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Cannabis use, time perspective and risk perception: Evidence of a moderating effect†

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Abstract

This study explores the relationship between time perspective (TP), cannabis use and risk perceptions associated with this substance. A sample of French students ($n = 198$) were provided with a valid French version of the *Zimbardo Time Perspective Inventory* (ZTPI) scale. Risk perceptions linked to cannabis consumption were evaluated from a list of 22 items referring to different risks. Respondents were asked to declare how frequently they consumed this substance. Data analysis was based firstly on ZTPI scores, secondly on declared consumption and finally on the two risk perception indices which were established after factorial analysis. Results showed that TP acted as a significant predictor of both psychoactive substance use and of cannabis consumption frequency. Significant links between consumption and risk perceptions also appeared. A second series of analyses showed that TP moderated the link between cannabis consumption and risk perceptions. These findings highlight the importance of TP when analyzing the complexity of contemporary cannabis use.

Keywords: *Cannabis use, time perspective, ZTPI, risk perception, young French adults*

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Introduction

Over the last decade in France, as in many other European countries, the use of cannabis among adolescents and young adults has represented a major public health issue. French epidemiological surveys show that cannabis is the most commonly used illicit drug and estimate that by the end of adolescence, between 50 and 60% of 18 years old will have at least tried cannabis (Beck & Legleye, 2003a). These prevalent rates of cannabis experimentation have been steadily increasing since 1993, among both male and female students (Choquet et al., 2004), and even though cannabis consumption decreases over a period of time, 48.3% of young adults under 25 years have tried cannabis at least once (Beck & Legleye, 2003b). Nowadays, along with alcohol and tobacco, cannabis is the most widely used drug.

If epidemiological rates and increased cannabis use have been extensively documented, little is actually known about the psychosocial dynamics of consumption behaviour and the relationship established by consumers to the substance. In order to study these dimensions further, it is important to take into account that, among young people, cannabis use has become “normalized”, in the sense of being commonplace (Hammersley, Jenkins, & Reid, 2001). In effect, the “normalization” of cannabis use is related not only to a “statistical norm” but also to a “culturally” established one, as was put forward from a British context (Pearson, 2001). However, within a French context, although the use is “normalized”, the way the substance is perceived is still a cause for much debate about its definition as a “drug” (Dany & Apostolidis, 2002). Debates concerning both the prohibition politics applied to cannabis consumption and the prevention policies aimed at reducing harmful effects, take advantage of an uncertainty in scientific positions concerning the risks involved by substance use (Peretti-Watel, 2000). Additionally, quantitative data on perceptions of drugs in the general population (Beck, Legleye, & Peretti-Watel, 2002a) show that cannabis occupies an ambiguous and special place between licit and illicit substances. Thus, cannabis appears, on the one hand, to be less addictive but more dangerous than alcohol and tobacco (e.g., the first step towards using more dangerous drugs: escalating theory), and, on the other hand, less dangerous than other illicit drugs (heroin, cocaine etc.).

Accordingly, in the French context, many researchers have noted that debates concerning the labelling of cannabis as a drug, beyond the ideological foundations of political and scientific arguments, have focused on the dangers of the substance, particularly concerning the associated risks in comparison to other substances. Thus, discussion regarding these risks has become a central part of social debates (e.g., legal attitudes towards users, primary preventive strategies, appropriate treatment of problematic use). Thus, individuals’ and groups’ substance perceptions (label, risks and benefits associated) are a crucial dimension for analyzing contemporary cannabis use. For consumers, managing the contradictory character of cannabis – normalized and illicit or dangerous – could be accompanied by a specific relationship to the substance,

which allows reconciling the private dimension of the practice (e.g., recreational motives, individual choice, socially functional) with the institutional one (e.g., deviant, “drug-takers”, health-harming behaviours). From a sociological perspective, it has been argued by Peretti-Watel (2003) that consumers’ management implies a reconstruction of cannabis’ image in order to get away from the “risky” and “deviant” label (cognitive neutralization techniques). Referring to Festinger’s cognitive dissonance theory (1957) as well to Becker’s seminal work on deviance related to marijuana smokers (1963), this author considers that “cognitive adaptation” (adjusting cognitions to behaviours) is a fundamental way to deal with stigmatized behaviours. Among these cognitive strategies, Peretti-Watel identifies three types of risk denial (scapegoat “hard drugs” users, emphasizing the ability to control one’s consumption, comparing cannabis and alcohol risks), particularly in adolescent consumers. These rationalizations have a dynamic character: they do not only rely on the experimental use of the substance but are also modified and adjusted when consumption increases.

