Cannabis use, cognitive functioning and behaviour problems

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Social Skills as Precursors of Cannabis Use in Young Adolescents - a TRAILS Study

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Abstract

Social skills (cooperation, assertion, and self-control) were assessed by teachers for a longitudinal cohort of (pre)adolescents, with measurements at average ages 11.1 (baseline) and 16.3 years (follow-up). Prospective associations with participants' self-reported use of cannabis, (age of) onset of cannabis use, and frequency of use at follow-up were examined using multinomial logistic regression analyses. Teacher-reported social skills predicted different aspects of cannabis use independent of better known factors such as presence of externalizing behaviour and use of other substances. The direction of associations depended on the type of social skill. Good cooperation skills during early adolescence were associated with a reduced risk of lifetime cannabis use and a reduced risk of using cannabis on a regular basis. On the other hand, assertion at age 11 increased the risk of lifetime cannabis use and of using cannabis on an experimental basis.

Introduction

Cannabis is the most widely used substance after tobacco and alcohol, with a particularly high prevalence among adolescents and young adults (European Monitoring Centre for Drugs and Drug Addiction, 2009; Substance Abuse and Mental Health Services Administration, 2009). Most cannabis users start consuming cannabis in early adolescence (Monshouwer, Smit, de Graff, van Os, & Vollebergh, 2005). Cannabis use during this life phase is associated with several problematic outcomes, such as use of other (illicit) drugs (Fergusson, Boden, & Horwood, 2006; Lynskey et al., 2003), educational problems (Lynskey & Hall, 2000), and deviant peer affiliations (Fergusson, Swain- Campbell, & Horwood, 2002). Because of these adverse outcomes, it seems crucial to identify risk factors associated with cannabis use during adolescence.

Many correlates or risk factors of cannabis use during adolescence have already been identified, including demographic factors (e.g., low socioeconomic status [SES]), poor academic performance, early onset of tobacco and alcohol use, drug using peers, family problems, and externalizing behaviour (e.g., Fergusson, Horwood, & Ridder, 2007; Griffith-Lendering, Huijbregts, Mooijaart, Vollebergh, & Swaab, 2011; Korhonen et al., 2010; von Sydow, Lieb, Pfister, Hofler, & Wittchen, 2002). Associations between social functioning and social skills, on one hand, and cannabis use, on the other, have not yet been extensively studied, despite the fact that cannabis use during adolescence generally takes place in social contexts such as at parties, in dancing clubs, or on the street.

Some studies did investigate cannabis use in relation to specific social skills or aspects of social functioning, such as social self-control and self-esteem (Pokhrel, Sussman, Rohrbach, & Sun, 2007; Sussman, McCuller, & Dent, 2003). Lack of social self-control refers to one's tendency to act without thinking (Tarter, 1988), especially in a social context. Here, the use of cannabis was associated with lack of social self-control. Negative self-esteem has also been associated with cannabis use in adolescence (Veselska et al., 2009), although self-esteem is not necessarily a social skill but rather a personality factor. Relations between social skills and cannabis use have not always been straightforward. For example, some findings suggest that those who experiment with cannabis during adolescence are socially better adjusted and have better social skills than both abstainers and heavy users (Shedler & Block,

1990). In addition, Engels and Ter Bogt (2001) showed that adolescents who experiment with cannabis had stronger peer relationships and were more socially competent in their relationships with peers than abstainers. Veselska et al. (2009) also focused on social competence and showed that adolescents with higher levels of assertive behaviour were more likely to use cannabis. They hypothesized that more socially competent adolescents may find themselves in social contexts where exposure to cannabis is high. These social contexts make adolescents more prone to experiment with cannabis. These findings illustrate that adolescence is a developmental phase where social interactions with peers become more important and more complex (Spear, 2000). To unravel the complex relations between cannabis use and social skills in adolescence, it therefore appears especially relevant to discriminate between different types of social skills. From a preventive perspective, one might assume that further discrimination is required with respect to outcome variables as well. Whether or not someone has (ever) used cannabis should be distinguished from onset and frequency of cannabis use. Both age of onset and frequency of use constitute risk factors for the use of other, possibly more dangerous or more addictive drugs, including alcohol and hard drugs (Fergusson et al., 2006; Lynskey et al., 2003).

