Erikson, 1968) and influence the perceived norms that dictate which behaviours are acceptable and which are not (Borsari and Carey, 2001). Since it involves individuals' perception of their peers' behaviours, PP is one of the core mechanisms through which group norms are transmitted (Clasen and Brown, 1985), and the perception of such norms are thought to influence one's own behaviours, including substance use (Berkowitz, 2005). Clasen and Brown (1985) delineated five aspects of PP: PP toward peer involvement (e.g. pressure to spend free time with friends), PP toward misconduct (e.g. pressure to use substance, to engage in delinquent behaviours), PP toward peer conformity (e.g. pressure to conform to peer norms), PP toward involvement in school (e.g. pressure to be agreeable with teachers), and PP toward involvement with family (e.g. pressure to obey parents).

1.1 Peer pressure and substance use

Most previous studies investigating the associations between PP and substance use suggested that PP constitutes a risk factor for substance use (e.g. Crockett et al., 2006; Santor et al., 2000). However, most studies considered only the negative aspect of PP, i.e. PP toward misconduct. Yet, as noted by Allen and Antonishak (2008), peers may also have a positive influence when the values they impart are adaptive, e.g. promoting non-deviant behaviours. This positive feature of PP has often been overlooked in previous research on substance use. The one exception is a recent study (Studer et al., 2014) that investigated the associations of three aspects of PP, i.e. PP toward misconduct, toward peer involvement, toward peer conformity, with alcohol use and misuse. When tested simultaneously, the association of PP toward misconduct was positive, whereas the associations of PP toward peer involvement and PP toward peer conformity were negative. By contrast, all three aspects of PP were positively associated with alcohol use and misuse in bivariate analyses. Since PP toward peer involvement and PP toward peer conformity were positively correlated with PP toward misconduct, and since individuals reporting PP toward misconduct are affiliated with deviant individuals (Clasen and Brown, 1985), the positive bivariate associations of PP toward peer involvement and PP toward peer conformity may reflect pressure to conform with (i.e. PP toward peer conformity) and to get involved (i.e. PP toward peer involvement) in deviant behaviours (e.g. substance use). By contrast, when PP toward misconduct is simultaneously taken into account, it takes over the "negative" impact of PP toward peer involvement and toward peer conformity. The remaining variance may then reflect "good" PP, such as PP toward involvement in caring for friends and conformity with non-deviant and positive behaviours (Studer et al., 2014). Unfortunately, the latter study focused on alcohol use and misuse exclusively. Hence, the question as to whether the findings on alcohol may be extended to other substances such as cigarette and cannabis remains unanswered.

1.2 Moderators of peer pressure toward misconduct

A recent review showed that the association between peers' and adolescents' substance use was moderated by several individual, social and environmental factors (Marschall-Lévesque et al., 2014). This suggests that peers' influence on substance use does not affect all individuals in the same way. There are certain circumstances under which peers may be more or less influential. Although peers' substance use is often considered as being equivalent to PP, the association between peers' and individuals' substance use may reflect not only the influence from peers (individuals adapting / conforming to their friends' substance use), but also peer selection processes, i.e. individuals who use substances affiliating with deviant peers (see e.g. Gillespie et al., 2009). Accordingly, if we are interested in studying the negative influence of peers on substance use and its moderators, measures such as peers' substance use should be avoided in favour of measures tapping peers' influence more directly such as PP toward misconduct.

PP toward misconduct constitutes one aspect of the broader concept of peer influence tapping the active influence of peers in promoting deviant behaviours more directly. However, studies investigating the moderators of its association with substance use are rare. The literature suggests that the availability of social resources (e.g. strong bonds with peers, with society, social support) constitutes key ingredients to prevent individuals from developing substance use problems (see e.g. Moos, 2007, for review). For example, according to Social Control Theory (Hirschi, 1969), strong bonds with family, friends and society reinforce individuals' adherence to public norms and regulations, which is thought to motivate individuals to engage in responsible and acceptable behaviours and refrain from substance use and deviant behaviours that are less accepted (Moos, 2007). To our knowledge, whether social resources may help individuals to resist to PP toward misconduct has not been examined.

If PP toward peer involvement and PP toward peer conformity reflected pressure from positive peers (Studer et al., 2014), one could assume that positive values and attitudes transmitted through

"good" PP may increase individuals' resistance to the deviant values and behaviours promoted by PP toward misconduct.

Social support (SS), i.e. "the resources provided by other persons" (Cohen and Syme, 1985) is an important aspect of social functioning with generally beneficial health effects because it helps individuals to cope with traumatic and stressful life events and to maintain good quality of life (Helgeson, 2003; Schwarzer and Knoll, 2007). However, with regard to substance use, findings for SS were mixed and depended on the source of support. The results in Tartaglia's (2014) study suggest that in young adults, SS from friends (SS-F) constitutes a risk factor for alcohol use, whereas SS from a significant other (SS-SO) constitutes a protective factor. Accordingly, SS-SO may provide resources to resist to PP toward misconduct, whereas SS-F may reinforce deviant behaviours associated with PP toward misconduct.