As Peretti-Watel argues by mentioning the need to consider a kind of “chronological disorder” in these processes, relations between behaviours and risk perceptions are complex (e.g., reciprocity; cf. Gerrard, Gibbons, Benthin, & Hessling, 1996). Causal inferences issues (i.e., behaviours cause changes in perceived risk) require care, especially concerning findings from cross-sectional studies (Brewer, Weinstein, Cuite, & Herrington, 2004). Nevertheless, several findings based on cross-sectional data showed a negative link between cannabis consumption level and related risk perceptions (Morgan et al., 1999; Resnicow, Smith, Harrison, & Drucker, 1999). Furthermore, numerous longitudinal studies have demonstrated the decline of risk perception among individuals engaged in risky behaviours such as substance use (e.g., smoking relapse, Gibbons, Eggleston, & Benthin, 1997; drinking behaviour Gerrard, Gibbons, Reis-Bergan, & Russell, 2000). Thus, risk perceptions appear essential when analyzing the development of consumer behaviours; their increase, quitting or relapses (Boney-McCoy et al., 1992).

Considering that substance use and abuse appear as complex social behaviours, then analysing the potential role of more general cognitive variables in the link between risk behaviour and risk perception, represents an essential issue (e.g., reciprocity between behaviour and cognition, and psychological defensiveness; Gerrard et al., 2000). Previous studies showed that variables such as self-esteem and sensation seeking could intervene in the link between consumption and risk associated to the substance in an unexpected way. For example, self-esteem plays an apparently “paradoxical” role in the link between tobacco smoking relapse and changes in perceived risk: individuals with high self-esteem minimize their perceptions more than those with low self-esteem (Gibbons et al., 1997). Moreover, an analogous moderating role was identified in literature concerning other personality variables (e.g., sensation seeking appeared to moderate the link between risk evaluation and risky behaviours; Rosenbloom, 2003). These observed moderating effects underline the anchorage of the individual’s management of risky behaviours in more general cognitive variables. Thus, relations

between behaviours and related risk perceptions can be modulated according to individuals' profiles on different psychological constructs.

Among the variables susceptible of intervening in the complex association between risky behaviours and perceived risks, time perspective (TP, Lewin, 1942) appears as particularly pertinent. This multidimensional variable concerns the psychological constructions of the past, the present and the future, not only in the importance granted to every temporal register, but also in the negative or positive attitude linked to each. TP constitutes a socio-cognitive variable that influences perceptions and actions by marking them with a temporal composite (Zimbardo & Boyd, 1999). When studying substance use, TP was often seen as playing an important role and was thus revealed as predictive of psychoactive substance consumption (Alvos, Gregson, & Ross, 1993; Hulbert & Lens, 1988; Keough, Zimbardo, & Boyd, 1999; Levy & Earleywine, 2004), and of cannabis use in particular (King & Manaster, 1975; Wills, Sandy, & Yaeger, 2001). Considering that TP constitutes a socio-cognitive variable that influences perceptions and actions by marking them with a temporal composite (Zimbardo & Boyd, 1999), it therefore appears particularly pertinent to consider the role played by the individual's temporal profiles when analyzing the links between behaviours and perceptions in the field of substance use.