It is important to focus on early adolescence when examining social risk factors of cannabis use for several reasons. First, (neurobiological) developmental processes at this age could constitute increased vulnerability for enduring effects of external influences such as cannabis use (Arsenault et al., 2002; Schneider, 2008). Furthermore, associations between cannabis use and poor outcomes (e.g., crime, suicidal behaviour, depression, other illicit drug use, deviant peer affiliations) appear to be age related, with (much) stronger associations in the youngest adolescents (14–15; Fergusson et al., 2002).

The purpose of this study was to investigate the possible relationship between multiple social skills (cooperation, assertion, and self-control) and different cannabis-use-related outcomes (i.e., whether cannabis was (ever) used, age of cannabis use onset, and frequency of cannabis use) during adolescence. It was hypothesized that cooperation and self-control would be negatively related to cannabis use. Cooperative behaviour is inversely related to aggressive-disruptive behaviour (Tinoco, Lagares, Moreno, Tessier, & Schneider, 2009). Because cannabis use is positively related to externalizing behaviour (Griffith-Lendering et al., in press; Monshouwer et al., 2006),

including aggressive and rule-breaking behaviour, it was hypothesized that good cooperative skills would be associated with less aggressive and rule-breaking behaviour as well as less cannabis use. The hypothesis regarding self-control and cannabis use was based on the findings by Pokhrel et al. (2007) and Sussman et al. (2003). Based on findings and arguments by Veselska et al. (2009), it was further expected that higher levels of assertive behaviour would be associated with higher risks of using cannabis. It was further hypothesized that poor social skills would predict early onset and high frequency of cannabis use. The predictive value of social skills on different aspects of cannabis use was examined while controlling for a number of well-established correlates of cannabis use, including SES, use of other substances (alcohol and tobacco), parental psychopathology, and externalizing behaviour. Moreover, based on differences in prevalence of cannabis use and presence of correlates of cannabis use for boys and girls (Nationale Drug Monitor, 2009; Substance Abuse and Mental Health Services Administration, 2009), moderating effects of gender on social skills in predicting cannabis outcomes were studied.

Method

Sample

The present study is part of the TRacking Adolescents' Individual Lives Survey (TRAILS) study and uses data from the first (T1) and third (T3) assessments of TRAILS, which ran from 2001 to 2002, and from 2005 to 2007, respectively. A detailed description of the sampling procedure and methods is provided in De Winter et al. (2005) and Huisman et al. (2008). The study was approved by the (Dutch) Central Committee on Research Involving Human Subjects. Briefly, the TRAILS target sample involved all 10- to 11-year-old children living in five municipalities, including both urban and rural areas, in the northern part of the
Netherlands. Of all individuals asked to participate in TRAILS (N=2,935), 76.0% agreed to participate at T1 (N=2,230; M age=11.09 years, SD=0.55; 50.8% girls). Responders and non-responders did not differ with respect to the prevalence of teacher-rated problem behaviour, sociodemographic variables, and health indicators (de Winter et al., 2005). T3 was completed with 81.4% of the original number of participants (N=1,816; M age=16.27 years old, SD=0.73; 52.3% girls). Analyses in

the present study were based on 1,363 adolescents (54.2% girls, 45.8% boys) with nonmissing data on all variables of interest (described next). This sample consisted of the following nationalities: 88.8% Dutch, .3% Turkish, .5% Moroccan, 1.5% Surinam, 1.2% Antillean, 1.5% Indonesian or Mollucan. The remaining 6.2% had other non-Western nationalities.

Measures

Cannabis use

Cannabis use by the participants was measured at T3 by four self-report items. The first question concerned the age of first cannabis use, with the following answer categories: never used, 9 years or younger, 10, 11, 12, 13 or 14, 15 or 16 years. In addition, participants were asked about lifetime use, use in the last year, and use in the last month with the following questions: 'How often have you used cannabis in your life in the last year/ in the last month?' with answer categories 'I have never used,' 'used it once,' 'used it twice,' 'three times,' . . . '10 times,'' '11–19 times,' '20–39 times,' '40 times or more'). Those who reported using cannabis at least once during their lifetime were classified as cannabis users in the dichotomous variable used for the first set of analyses. For age of onset, items were recoded into three categories: (a) those who had never used, (b) those who used before the age of 15, and (c) those who used at age 15 or older. For frequency of use, items were recoded into five categories: (a) those who had never used, (b) those who had used but not during the past year (discontinued use), (c) those who used once or twice during the past year (experimental use), (d) those who reported using cannabis between 3 and 39 times during the past year (regular use), and (e) those who reported using it 40 times or more during the last year (heavy use). The construction of these categories was similar to that used in other studies focusing on cannabis use in the Netherlands (Griffith-Lendering et al., 2010; Monshouwer et al., 2006).