Social cohesion refers to the "glue" that binds people together and may be defined as the extent of connectedness and solidarity among groups in society (Kawachi and Berkman, 2000). It may have protective functions in at least three ways (Patterson et al., 2004): by promoting the more rapid diffusion of information about health, by increasing the likelihood that norms of healthy behaviours are adopted, and by exerting social control over deviant health-related behaviours. With regard to substance use, previous studies showed that social cohesion constitutes a protective factor for smoking and cannabis use (Dupuis et al., 2016; Lindström, 2004; Patterson et al., 2004), whereas findings regarding alcohol use were mixed (Dupuis et al., 2016; Lindström, 2005). Accordingly, high levels of social cohesion may provide resources to resist to PP toward misconduct.

The first aim of this study was to investigate the associations of risky use of alcohol, cigarette and cannabis with PP toward misconduct, toward peer involvement and toward peer conformity. We hypothesized positive associations with substance use outcomes for PP toward misconduct and negative associations for PP toward peer involvement and toward peer conformity (Studer et al., 2014).

The second aim was to examine whether the associations between risky substance use and PP toward misconduct were moderated by social resources, namely neighbourhood cohesion, SS, PP toward peer involvement and toward peer conformity. Since social resources may help individuals to prevent from developing substance use problems, we hypothesized that the availability of these resources would help individuals to resist to PP toward misconduct. Thus, the associations between PP toward misconduct and substance use outcomes were expected to be lower in participants reporting high values on these social factors.

2 Material and methods

2.1 Study design and participants

In Switzerland, army recruitment is mandatory for young men. All nineteen-year-old males must report to one of the six recruitment centres, where they undergo a two-hour assessment to determine their eligibility for military or civil service. During this assessment, virtually all young men were invited to participate in the Cohort Study on Substance Use Risk Factors (C-SURF) between August 2010 and November 2011 in three recruitment centres, i.e. Lausanne (in the French-speaking part of Switzerland), Windisch and Mels (both in the German-speaking part), thereby covering twenty-one of twenty-six cantons in Switzerland. A total of 7,556 men gave written informed consent. Although army recruitment centres were used to inform and enrol participants, the C-SURF study was independent from the army. A few days after consenting, the baseline questionnaire was sent by email or by post to participants. It was filled out by 5,987 (79.2% response rate) men between September 2010 and March 2012. The follow-up questionnaire was completed by 6,020 participants (79.7% response rate) between March 2012 and January 2014, i.e. about fifteen months after the baseline questionnaire. The research protocol (15/07) of the study was approved by the Ethics Committee for Clinical Research of the Lausanne University Medical School. More information on enrolment procedures and the study in general was described previously (Gmel et al., 2015; Studer et al., 2013a;

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Studer et al., 2013b). The current study used data from the follow-up assessment only, because some variables of interest (i.e. SS and neighbourhood cohesion) were not assessed during the baseline assessment. Missing values were listwise deleted (n = 340, 5.6% of the follow-up respondents). The final analytical sample comprised 5,680 respondents (94.4% of follow-up respondents).

2.2 Measures

2.2.1 Substance use outcomes. Frequency of risky single occasion drinking (RSOD) – defined as drinking at least six standard drinks on a same occasion – in the previous twelve months was measured on a 5-point scale ranging from "never" to "every or nearly every day". A three-level RSOD variable was created to differentiate between "never or less than monthly", "monthly", and "at least weekly" RSOD. Frequency of smoking cigarettes in the previous twelve months was measured on a 7-point scale ranging from "never" to "everyday". A three-level smoking status variable was created to differentiate between "non", "occasional" and "daily" smokers. Cannabis use frequency in the previous twelve months was measured on a 6-point scale ranging from "never" "to "every day or almost every day". A three-level variable was created to differentiate between "non", "weekly or less frequent" and "more than weekly" cannabis users.

2.2.2 Peer pressure. PP was assessed using a short version of Clasen and Brown's original Peer Pressure Inventory (PPI; Clasen and Brown, 1985), a questionnaire recently validated in French and German (Baggio et al., 2013). The short PPI consists of fourteen items describing pairs of statements representing polar opposites. These statements refer to three of the five original PPI aspects: PP toward misconduct (e.g. to get drunk or get "a buzz"), PP toward peer involvement (e.g. to go out with friends), and PP toward peer conformity (e.g. to talk or act in the same way as your friends do). For each item, participants evaluated how strongly they perceived pressure from their peers on a seven-point Likert scale ranging from −3 ("a lot of pressure not to do") to 3 ("a lot of pressure to do"), with 0 for "no pressure". Baggio et al. showed that using the original 7-point scale (i.e. from -3 – "a lot of

pressure not to do" to 3 – "a lot of pressure to do") yielded very poor psychometric qualities: root mean square error of approximation (RMSEA)=0.13, comparative fit index (CFI)=0.64. Since pressure "not to do" may be a different concept than pressure "to do", Baggio et al. (2013), grouped response categories -3 to 0 together to produce item responses ranging from 0 ("no pressure to do") to 3 ("a lot of pressure to do"). These recoded data yielded better psychometric properties, (RMSEA=0.06, CFI=0.93), and the concurrent validity was similar to that of the original scales, thereby supporting the recoding of pressure "not to do" values into no pressure "to do" values. Accordingly, the data of the present study were recoded following Baggio et al.'s (2013) procedure. Fit indices (RMSEA=0.06, CFI=0.94) were similar to those observed by Baggio et al. (2013). Mean scores were computed for each PP aspect.