Despite the importance of risk perceptions when analyzing risky behaviours (Gerrard et al., 1996), few studies have investigated the link between TP and risk perceptions. Usually, studies in this framework consider the relationship to the substance only under the behavioural dimension (e.g., use/non-use) without exploring the cognitive one. This is particularly true of risk perception involved in substance use. Nevertheless, the role played by TP in risky behaviours is often analyzed for its degree of effectiveness in relating to future consequences (Hall & Fong, 2003; Lipscomb, 1989; Strickland, Lewicki, & Katz, 1966). Future-oriented individuals should therefore be more likely to consider long-term consequences (perceived as risks), while conversely present-oriented individuals should be less concerned by the potential harm and future risks linked to health-compromising behaviour (Keough et al., 1999; Petry & Bickel, 1998; Wilde, 1982). Unfortunately, with the focus being on the behavioural dimension in previous research, no direct empirical evidence supports the assumptions of differential risk perceptions related to health-compromising behaviour in regard to individuals' TP.

Considering the complex links between consumption behaviours and risk perceptions, a key issue when analyzing contemporary cannabis use, would be to investigate, in regard to the TP variable, "when" and/or "for whom" (Frazier, Tix, & Barron, 2004) these constructs are more or less related. Thus, the main goal of this study is to go beyond the investigation of simple relations between cannabis use, risk perceptions and TP and to explore if individuals' TP have an impact on the link between cannabis use and risk perception. More explicitly, the main hypothesis tested here is that this link will vary according to the TP in which individuals find themselves. Those variations may appear "paradoxical" in regard to the role generally attributed to some TP dimensions

(e.g., protective role of future TP). However, this moderating hypothesis is based on previous work that suggested such “paradoxical” role played by some other individual or dispositional factors in risk-denial cognitive strategies linked to substance use (Gibbons et al., 1997), and, more generally, in health intentions (Taubman-Ben-Ari & Findler, 2005). This hypothesis can provide potential for furthering our understanding of such psychological phenomena (Baron & Kenny, 1986), by acknowledging the potential role played by a related, but distinct and undertaken, general cognitive variable (Zimbardo & Boyd, 1999).

Overview of the current study

In the current study concerning the relationship of French young adults to cannabis, we had four distinct but related goals: (1) to verify the established links between TP and substances use (e.g., Keough et al., 1999), using a sample of French students; (2) to explore the relation between TP and cannabis risk perceptions; (3) to examine the statement about the relation between cannabis consumption level and risk perceptions associated with the substance. Considering previous findings about cognitive strategies related to risk denial, one might expect a negative relation between those constructs in terms of an accurate state (cf. *accuracy hypothesis*: Weinstein, Rothman, & Nicolich, 1998); and (4) to test whether TP moderates the link between cannabis consumption and risk perceptions.

Method

Participants and procedure

The study was carried out between February and April 2003. A total of 198 Human Science undergraduate students from two French universities (located in Aix-en-Provence), aged from 18 to 25 years (M age = 21.8; SD = 1.96), took part in this study on a voluntary basis. The sample composed of 100 men (M age = 22.4; SD = 2.02) and 98 women (M age = 21.3; SD = 1.7). The research team administrated the questionnaires during normal class hours in the two universities following a standardized protocol. Research presented as a survey concerning opinions and lifestyles and not as “a drug study”. Participants were invited to fill in the questionnaire individually and it was stressed that responses were completely anonymous and confidential. Teachers remained in the room, but they were asked to avoid walking around so that students could respond without feeling that they were under observation. After completion, the team collected the questionnaires and left the classroom.

Measures

Time perspective. TP was measured using the Zimbardo Time Perspective Inventory (ZTPI) scale (Zimbardo & Boyd, 1999) in its French validated version (Apostolidis & Fieulaine, 2004). ZTPI is a multidimensional scale

which measures both TP in three temporal frames; the past, present and future, and the attitude related to each of them. It takes into account the motivational, emotional, cognitive and social aspects of TP by using an inventory of temporally marked propositions concerning beliefs, values and preferences that individuals associate with their experiences. This scale contains the following 5 subscales: 'Past-Positive' (PP: nostalgic, positive construction of the past); 'Past-Negative' (PN: aversive attitude towards the past); 'Present-Fatalistic' (PF: hopeless, nihilistic attitude towards life); 'Present-Hedonistic' (PH: orientation towards enjoyment and pleasure in the present) and 'Future' (F: planning for and achievement of future goals). These temporal frames are represented by 54 items in the French validated version, which are assessed on a 5-point Likert-type scale according to how characteristic each statement is considered by the respondent (ranging from 1 [*very uncharacteristic*] to 5 [*very characteristic*]).¹