Social skills

Social skills of the participants were evaluated by teachers at T1. The Social Skills Rating System (SSRS; Gresham & Elliott, 1990) is a standardized questionnaire that evaluates children's social skills and is appropriate for the age range of 3 to 18 years. In the Teacher version of the SSRS, 30 items assess ''Social Skills.'' The Social

Skills domain contains the subscales of Cooperation (10 items, α =.90), Assertion (10 items, α =.88), and Self-Control (10 items, α =.91). The Cooperation subscale includes behaviours such as helping others and complying with rules and directions. The Assertion subscale includes initiating behaviours, such as asking others for information and introducing oneself. The Self-Control subscale includes behaviours that emerge in conflict situations such as appropriate management of teasing, and in non-conflict situations such as 'taking turns' and compromising. Teachers rated items on a 3-point scale: 1 (never), 2 (sometimes), and 3 (very often). For the SSRS–Teacher form, Gresham and Elliot (1990) reported evidence for acceptable internal consistency, test–retest and interrater reliability, content validity, and criterion-related validity. In addition, van Oord et al. (2005) evaluated psychometric properties of the Dutch translation of the SSRS and concluded that all SSRS scales had adequate internal consistency (all above .76).

Socialeconomic Status (SES)

The TRAILS database contains several variables contributing to an overall score for Socialeconomic Status (all measured at T1): income level, educational level of both the father and the mother, and occupational level of each parent, using the International Standard Classification for Occupations (Ganzeboom & Treiman, 1996). SES was operationalized as the standardized average of these five items (standardized). The internal consistency of this measure is satisfactory (Cronbach's alpha=.84; Veenstra, Lindenberg, Oldehinkel, De Winter, & Ormel, 2006).

Parental psychopathology

Parental psychopathology (i.e., for depression, anxiety, substance abuse, and antisocial behaviour) was measured by means of the Brief TRAILS Family History Interview (Ormel et al., 2005), administered at T1. Each syndrome was introduced by a vignette describing its main symptoms and followed by a series of questions to assess lifetime occurrence, professional treatment, and medication use. The scores for substance abuse and antisocial behaviour were used to construct a familial vulnerability index for externalizing disorder. The scores for depression and anxiety disorder were used to construct an index for internalizing disorder.

The construction of familial vulnerability indices was based on Kendler, Prescott,

Myers, and Neale (2003), who performed multivariate twin modelling to investigate shared genetic risk factors for psychiatric and substance use disorders, and performed for TRAILS by Veenstra and colleagues (Veenstra et al., 2005). For both internalizing and externalizing disorder, parents were assigned to one of the following categories: (probably) not (0); (probably) yes (1); yes plus either the use of treatment=medication (for substance abuse, depression, and anxiety) or having been picked up by police (antisocial behaviour) (2).

Externalizing behaviour problems

Externalizing behaviour at T1 was assessed using the Youth Self Report (YSR), which is one of the most commonly used self-report questionnaires in current child and adolescent psychiatric research (Achenbach, 1991; Verhulst & Achenbach, 1995). The YSR contains 112 items on behavioural and emotional problems in the past 6 months. Participants can rate the items as being not true (0), somewhat or sometimes true (1), or very or often true (2). For the present study, we used the Externalizing Behaviour Problems scale, which consists of items measuring aggressive and rule-breaking behaviour (Achenbach, 1991). Reliability and validity of the Dutch version of the YSR have been shown to be satisfactory (de Groot, Koot, & Verhulst, 1996; Verhulst, van der Ende, & Koot, 1997).