2.2.3 Social support. Two aspects of SS were evaluated using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988), namely SS-F and SS-SO. For SS-SO, the significant other was defined as a special person, thus it may refer to e.g. a close supportive friend or a romantic partner. Four items were used to evaluate each aspect of SS (e.g. "I can count on my friends when things go wrong" for SS-F, "There is a special person who is around when I am in need" for SS-SO), using a seven-point Likert scale ranging from 1 ("very strongly disagree") to 7 ("very strongly agree"). Mean scores were computed for each aspect of SS.

2.2.4 Neighbourhood cohesion. Neighbourhood cohesion was assessed using a modified version of the questionnaire originally developed by Stafford et al. (2003, 2004), i.e. the Perceived Neighbourhood Social Cohesion Questionnaire (P-NSC), which has recently been validated in French and German (Dupuis et al., 2016). The P-NSC is a sixteen-item questionnaire evaluated on a seven-point Likert scale. It comprises three subscales tapping distinct cognitive aspects of neighbourhood cohesion, namely trust (e.g. trust in people, including members of the neighbourhood who are not personally known), attachment to neighbourhood (e.g. feeling part of the community), tolerance and

respect (e.g. reciprocal tolerance among the community), all loading on a higher order general factor, namely perceived neighbourhood cohesion. In this study, only the general factor (i.e. mean score) was used.

2.2.5 Socio-demographics. Socio-demographic variables including linguistic region (French, German), age and highest completed level of education were assessed. Highest completed level of education consisted of three categories of schooling: primary schooling (nine years); vocational training (9–12 years); postsecondary schooling (thirteen years or more, including high school).

2.3 Statistical analyses

In addition to descriptive statistics, bivariate associations between variables of interest were examined. Simultaneous associations were tested using multinomial logistic regressions. The reference category of the outcome variables was set as "never or less than monthly" for RSOD, "non-smokers" for smoking and "non-users" for cannabis use. Model 1 tested the simultaneous associations of the three PP aspects, adjusted for socio-demographics. Models 2a-e tested whether PP toward peer involvement (model 2a), PP toward peer conformity (model 2b), SS-F (model 2c), SS-SO (model 2d), and neighbourhood cohesion (model 2e) moderated the associations between PP toward misconduct and substance use outcomes. In models 2, each moderator was tested in separate models including socio-demographics. Significant interactions observed in models 2a-e were then tested simultaneously in model 3 following the suggested strategy used by Hosmer and Lemeshow (2000). Variables of interest were standardized before running the analyses and multicollinearity was checked using the variance inflation factor (VIF) for each explanatory variable. No problem of multicollinearity was detected, as the highest VIF value (all VIFs < 2.21) was well below the thresholds (≥ 5 or ≥ 10) generally considered as evidence of multicollinearity (see O'brien, 2007). A graphical view of the significant interactions was obtained by plotting the simple slopes of PP toward misconduct at low (i.e.

25th percentile) and high (i.e. 75th percentile) levels of the moderators. All analyses were conducted using SPSS 23.

3 Results

3.1 Descriptive characteristics of the sample.

The mean age of participants was 21.34 years (SD=1.28). Three thousand two hundred and twenty-six participants (56.8%) were French-speaking, whereas 2,454 (43.2%) were German-speaking. Four hundred and thirty-nine (7.7%), 2,666 (46.9%), and 2,575 (45.3%) participants reported primary schooling, vocational training, and postsecondary schooling, as their highest completed level of education, respectively. Means and standard deviations for PP, SS and neighbourhood cohesion as well as prevalence of substance use outcomes are reported in Table 1. Correlations between variables of interest are reported in Table 2.

3.2 Associations of PP with substance use outcomes

Adjusted associations (model 1) of PP toward misconduct, toward peer involvement and peer conformity with substance use outcomes are reported in Tables 3-5. PP toward misconduct was positively and significantly associated with all substance use outcomes. PP toward peer involvement was significantly and positively associated with monthly ROSD, and significantly and negatively associated with more than weekly cannabis use and daily smoking. PP toward peer conformity was significantly and negatively associated with monthly and at least weekly RSOD and with occasional and daily smoking.

3.3 Moderation of the associations between PP toward misconduct and risky substance use

Results of models 2a-e are reported in Tables 3-5, whereas Figures 1-2 depict a graphical view of the significant interactions. PP toward peer involvement significantly moderated the associations of PP toward misconduct with at least weekly RSOD and daily smoking, indicating that the strength of

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the associations of PP toward misconduct increased as levels of PP toward peer involvement increased. PP toward peer conformity significantly moderated the associations of PP toward misconduct with weekly or less frequent cannabis use, so that the strength of the association of PP toward misconduct decreased as levels of PP toward peer conformity increased. SS-F significantly moderated the associations of PP toward misconduct with monthly and at least weekly RSOD in a way that the strength of associations of PP toward misconduct increased as levels of SS-F increased. SS-SO significantly moderated the associations of PP toward misconduct with at least weekly RSOD and more than weekly cannabis use, so that the strength of associations of PP toward misconduct increased as levels of SS-SO increased. Finally, neighbourhood cohesion significantly moderated the associations of PP toward misconduct with monthly and at least weekly RSOD and more than weekly cannabis use: the strength of the associations of PP toward misconduct increased as levels of neighbourhood cohesion increased. Results of model 3 are reported in Tables 3-5. For at least monthly RSOD, only neighbourhood cohesion and PP toward peer involvement remained significant moderators. For smoking, model 3 is the same as model 2a, since only the PP toward involvement significantly moderated the association in separate models. Finally, for monthly and less frequent cannabis use, only PP toward peer conformity remained a significant moderator, whereas for weekly or more frequent cannabis use only neighbourhood cohesion remained a significant moderator.