Risk perceptions. In order to explore the perceptions of risks linked to cannabis, we created a questionnaire, which was based on the analysis of 28 semi-structured interviews with young adults concerning cannabis. The aim of the interviews was to investigate how lay people perceive and make sense of risk by focusing on the particular content of common-sense thinking about the risks related to cannabis consumption (Joffe, 2003). Indeed, understanding the "normalizing" context of substance-use necessitates taking into consideration both the symbolic and social aspects of risk apprehension along with the scientific discourses regarding the use and abuse of cannabis. The selected elements concerned different aspects of risk revealed by the interviewees, and which are rooted in the debates throughout French society concerning the effects of cannabis use. Firstly, certain statements correspond to risks generally associated with cannabis (health risks, psychological dependence, neuron damage) while others evoke risks related to "hard" drugs consumption such as heroin (overdose, physical dependence). When applied to cannabis, these risks can suggest a comparison with the "hard" drugs universe. Secondly, certain statements rejecting all noxious effects of the substance, such as losing self-control or motivation and risks on driving, directly represent negation of risks. Finally, a third category of propositions, corresponding to a positive attitude towards the substance, focuses on its positive effects such as communication with friends and positive emotions. The questionnaire was constituted of 22 statements in total (see presentation of these items in Table IV), representing the three categories and presented to participants in randomized order. For each statement, the participants were asked to rate their level of agreement on a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Substance use. This research used a self-report questionnaire to assess the respondents' substance use. In order to assess the level of cannabis use, the respondents were asked to indicate how often they had used cannabis in the last year, month or day. This response format contained 5 levels of consumption; abstinent,

experimental, occasional, repeated and regular, and was based on the criteria used in surveys conducted by the French Monitoring Centre for Drugs and Drugs Addiction (OFDT). Considering the strong prevalence of cannabis use among young adults in France (Beck, Legleye, & Peretti-Watel, 2002b), we added an additional level – intensive.² The distinction between these levels enabled us to evaluate the frequency of cannabis consumption, which in turn allowed us to analyze the eventual differences in the relationship to cannabis that can exist between those who consume in an experimental way and those who are engaged in a more regular or intensive manner. Moreover, it appeared to be more effective to study the possible influence of psychological or social variables in consumption and the related cognitions than to study the simple dichotomy between users and non-users (McCusker, Roberts, Douthwaite, & Williams, 1995; McMillan, Sherlock, & Conner, 2003). Hence, we evaluated the quantity of consumption from the declared number of joints smoked, and then took into account other consumed substances indicated by the respondents; whether they be licit, such as alcohol and tobacco, or illicit, such as ecstasy, LSD, cocaine or heroin.

Results

Descriptive statistics

Consumption. Table I recapitulates the sample characteristics for declared consumption and principal measures for men and women. One can observe the high rates of cannabis, tobacco and alcohol use among the population questioned. These results confirm those established by the French national investigations showing “statistical normalization” of cannabis use, even though in this sample of students, rates appeared higher than those estimated in the general population by the French Monitoring Centre for Drugs and Drugs Addiction. However, it is notable that chi-square tests in our sample did not reveal significant differences in cannabis consumption levels between men and women, apart from a difference in the ‘intensive’ level ($p=0.07$), where we observed a higher rate in men than in women. Other declared substances’ consumption did not appear to make any significant difference between sexes.

ZTPI dimensionality and intercorrelations between subscales. In order to verify the factorial structure of the ZTPI scale in its French version, we used the statistical package STATISTICA to carry out a principal components analysis on the responses to the 54 items. As expected, five factors emerged from factorial solution with a similar total explained variance to the earlier French validation (34.43% *versus* 32.75%). All items of the scale were correctly categorized into the five latent constructs (see Table II). Nevertheless, some minimal differences emerged, for example the reversed order with explained variance of two factors (future and present-hedonistic), as well as some items which have significant loadings on two factors (with the largest loading on an unexpected factor for item 27). Despite these differences, the dimensionality of the scale appears

Table I. Demographic data and drug use characteristics.