Use of other substances

Alcohol use and tobacco use by the participants were measured at the third assessment. Participants self-reported on the frequency of use in the past month. For tobacco use reported frequency was recoded into nonweekly (0) versus weekly (1), and for alcohol use, the reported frequency was recoded into nonmonthly (0) versus monthly use (1). These categories were similar to those used in other studies focusing on cannabis use in the Netherlands
(Monshouwer et al., 2006).

Data Analyses

It was first examined whether those with missing values on one or more variables of interest (n=453) differed from those without missing values (n=1,363) on SES (by means of t test) and gender (by means of Pearson chi-square test). Next, it was

investigated whether control variables should be included in the main statistical analyses as covariates (i.e., whether cannabis users differed from nonusers on these variables) using t tests or GLM univariate analysis of variance for SES, parental psychopathology, externalizing behaviour problems, and using Pearson chi-square analysis for gender, alcohol, and tobacco use. It was then tested whether these variables were related to social skills using Pearson correlation for SES, parental psychopathology, externalizing behaviour, and using t-tests or GLM univariate analysis of variance for gender, alcohol, and tobacco use.

Logistic regression analysis was performed to examine the impact of social skills on whether or not cannabis was used during adolescence. Using multinomial regression analysis, onset of cannabis use was predicted by social skills using the three-category variable (a) no use (reference group), (b) early onset, and (c) late onset. Next, multinomial regression analyses were used to predict frequency of cannabis use at T3 from social skills, using a five-category cannabis variable as the dependent variable: (a) those who had never used (reference group), (b) discontinued use, (c) experimental use, (d) regular use, and (e) heavy use.

Results

Preliminary Analyses

Participants with and without missing values did not differ in terms of SES. Participants without missing values were more likely to be girls (54.2%) compared to those with missing values (46.6%): $\chi 2$ (1) =8.0, p=.005. In the sample used for further statistical analyses (n=1,363), cannabis users (n=400) did not differ from nonusers with respect to gender ($\chi 2$=.34, p=.561), SES (t=.97, p=.332), and familial vulnerability for internalizing behaviour (t=_-84, p=.404). Cannabis users and nonusers did, however, differ significantly on familial vulnerability for externalizing behaviour (t=-2.1, p=.037), externalizing behaviour (t=-6.4, p<.001), alcohol use ($\chi 2$=83.6, p<.001) and tobacco use ($\chi 2$=367.1, p<.001). Cannabis users scored higher on both familial vulnerability for externalizing behaviour (M=.2, SD=.4) and internalizing behaviour (M=.3, SD=.2) than nonusers (M=.1, SD=.4 and M=.2, SD=.2, respectively). In addition, cannabis users were more often monthly alcohol users (92.8% vs. 69.7%) and also more often weekly tobacco users than nonusers (60.8% vs. 11.0%). Familial vulnerability for externalizing behaviour, externalizing

behaviour, tobacco use, and alcohol use were also related to social skills and therefore introduced as covariates in further statistical analyses (Table 1).

Table 1: Correlation among variables

	Control variables				Teacher-Reported Social Skills			Cannabis use variables		
	1. Fam. Vuln. Ext	2. Ext Beh.	3. Tob-acco use	4. Alco-hol use	5. Coope ration	6. Assert ion	7. Self-Contr ol	8. Life-time use	9. Age of onset	10. Freq. Of use
1.	–									
2.	.1*	–								
3.	.1**	.28*	–							
4.	.0	.1**	.2**	–						
5.	-.1**	-.2**	-.288	.0	–					
6.	-.1**	-.1**	-.1**	.1**	.5**	–				
7.	-.1**	-.2**	-.1**	.1	.7**	.7**	–			
8.	.1*	.2**	.5**	.3**	-.2**	.0	-.1**	–		
9.	.0	.1**	.4**	.2**	-.2**	.0	-.1**	.9*8	–	
10.	.1*	.2**	.5**	.2**	-.2**	.0	-.1**	.9**	.8**	–

Note: *n*= 1,363.

Fam Vuln Ext.=familial vulnerability externalizing behaviour;

Ext. Beh = Externalizing Behaviour.

* p<.05. **p<.01.

Descriptives

At follow-up (i.e., when participants had a mean age of 16.3 years), 71.1% had never used cannabis, 6.1% had used cannabis but not during the past year (discontinued use), 10.6% had used it once or twice during the past year (experimental use), 8.8% had used cannabis between 3 and 39 times during the past year (regular use), and 3.4% had used it more than 39 times in the past year (heavy use). Forty-six percent (n=184) of users were 'early starters,' indicating onset of cannabis use before the age of 15; 54% (n=216) were 'late starters,' indicating onset of cannabis use at age 15 or older.