4 Discussion

This study sought to examine the associations of risky alcohol, cigarette and cannabis use with PP toward misconduct, toward peer involvement and peer conformity, as well as to investigate whether the associations between risky substance use and PP toward misconduct were moderated by social factors.

4.1 Association of PP with risky substance use

In line with several previous studies (Crockett et al., 2006; Jamison and Myers, 2008; Santor et al., 2000; Studer et al., 2014), results showed that PP toward misconduct was positively associated with all substance use outcomes, thereby confirming that it constitutes a risk factor for substance use. Associations of PP toward peer involvement with daily smoking and more than weekly cannabis use were negative, showing that PP can have protective components and that the negative association between alcohol use and misuse and PP toward peer involvement as observed by Studer et al. (2014) may be extended to smoking and cannabis use. However, despite the fact that data was used from the same sample (C-SURF study), the negative association could not be found for RSOD, contrary to what Studer et al. (2014) found. Instead, the positive association between PP toward peer involvement and monthly RSOD was significant. The only differences that may explain the inconsistency between the two reports are (1) the time assessment – i.e. baseline assessment in Studer et al. (2014), 15-month follow-up in the current study; (2) the use of a three-level RSOD outcome in the present study as opposed to a binary outcome in Studer et al. (2014); (3) the exclusion of non-drinkers by Studer et al. (2014) as opposed to their inclusion in the present study; and (4) the use of latent variables by Studer et al. (2014) as opposed to mean scores in the present study. Supplementary analyses (not reported) suggest that this inconsistency comes from the use of latent variables by Studer et al. (2014) that are better suited to deal with measurement error than mean scores (see Gallagher and Brown, 2013). As a consequence, the positive association between PP toward peer involvement and monthly RSOD observed in the present study should be interpreted with caution.

Conversely, the positive bivariate correlation and the negative association between PP toward peer conformity and RSOD in simultaneous models are consistent with the results provided by Studer et al. (2014), and suggest the presence of a negative suppression (see Maassen and Bakker, 2001, for more information on suppression). In the simultaneous analyses, PP toward peer conformity was also negatively associated with occasional and daily smoking, whereas no evidence of association was

found for cannabis use, suggesting that Studer et al.'s (2014) finding regarding the negative association of PP toward peer conformity with alcohol use may be extended to smoking but not to cannabis use.

Thus, taken together, these findings indicate that when all PP aspects were tested simultaneously, the part of the variance of PP toward peer involvement and toward peer conformity reflecting negative pressure (e.g. pressure to get involved with "deviant peers" and to conform with "deviant peers" norms) is already accounted by PP toward misconduct. Hence, the remaining variance of PP toward peer involvement and toward peer conformity reflects the positive side of PP toward peer involvement (e.g. pressure from non-deviant peers to get involved in positive behaviours and to conform to positive norms). Accordingly, it is important to consider all three PP aspects simultaneously to emphasize the protective contribution of PP toward peer conformity and peer involvement. As an alternative, if information regarding either PP toward peer conformity or PP toward peer involvement – but not both – is known, additional information regarding peer characteristics and behaviours may also be informative regarding whether the influence of PP will be protective or harmful. This statement is consistent with Allen and Antonishak's (2008) proposition that peers may have a positive influence when the values they impart are adaptive.

4.2 Moderation of the associations between PP toward misconduct and risky substance use

The present study also provides evidence that alcohol, cigarette and cannabis risky use associated with PP toward misconduct varied under certain circumstances. However, only one result provided support for the hypothesis that the availability of social resources may help individuals to resist to PP toward misconduct: its association with weekly or less frequent cannabis use was lower in individuals reporting high levels of PP toward peer conformity than in those reporting low levels. However, support regarding this hypothesis was weak given that it was limited to infrequent cannabis

use (monthly or less often), but was not significant for frequent cannabis use (more than weekly) and alcohol and tobacco outcomes.

By contrast, an opposite pattern of results was observed for the moderating role of the other social factors. The risk for weekly or more frequent RSOD and daily smoking associated with PP toward misconduct was stronger among individuals reporting high levels than among those reporting low levels of PP toward peer involvement. Similarly, the risk for RSOD and risky cannabis use associated with PP toward misconduct was stronger among individuals reporting high levels of SS-F (only significant for monthly and at least weekly RSOD), SS-SO (only significant for at least weekly RSOD and more than weekly cannabis use), as well as neighbourhood cohesion (only significant for monthly and at least weekly RSOD and more than weekly cannabis use), than among individuals reporting low levels.