Variable	Men	Women
<i>N</i>	100	98
Mean Age (<i>SD</i>)	22.3 (2.02)	21.3 (1.77)
Self-reported consumption (% ever consumed)		
Cannabis	76	71.4
Tobacco	92	88.7
Alcohol	70	76.5
Ecstasy	17	14.3
LSD	14	7.1
Cocaine	18	10.2
Heroin	6	2
Cannabis consumption level (% in consumers)		
Experimental	15.6	25.7
Occasional	23.3	28.6
Repeated	14.4	17
Regular	20.7	14.4
Intensive	26	14.3

correctly replicated in our sample, and alpha coefficients calculated for the ZTPI five sub-scales appear to be acceptable (“Past-Positive”, $n = 8$, $\alpha = 0.70$; “Past-Negative”, $n = 9$, $\alpha = 0.77$; “Present-Fatalistic”, $n = 7$, $\alpha = 0.67$; “Present-Hedonistic”, $n = 18$, $\alpha = 0.77$; and “Future”, $n = 12$, $\alpha = 0.75$). The scores for the items in each sub-scale were calculated by the mean.

Table III gives intercorrelations among principal measures. We can observe significant associations between age and PHTP ($r = -0.20$) and PFTP ($r = -0.16$). Several ZTPI subscales correlate strongly, in accordance with previous research (Zimbardo & Boyd, 1999; see for the French context: Apostolidis & Fieulaine, 2004). Intercorrelations show significant negative relations between age and present time perspective subscales. This result is coherent with theoretical considerations and empirical findings in previous works (e.g., D’Alessio, Guarino, DePascalis, & Zimbardo, 2003). In addition, a significant negative relationship appears between Future TP and consumption level.

Cannabis risk perceptions

The statistical package STATISTICA was used to carry out a principal components analysis (with varimax rotation) based on the responses to the 22 items concerning the perception of risks linked to cannabis use. Two factors emerged (Scree test, Cattell, 1966) which accounted for 31.5% of the total variance (see Table IV). The first factor (eigenvalue = 5.14; explained variance = 22.3%) included both items that reflected a positive attitude towards cannabis, by focusing on its positive effects (e.g., “Cannabis amplifies emotions in a positive way”) and items denoting a rejection of “drug image” and of risks generally associated with the substance’s use and abuse (e.g., “Cannabis consumption does not involve any health risks” or “Smoking cannabis is not bad for the memory”). This result can be interpreted as a tendency to relativize

Table II. Factorial solution of the French version of ZTPI. Principal-component analysis: Varimax-rotated factor matrix.

Item (dimension)	Future	Past-negative	Present-hedonistic	Past-positive	Present-fatalistic
13 (F)	0.606				
38 (F)	0.568				-0.342
20 (F)	0.543				
6 (F)	0.530				
43 (F)	0.507				
10 (F)	0.464		0.380		
41 (F)	0.447				
9 (F)	-0.445				
54 (F)	-0.437				0.339
17 (F)	0.435				
49 (F)	0.383				
29 (F)	0.336				-0.312
48 (PN)		0.797			
15 (PN)		0.757			
33 (PN)		0.751			
52 (PN)		0.524			
21 (PN)		0.476			
26 (PN)		0.464			
4 (PN)		0.459			
32 (PN)		0.397			
5 (PN)		0.301			
25 (PH)			0.679		
16 (PH)			0.618		
18 (PH)			0.521		
53 (PH)			0.517		
40 (PH)			0.471		0.302
44 (PH)	-0.314		0.427		
30 (PH)			0.416		
42 (PH)			0.398		
12 (PH)			0.391		
46 (PH)			0.390		
8 (PH)			0.387		
50 (PH), (PF)	-0.331		0.352		
1 (PH)			0.339		
27 (PH)	-0.397		0.338		
35 (PH), (PF)			0.321		
22 (PH)			0.301		
23 (PH), (F)			0.301		
31 (PH)			0.300		
7 (PP)		-0.307		0.619	
28 (PP)				0.566	
2 (PP)				0.563	
24 (PP)				-0.478	
11 (PP)		-0.385		0.471	
19 (PP)				0.344	
39 (PP)				-0.324	
47 (PP)				0.301	
37 (PF)					0.617
36 (PF)		0.304			0.503
51 (PF)					0.482
14 (PF)					0.473
34 (PF)					0.462
3 (PF)		0.314			0.405
45 (PF)		0.336			0.380
Eigenvalue	6.12	4.42	3.44	2.47	2.13
Explained variance	11.34	8.20	6.37	4.57	3.95