Predicting Cannabis Use

The impact of social skills (cooperation, assertion, and self-control) on cannabis use during adolescence (yes/no) was investigated using logistic regression analyses.

Tobacco use, alcohol use, and externalizing behaviour problems all increased the chance of cannabis use (Table 2). After adjusting for these control variables, logistic regression analyses revealed that at baseline, high levels of SSRS–Cooperation were associated with reduced chances of cannabis use during adolescence (odds ratio [OR]=.4; 95% confidence interval [CI] [.3, .6]; p<.001). High levels of SSRS–Assertion were associated with increased chances of cannabis use (OR=1.8; 95% CI [1.1, 2.8]; p=.014; Table 2). No moderating effect of gender was found.

Table 2. *Summary of Logistic Regression Analysis Predicting Cannabis Use (n=1369).*

	B	SE	OR
Covariates			
Familial vulnerability for externalizing behaviour	0.1	0.2	1.1
Externalizing behaviour	1.0**	0.4	2.8
Tobacco use	2.3***	0.2	10.0
Alcohol use	1.3***	0.2	3.7
Social Skills			
Cooperation	-0.9	0.2	0.4
Assertion	0.6	0.2	1.8
Self control	-0.2	0.2	0.8
Constant	-3.9		
$\chi 2$	24.9***		
df	7		

B = Unstandardized coefficient; SE = standard errors; OR = Odds Ratio.

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

Predicting Age of Onset

Multinomial regression analyses revealed that of the control variables, tobacco use and alcohol use were related to both early and late onset of cannabis use (Table 3), indicating a heightened risk for both early and late onset of cannabis use compared to nonuse. Externalizing behaviour problems, however, were associated only with early onset of cannabis use. After adjusting for externalizing behaviour problems, alcohol use, and tobacco use, cooperation predicted both early (OR=.4; 95% CI [.2, .7]; p=.001) and late (OR=.4; 95% CI [.3, .7], p=.002) onset compared to nonuse. Assertion also predicted both early (OR=1.9; 95% CI [1.0, 3.4], p=.041) and late (OR=1.7; 95% CI [1.0, 2.9]; p=.046) onset of cannabis use compared to nonuse (Table 3). Cooperation and assertion did not significantly discriminate between the early onset and late onset. Again, there were no significant Gender x Social Skill

interactions.

Table 3. Summary of Multinomial Logistic Regression Analysis Predicting Early (9–14 Years) and Late Onset (15–16 Years) of Cannabis Use.

	Early Starters			*Late Starters*		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Familial Vulnerability						
Ext.Beh.	0.3	0.2	1.4	-0.1	0.2	0.9
Externalizing Behaviour	1.7***	0.5	5.7	0.5	0.5	1.7
Tobacco Use	2.8***	0.2	16.3	1.9***	0.2	7.0
Alcohol Use	1.4***	0.3	4.0	1.3***	0.3	3.6
Cooperation	-1.0***	0.3	0.4	-0.8**	0.3	0.4
Assertion	0.6*	0.3	1.9	0.5*	0.3	1.7
Self control	0.0	0.3	1.0	-0.3	0.3	0.7
Constant	-6.1			-3.5		
$\chi 2$	457.5***					
df	14					

Note: n = 1,363. Reference category consists of subjects who did not report any cannabis use at T3. OR = odds ratio; Ext. Beh. = externalizing behaviour.

*$p < .05$. **$p < .01$. ***$p < .001$.

Predicting Frequency of Cannabis Use

As the separate categories for discontinued and heavy use were considered to contain too few participants, these were merged with the 'never used' and 'regular use' categories, respectively. This resulted in the following categories for statistical analysis: (a) those who had never used and discontinued users, (b) experimental users, and (c) regular and heavy users. When predicting frequency of cannabis use by cooperation, assertion, and self-control, multinomial regression analyses showed that, of the control variables, tobacco use and alcohol use were related to both experimental use and regular use of cannabis, whereas externalizing behaviour problems was only related to regular/ heavy use of cannabis (Table 4).