These findings failed to support our hypothesis that the availability of social resources helps individuals to resist to PP toward misconduct. Conversely, they contradict the prediction of Social Control Theory (Hirschi, 1969) suggesting that strong bonds with social environment may refrain individuals from norm-breaking behaviours, such as substance use. Interestingly, however, these findings are consistent with a previous study that showed that the positive association between adolescents' and peer alcohol and cigarette use was stronger among those reporting medium and high quality relationship with friends than among those reporting low quality relationship with friends (Urberg et al., 2003). Considering that individuals reporting high levels of PP toward misconduct may be affiliated with more deviant individuals than those reporting low levels (Clasen and Brown, 1985), those who are also well connected with others (i.e. with high levels of PP toward peer involvement, SS-F, SS-SO, neighbourhood cohesion,) may have more opportunities to engage in risky behaviours such as alcohol, cigarette and cannabis use. The results of final models testing significant moderators simultaneously suggest that the most important moderators were PP toward peer involvement (for

RSOD and smoking) and neighbourhood cohesion (for RSOD and cannabis). This suggests that the moderation role of SS-F (for RSOD) and SS-SO (for RSOD and cannabis) observed when testing moderators separately may be confounded with that of PP toward peer involvement (for RSOD) and with that of neighbourhood cohesion (for RSOD and cannabis).

4.3 Limitations

The limitations of this study deserve attention. First, although the sample is representative of Swiss young males, further studies should be conducted to investigate whether the findings of the present study may be generalized to females and older individuals. Second, the present study used a cross-sectional design; hence causal inference should not be made. Thirdly, information regarding peer and neighbourhood characteristics and behaviours was lacking in the present study. Yet the protective and harmful influence of social factors on substance use may depend on whether the values and norms imparted by the social environment are positive or negative. For example, high scores on PP toward peer conformity or PP toward peer involvement may have a protective influence when values and attitudes transmitted by peers are positive (e.g. low substance use norms), but may enhance the risk of substance use when values and attitudes are negative (e.g. high substance use norms, deviant peers). Similarly, high levels of neighbourhood cohesion may be protective or risk enhancing depending on whether neighbourhood is good or bad. Further studies including measures of the "good" or "bad" nature of peers and of the social environment should be conducted in order to refine the understanding of the conditions under which social factors act as protective or risk enhancing factors. In addition, the Cronbach's alpha coefficient of the PP toward peer conformity domain was suboptimal, thereby suggesting that further studies should be conducted to improve the psychometric properties of this scale. Finally, all variables used in the present study relied on self-reported measures that may potentially introduce memory or social desirability bias. However, as standard instruments were used and confidentiality was assured, the potential risk for bias should be limited.

4.4 Conclusion

This study showed that being well connected with others and living in a cohesive neighbourhood may amplify the risk associated with pressure toward misconduct. This suggests that prevention targeting peer influence, such as training resistance to PP or providing normative feedbacks (e.g. Botvin, 2000; Donaldson et al., 1995; Hansen and Graham, 1991; Walters et al., 2007), may be beneficial especially to individuals who are well connected with their social environment and live in a cohesive neighbourhood.

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Table 1. Means and standard deviations for peer pressure, perceived social support and social neighbourhood cohesion and prevalence of substance use outcomes

	Mean (SD)	Range	Cronbach's α
Peer pressure			
Misconduct	0.34 (0.40)	0.0-2.6	0.65
Peer involvement	0.98 (0.76)	0.0-3.0	0.73
Peer conformity	0.21 (0.30)	0.0-2.4	0.52
Social support			
From friends	5.89 (1.22)	1.0-7.0	0.95
From a significant other	5.92 (1.40)	1.0-7.0	0.96
Social neighbourhood cohesion	5.29 (1.09)	1.0-7.0	0.90
RSOD (n, %)			
Never or less than monthly	3149	55.4	
Monthly	1358	23.9	
At least weekly	1173	20.7	
Smoking (n, %)			
Non-smokers	2975	52.4	
Occasional smokers	1452	25.6	
Daily smokers	1253	22.1	
Cannabis use (n, %)			
Non-users	3864	68.0	
Weekly or less frequent users	1317	23.2	
More than weekly users	499	8.8	

Note. SD= standard deviation. RSOD = risky single-occasion drinking.

Table 2. Correlations between variables of interest

	1	2	3	4	5	6	7	8	9
Peer pressure									
(1) Misconduct	-								
(2) Peer involvement	**.838**	-							
(3) Peer conformity	**.777**	**.827**	-						
Social support									
(4) From friends	-.017	**.074**	.005	-					
(5) From a significant other	**-.060**	.007	**-.047**	**.745**	-				
(6) Social neighbourhood cohesion	**.050**	**.109**	**.055**	**.249**	**.182**	-			
(7) RSOD	**.273**	**.187**	**.151**	**.063**	-.018	**.058**	-		
(8) Smoking	**.072**	.017	.021	.022	.016	**-.107**	**.218**	-	
(9) Cannabis use	**.190**	**.110**	**.131**	.004	**-.029**	**-.106**	**.280**	**.464**	-

Note. Correlations in bold are significant at $p < .05$. SD= standard deviation. RSOD= risky single-occasion drinking

Table 3. Multinomial logistic regression models predicting monthly and at least weekly RSOD.