Notes: Although the items' numbering order remains the same as in the original version of ZTPI, it must be noted that the items' corresponding numbers are different in the French version because items 15 and 36 have been removed. Categorizations from the original validated version are indicated in italics in parentheses for those items for which categorization on a sub-scale varied in the French version ($n = 3$). We present only factor loadings ≥ 0.30 .

Table III. Mean scores, standard deviations and intercorrelations ($N=198$).

Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Age	21.8	1.96	–						
2. Past-positive	3.45	0.60	0.08	–					
3. Past-negative	3.07	0.61	–0.05	–0.23**	–				
4. Present-fatalistic	2.41	0.66	–0.16*	–0.18**	0.34***	–			
5. Present-hedonistic	3.32	0.47	–0.20**	–0.06	0.12	0.36***	–		
6. Future	3.18	0.60	0.12	0.15*	–0.08	–0.31***	–0.33***	–	
7. Consumption level	3.16	1.78	–0.11	0.03	–0.10	0.01	0.13	–0.19**	–

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Notes: Consumption level coded as 1 (*abstinent*), 2 (*experimental*), 3 (*occasional*), 4 (*repeated*), 5 (*regular*), 6 (*intensive*).

risks involved in cannabis use in order to get away from the risky label. The items included in this factor suggest that this relativization deals with, on the one hand, highlighting expected benefits, and on the other hand, rejecting risks and the labelling of cannabis as a drug. The second factor (eigenvalue = 2.10; explained variance = 9.2%) corresponded to items emphasising harmful risks usually associated with the world of “hard drugs” (e.g., “Consuming cannabis can lead to an overdose” or “Cannabis consumption leads to the consumption of other drugs”) and to a perception of the substance as riskier in comparison with alcohol (“Cannabis is more dangerous than alcohol for the health”). Many of these aspects concerning potential consequences of cannabis use are still in debate within the social context and may reflect an approval of the vision of cannabis as a “hard drug” based on those associated risks.

These two factors could be interpreted as reflecting two cognitive strategies referring to the denial of cannabis risks. Namely, a “risk relativization” dimension, illustrated by simultaneous emphasizing benefits and rejecting risks induced by cannabis use, and a “risk approval” dimension, which concerns risks associated to “hard drug-taker” behaviour. Both of these strategies may be related to two different cognitive ways of neutralizing risky label: on the one hand, an agreement with the “risk relativization” dimension, and, on the other hand, a disagreement with the “risk approval” one. Using these results, we created two indicators by averaging the scores of the items of each factor after having inverted the scores of the negative loadings. The first indicator was called “risk relativization” ($n=15$, $\alpha=0.79$, $M=2.30$, $SD=0.54$) and the second “risk approval” ($n=7$, $\alpha=0.72$, $M=2.37$, $SD=0.69$). Again, no differences between sexes were observed on these indicators.

Time perspective and substance use

For each substance consumed, the five ZTPI sub-scales scores were entered as predictors into a logistic regression equation. Odds ratios and 95% confidence intervals for each predictor are shown in Table V. Some TP scales appeared as significant predictors of reported substance use. Higher scores on FTP

Table IV. Opinions about risks involved using cannabis. Principal-component analysis: Varimax-rotated factor matrix.