After controlling for family vulnerability for externalizing behaviour, externalizing behaviour problems, alcohol use, and tobacco use, high scores on cooperation predicted lower regular/heavy use (OR=.4; 95% CI [.2, .6], p=.001). Good cooperation skills reduced the relative chance of being a regular or heavy cannabis

user compared to being a nonuser. Chances of being an experimental user as opposed to a nonuser also reduced as a function of cooperative skills, although this effect just failed to reach significance. Assertion predicted higher experimental use (OR=2.1; 95% CI [1.1, 3.7]; p=.021) as opposed to non-use. Thus, although cooperation did not predict regular use compared to experimental use, there are indications that good cooperative skills particularly prevent adolescents from becoming a regular or heavy user. Also, assertive skills only predicted experimental use, not regular or heavy use, which may also be important when social skills are considered intervention or prevention targets. Social skills and gender did not significantly interact.

Table 4 Summary of Multinomial Logistic Regression Analysis Predicting Experimental and Regular/ Heavy Cannabis Use.

	Experimental users			*Regular / Heavy users*		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Familial Vulnerability Ext. Beh.	-0.1	0.2	0.9	0.2	0.2	1.3
Externalizing Behaviour	0.7	0.2	1.9	1.5**	0.5	4.3
Tobacco Use	1.6***	0.2	4.9	2.5**	0.2	11.8
Alcohol Use	1.3***	0.3	3.8	1.5**	0.4	4.6
Cooperation	-0.5***	0.3	0.6	-1.0**	0.3	0.4
Assertion	-0.7*	0.3	2.0	0.5	0.3	1.1
Self control	-0.4	0.3	2.7	-0.1	0.3	1.1
Constant	4.8					
χ^2	359.8***					
df	14					

Note: n=1,363. Reference category consists of subjects who did not report any cannabis use at T3. OR = odds ratio; Ext. Beh.= externalizing behaviour.

*p<.05. **p<.01. ***p<.001.

Discussion

The present study examined multiple social skills as possible risk factors for cannabis use during adolescence. Those who had used cannabis by the age of 16 had lower levels of cooperation at age 11, compared to nonusers. Assertion was differently related to cannabis use; specifically, cannabis users were more assertive than nonusers. Cooperation includes behaviours such as helping others, complying with rules and directions, and sharing materials. Assertion involves behaviours such as asking others for information, introducing oneself, and responding to the actions of

others. Self-control was not related to cannabis use during adolescence. It is important to note that cooperation and assertion were predictive of cannabis use independent of other, better-known factors associated with cannabis use, such as use of other substances or externalizing behaviour.

Social skills did not predict early versus late onset of cannabis use. Chances of both early and late onset decreased with higher levels of cooperation and increased with higher levels of assertion. Social skills did not predict regular/heavy use versus experimental use either, although high levels of cooperative behaviour particularly appeared to reduce the chances of being a regular/heavy user rather than a nonuser. Assertion particularly increased the chance of being an experimental user rather than a nonuser. This result could indicate that, although assertion increases the chance of cannabis use during adolescence, it does not do so for heavy cannabis use, which may be considered a risk factor for using other more addictive drugs (Fergusson et al., 2006). Still, despite the fact that both cooperation and assertion are considered positive social skills, our results show that they are differentially predictive of what may be considered risky behaviour (i.e., becoming a cannabis user). Cooperative behaviour, as expressed in, for example, complying with rules and directions, reduces chances of risky behaviour, whereas the type of engagement represented by the assertion items appears to increase chances of risky behaviour.

Our results are in line with expectations. Previous studies have shown negative associations between cooperative behaviour and aggressive/ disruptive behaviour during adolescence (Tinoco et al., 2009). Because cannabis use has been positively associated with aggressive and rule-breaking behaviour repeatedly (Fergusson et al., 2002; Griffith-Lendering et al., 2010 Monshouwer et al., 2006), it was expected that cooperative behaviour would also be related to a reduction in chances of cannabis use. This is what our findings indicated. When focusing on assertive behaviour, Veselska et al., (2009) also showed that higher levels of assertion (or social competence) were associated with cannabis use among adolescents (M age=14.3 years). Veselska et al. argued that those adolescents with high levels of social competence (i.e., those who were more assertive) are more likely to find themselves in places where exposure to drug (cannabis) use is high, thereby providing a social context for cannabis use. One can also argue that assertive adolescents are inclined to enter new social situations more frequently; in other words, they are less inhibited and therefore show more risk-taking behaviour, such as the use of cannabis.