	Monthly RSOD			at least weekly RSOD		
	b(SE)	OR	95% CI	b(SE)	OR	95% CI
Model 1						
PP toward misconduct	0.46 (0.04)	1.58	1.46; 1.71	0.71 (0.04)	2.04	1.88; 2.21
PP toward peer involvement	0.10 (0.04)	1.11	1.03; 1.19	0.07 (0.04)	1.07	0.98; 1.16
PP toward peer conformity	-0.11 (0.04)	0.90	0.84; 0.97	-0.14 (0.04)	0.87	0.80; 0.94
Model 2a						
PP toward misconduct	0.42 (0.04)	1.52	1.40; 1.66	0.63 (0.04)	1.88	1.72; 2.05
PP toward peer involvement	0.09 (0.04)	1.09	1.01; 1.17	0.02 (0.04)	1.02	0.94; 1.11
PP toward misconduct by PP toward peer involvement	0.04 (0.04)	1.04	0.97; 1.12	0.10 (0.04)	1.11	1.03;1.19
Model 2b						
PP toward misconduct	0.50 (0.04)	1.65	1.53; 1.78	0.75 (0.04)	2.11	1.96; 2.28
PP toward peer conformity	-0.08 (0.04)	0.93	0.86; 1.00	-0.10 (0.04)	0.90	0.83; 0.98
PP toward misconduct by PP toward peer conformity	-0.02 (0.03)	0.98	0.93; 1.03	-0.04 (0.03)	0.97	0.92; 1.02
Model 2c						
PP toward misconduct	0.49 (0.04)	1.64	1.52; 1.76	0.72 (0.04)	2.05	1.91; 2.21
SS from friends	0.20 (0.04)	1.22	1.13; 1.31	0.16 (0.04)	1.17	1.09; 1.26
PP toward misconduct by SS from friends	0.07 (0.03)	1.08	1.01; 1.15	0.09 (0.03)	1.09	1.03; 1.16

Table 3. (continued)

	Monthly RSOD			at least weekly RSOD		
	b(SE)	OR	95% CI	b(SE)	OR	95% CI
Model 2d						
PP toward misconduct	0.48 (0.04)	1.61	1.50; 1.73	0.71 (0.04)	2.02	1.89; 2.17
SS from a significant other	0.09 (0.04)	1.10	1.02; 1.17	-0.02 (0.04)	0.98	0.91; 1.05
PP toward misconduct by SS from a significant other	0.04 (0.03)	1.05	0.98; 1.12	0.09 (0.03)	1.10	1.03; 1.17
Model 2e						
PP toward misconduct	0.49 (0.04)	1.63	1.51; 1.75	0.72 (0.04)	2.05	1.91; 2.20
Neighbourhood cohesion	0.14 (0.03)	1.15	1.08; 1.23	0.15 (0.04)	1.16	1.08; 1.25
PP toward misconduct by neighbourhood cohesion	0.09 (0.03)	1.09	1.02; 1.16	0.12 (0.03)	1.12	1.05; 1.20
Model 3						
PP toward misconduct	0.48 (0.05)	1.62	1.48; 1.76	0.70 (0.05)	2.02	1.84; 2.20
PP toward peer involvement	0.04 (0.04)	1.04	0.96; 1.12	-0.03 (0.04)	0.97	0.89; 1.05
SS from friends	0.22 (0.05)	1.24	1.13; 1.37	0.30 (0.05)	1.35	1.22; 1.50
SS from a significant other	-0.07 (0.05)	0.93	0.85; 1.02	-0.24 (0.05)	0.79	0.72; 0.87
Neighbourhood cohesion	0.10 (0.04)	1.10	1.03; 1.18	0.12 (0.04)	1.13	1.05; 1.22
PP toward misconduct by PP toward peer involvement	0.03 (0.04)	1.03	0.96; 1.10	0.09 (0.04)	1.09	1.02; 1.18
PP toward misconduct by SS from friends	0.07 (0.05)	1.07	0.98; 1.18	0.02 (0.05)	1.02	0.93; 1.12
PP toward misconduct by SS from a significant other	-0.03 (0.05)	0.98	0.89; 1.07	0.05 (0.05)	1.05	0.96; 1.16
PP toward misconduct by neighbourhood cohesion	0.06 (0.04)	1.06	0.98; 1.14	0.08(0.04)	1.09	1.01; 1.17

Note. PP= peer pressure. SS= social support. RSOD= risky single-occasion drinking. b = coefficient of association. SE= standard error of b. OR = Odds ratio. CI = confidence interval. All models were adjusted for age, linguistic region, highest completed level of education.

Table 4. Multinomial logistic regression models predicting occasional and daily smoking.

	Occasional smokers			Daily smokers		
	b(SE)	OR	95% CI	b(SE)	OR	95% CI
Model 1						
PP toward misconduct	0.48 (0.04)	1.62	1.50; 1.74	0.49 (0.04)	1.63	1.50; 1.77
PP toward peer involvement	0.03 (0.04)	1.03	0.96; 1.11	-0.18 (0.04)	0.84	0.77; 0.91
PP toward peer conformity	-0.10 (0.04)	0.90	0.84; 0.97	-0.08 (0.04)	0.92	0.85; 1.00
Model 2a						
PP toward misconduct	0.45 (0.04)	1.56	1.44;1.70	0.43 (0.04)	1.53	1.40; 1.67
PP toward peer involvement	0.01 (0.04)	1.01	0.94; 1.09	-0.20 (0.04)	0.82	0.76; 0.89
PP toward misconduct by PP toward peer involvement	0.02 (0.03)	1.02	0.96; 1.09	0.09 (0.04)	1.10	1.02; 1.17
Model 2b						
PP toward misconduct	0.50 (0.04)	1.64	1.53; 1.76	0.41 (0.04)	1.50	1.39; 1.63
PP toward peer conformity	-0.08 (0.04)	0.93	0.86; 1.00	-0.15 (0.04)	0.86	0.79; 0.93
PP toward misconduct by PP toward peer conformity	-0.02 (0.03)	0.98	0.93; 1.03	0.03 (0.03)	1.03	0.98; 1.09
Model 2c						
PP toward misconduct	0.46 (0.03)	1.59	1.49; 1.70	0.38 (0.04)	1.46	1.36; 1.57
SS from friends	0.10 (0.03)	1.11	1.04; 1.19	0.07 (0.04)	1.08	1.01; 1.15
PP toward misconduct by SS from friends	0.05 (0.03)	1.05	0.99;1.12	0.04 (0.03)	1.04	0.98; 1.11

	Occasional smokers			Daily smokers		
	b(SE)	OR	95% CI	b(SE)	OR	95% CI
Model 2d						
PP toward misconduct	0.46 (0.03)	1.58	1.48; 1.69	0.38 (0.04)	1.46	1.36; 1.57
SS from a significant other	0.05 (0.03)	1.05	0.98; 1.12	0.06 (0.04)	1.07	0.99; 1.14
PP toward misconduct by SS from a significant other	0.05 (0.03)	1.05	0.99; 1.12	0.02 (0.03)	1.02	0.95; 1.09
Model 2e						
PP toward misconduct	0.45 (0.03)	1.58	1.48; 1.68	0.36 (0.04)	1.43	1.33; 1.54
Neighbourhood cohesion	-0.02 (0.03)	0.98	0.92; 1.05	-0.22 (0.03)	0.80	0.75; 0.86
PP toward misconduct by neighbourhood cohesion	0.05 (0.03)	1.05	0.99; 1.12	-0.01 (0.03)	1.00	0.93; 1.07
Model 3						
PP toward misconduct	0.45 (0.04)	1.56	1.44;1.70	0.43 (0.04)	1.53	1.40; 1.67
PP toward peer involvement	0.01 (0.04)	1.01	0.94; 1.09	-0.20 (0.04)	0.82	0.76; 0.89
PP toward misconduct by PP toward peer involvement	0.02 (0.03)	1.02	0.96; 1.09	0.09 (0.04)	1.10	1.02; 1.17

Note. PP= peer pressure. SS= social support. b = coefficient of association. SE= standard error of b. OR = Odds ratio. CI = confidence interval. All models were adjusted for age, linguistic region, highest completed level of education.

Table 5. Multinomial logistic regression models predicting weekly or less frequent and more than weekly cannabis use.

	Weekly or less frequent cannabis users			More than weekly cannabis users		
	b(SE)	OR	95% CI	b(SE)	OR	95% CI
Model 1						
PP toward misconduct	0.57 (0.04)	1.77	1.64; 1.91	0.80 (0.05)	2.22	2.00; 2.46
PP toward peer involvement	-0.06 (0.04)	0.94	0.87; 1.02	-0.30 (0.06)	0.74	0.66; 0.83
PP toward peer conformity	-0.05 (0.04)	0.95	0.89; 1.02	0.05 (0.05)	1.05	0.95; 1.16
Model 2a						
PP toward misconduct	0.58 (0.04)	1.79	1.65; 1.94	0.82 (0.05)	2.28	2.05; 2.53
PP toward peer involvement	-0.07 (0.04)	0.93	0.87; 1.01	-0.29 (0.06)	0.75	0.67; 0.85
PP toward misconduct by PP toward peer involvement	-0.05 (0.03)	0.96	0.90; 1.02	-0.03 (0.04)	0.97	0.90; 1.05
Model 2b						
PP toward misconduct	0.56 (0.04)	1.76	1.64; 1.88	0.70 (0.05)	2.01	1.83; 2.21
PP toward peer conformity	-0.02 (0.04)	0.98	0.91; 1.05	0.02 (0.06)	1.02	0.91; 1.14
PP toward misconduct by PP toward peer conformity	-0.07 (0.02)	0.94	0.89; 0.98	-0.04 (0.03)	0.96	0.91; 1.01
Model 2c						
PP toward misconduct	0.53 (0.03)	1.70	1.59; 1.81	0.70 (0.04)	2.00	1.84; 2.18
SS from friends	0.08 (0.04)	1.08	1.01; 1.16	0.04 (0.05)	1.04	0.94; 1.15
PP toward misconduct by SS from friends	0.01 (0.03)	1.01	0.95; 1.07	0.05 (0.04)	1.06	0.98; 1.14

Table 5. (continued)

	Weekly or less frequent cannabis users			More than weekly cannabis users		
	b(SE)	OR	95% CI	b(SE)	OR	95% CI
Model 2d						
PP toward misconduct	0.53 (0.03)	1.70	1.59; 1.81	0.69 (0.04)	2.00	1.83; 2.18
SS from a significant other	0.03 (0.03)	1.03	0.97; 1.07	-0.08 (0.05)	0.93	0.84; 1.02
PP toward misconduct by SS from a significant other	0.04 (0.03)	1.04	0.98; 1.11	0.08 (0.04)	1.08	1.01;1.17
Model 2e						
PP toward misconduct	0.53 (0.03)	1.69	1.59; 1.81	0.70 (0.05)	2.02	1.85; 2.20
Neighbourhood cohesion	-0.13 (0.03)	0.88	0.82; 0.94	-0.32 (0.05)	0.73	0.66; 0.80
PP toward misconduct by neighbourhood cohesion	0.06 (0.03)	1.06	0.99; 1.12	0.10 (0.04)	1.10	1.02; 1.19
Model 3						
PP toward misconduct	0.57 (0.04)	1.77	1.65; 1.90	0.72 (0.05)	2.06	1.87; 2.27
PP toward peer conformity	-0.02 (0.04)	0.99	0.91; 1.06	0.03 (0.06)	1.03	0.92; 1.15
SS from a significant other	0.05 (0.04)	1.05	0.98; 1.13	-0.03 (0.05)	0.97	0.88; 1.07
Neighbourhood cohesion	-0.14 (0.03)	0.87	0.81; 0.93	-0.32 (0.05)	0.73	0.66; 0.80
PP toward misconduct by PP toward peer conformity	-0.07 (0.02)	0.94	0.89; 0.98	-0.05 (0.03)	0.95	0.90; 1.01
PP toward misconduct by SS from a significant other	0.02 (0.03)	1.02	0.96; 1.09	0.06 (0.04)	1.06	0.98; 1.15
PP toward misconduct by neighbourhood cohesion	0.04 (0.03)	1.04	0.98; 1.11	0.08 (0.04)	1.08	1.00;1.17