Our data did not confirm the social skill of self-control to be related to cannabis use, age of onset, or frequency of use. This appears to be inconsistent with previous studies focusing on self-control and cannabis use (Pokhrel et al., 2007; Sussman et al., 2003). This discrepancy in findings may be explained by different operationalizations of the construct self-control or by assessment through different informants. Although self-control refers to one's tendency to act without thinking (Tarter, 1988), social self-control is a self-control measure related to interpersonal relations. In addition, in this study, self-control, defined by the SSRS as 'behaviours that emerge in conflict and non-conflict situations' was rated by the participants' teachers. Whereas assertion and cooperative behaviour may be behaviours that occur frequently in (generally well-structured) classroom settings, self-control items may be more difficult to observe and rate in this context.

Strengths of this study are its prospective design and its large population. Also, this is one in a few studies that focused on different social skills rather than general social ability, which could have masked the differential effects of different social skills. Furthermore, this study focused on different cannabis use variables (i.e., cannabis use, age of onset, and frequency of use). A possible limitation of the study is that participants self-reported on cannabis use. Although previous studies have concluded that self-reporting on substance use is generally valid (Buchan, Dennis, Tims, & Diamond, 2002), one can still argue that the nature of the questions could have led to socially desirable answers (especially for young adolescents). Another limitation is the loss of respondents between baseline and follow-up. Furthermore, the reliability of the measurement of social skills could have benefited from the use of multiple informants (i.e., parents=caretakers as well as teachers). This could have covered social skills in different contexts. Also, because of the liberal laws regarding cannabis use in the Netherlands, it is unclear whether the results of the present study are applicable across countries. Despite these differences in laws, the percentage of young adults using cannabis in the Netherlands is similar to that in other European countries (European Monitoring Centre for Drugs and Drug Addiction, 2009) and the United States (Substance abuse and mental health services administration, 2008).

The general conclusion of this study is that different teacher-reported social skills are differentially predictive of cannabis use during early adolescence and that these associations are not explained by important other correlates of both cannabis use and

social behaviour. Good cooperative skills decreased the chance of cannabis use, whereas high levels of assertion increased the probability of (experimental) cannabis use.

The results of this study show that social functioning might deserve more attention in studies investigating precursors of substance use and abuse. In the present study, we focused on social skills, but other aspects of social functioning may also be of importance. Examples include functioning and roles within peer groups and quality of other interpersonal relations. The presence of psychopathology or, for example, externalizing behaviour in high but subclinical gradations may be stronger predictors of substance use and, possibly, the transition into addiction. However, there appears to be a role for social functioning in general as well. The extent to which different aspects of social functioning contribute to substance use and addiction should be clarified further, both their unique contribution and their contribution in combination with other risk factors, such as psychopathology, but also poor sociodemographic circumstances.

In social skills interventions, it should be taken into account that specific social skills are not by definition, or under all circumstances, ‘‘good’’ or ‘‘bad.’’ A more subtle approach appears to be required. For example, it seems unlikely that suppressing assertive behaviour would be beneficial. Still, the positive associations between assertive behaviour and cannabis use suggest something could be done with this type of behaviour. Possibly, the focus regarding this behaviour should lie on stimulating assertive refusal behaviour (Botvin, 2000; Botvin & Griffin, 2007). Whereas the findings regarding cooperative behaviour appear to be relatively straightforward, it might be important here as well to not stimulate every form of cooperative behaviour. Moreover, it may be important to take into account individual goals. That is, if someone is cooperative to fit within certain peer groups (which could or could not be a group involved in substance use), it may be beneficial to target contextual factors, emphasizing situations during which cooperative behaviour should or should not be shown. One can also imagine that certain forms of assertive behaviour can actually help decision making in such situations. Thus, the important point is that positive results regarding the prevention of cannabis use or the transition into addiction could be obtained not by suppressing or stimulating particular types of social behaviour, but by considering the different forms of certain social behaviours in different contexts and by considering different social behaviours in combination with each other.

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