Note. PP= peer pressure. SS= social support. b = coefficient of association. SE= standard error of b. OR = Odds ratio. CI = confidence interval. All models were adjusted for age, linguistic region, highest completed level of education.

Figure caption.

Figure 1. Moderation of the associations between peer pressure toward misconduct and RSOD

Figure 2. Moderation of the associations between peer pressure toward misconduct and smoking and cannabis use
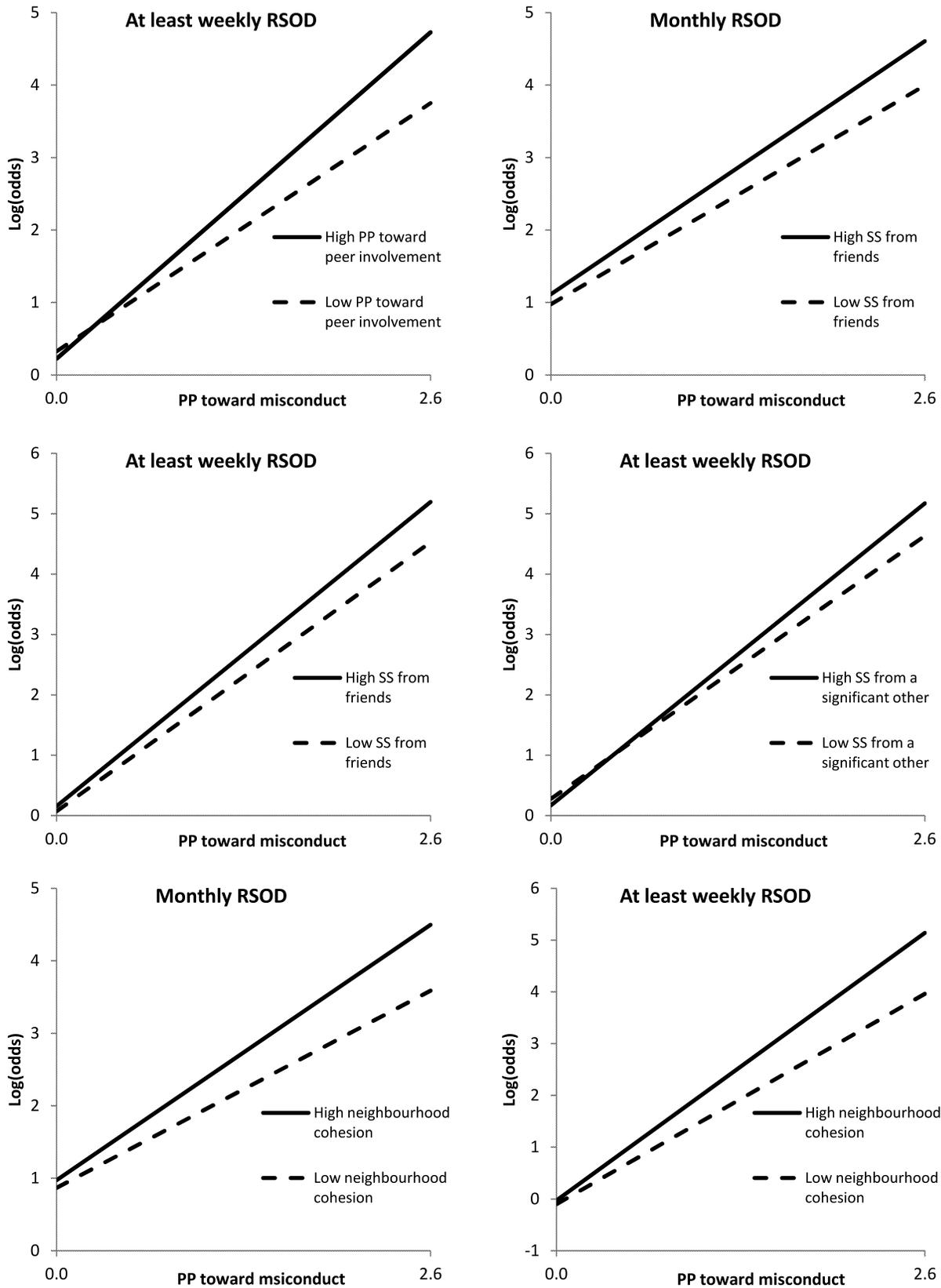
Figure 1

Figure 2