Items	Risk relativization ($\alpha = 0.79$)	Risk approval ($\alpha = 0.72$)	<i>M</i>	<i>SD</i>
1. Cannabis does not disturb the mental equilibrium of the consumer.	0.632		2.32	1.00
2. Cannabis consumption does not interfere with school or professional activities.	0.603		2.39	1.13
3. Cannabis consumption does not involve health risks.	0.594		2.10	1.12
4. People who buy cannabis have nothing to fear from the dealers.	0.566		2.39	1.03
5. Cannabis is a drug.	-0.516		4.16	1.02
6. It is not dangerous to drive after having consumed cannabis.	0.506		1.87	1.15
7. Cannabis consumption does not affect the neurons.	0.488		1.85	1.07
8. Smoking cannabis is not bad for the memory.	0.480		2.04	0.93
9. After consuming cannabis, one is motivated to work.	0.477		1.92	1.08
10. Simultaneous consumption of alcohol and cannabis multiplies the risks of losing self-control.	-0.477		4.26	0.89
11. Smoking cannabis facilitates the discussion between the smokers and non-smokers.	0.446		2.31	1.04
12. Cannabis consumption makes one lose self-control.	-0.411		3.33	1.20
13. Cannabis amplifies emotions in a positive way.	0.407		3.10	1.05
14. Cannabis does not lead to psychological dependence.	0.394		2.03	1.11
15. Cannabis consumption leads to problems of a sexual nature.	-0.390		2.95	1.16
16. Consuming cannabis destroys friendly relationships.		0.660	2.34	1.06
17. Consuming cannabis can lead to an overdose.		0.659	1.94	1.15
18. Cannabis consumption leads to the consumption of other drugs.		0.621	2.42	1.22
19. Cannabis leads to physical dependence.		0.563	2.80	1.31
20. Smoking cannabis causes eczema.		0.514	2.34	0.92
21. Cannabis is more dangerous than alcohol for the health.		0.484	2.16	1.11
22. Cannabis is bought in disreputable places.		0.481	2.58	1.12

Note: We present only factor loadings ≥ 0.30 .

correspond to lower odds of reported tobacco and alcohol use, while higher scores on PHTP correspond to higher odds of reported alcohol consumption. As for cannabis use, the same effects were observed: odds of reported cannabis use are lesser for higher scores on FTP and lower scores on PHTP.

A simultaneous multiple regression was carried out using the five TP scores as predictors, and the consumption level (coded as 1: *abstinent* to 6: *intensive*) and quantity (number of joints smoked) as dependent variables. FTP appeared as a significant predictor in both cases. Thus, a higher level of FTP is related to less frequent ($\beta = -0.18$, $p = 0.01$) and less important ($\beta = -0.19$, $p = 0.02$) self-reported cannabis use.

Table V. Summary of logistic regression analyses predicting tobacco, alcohol and cannabis use.

	Tobacco use	Alcohol use	Cannabis use
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Past-negative	1.26 (0.75–2.12)	0.41 (0.16–1.00)*	0.80 (0.48–1.34)
Past-positive	1.33 (0.74–2.42)	0.54 (0.19–1.52)	1.53 (0.87–2.79)
Present-hedonistic	1.40 (0.66–2.96)	8.14 (2.33–28.40)***	2.26 (1.06–4.84)*
Present-fatalistic	0.96 (0.52–1.77)	0.62 (0.23–1.69)	0.87 (0.48–1.58)
Future	0.32 (0.17–0.62)***	0.29 (0.10–0.80)**	0.50 (0.27–0.91)*
Model			
Chi ² (5)	19.74***	27.13***	17.32**
R ² (Nagelkerke)	0.14	0.25	0.12

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Table VI. Regression estimates (βs) predicting risk perceptions.

	Risk perception: “Relativization”	Risk perception: “Approval”
Past-negative	−0.13*	0.09
Past-positive	−0.08	−0.00
Present-fatalistic	0.01	0.15*
Present-hedonistic	0.18**	−0.19**
Future	−0.16*	0.28***
R ²	0.09	0.14

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Time perspective and risk perceptions

Multiple regressions were also performed in order to predict risk perceptions from the scores on TP dimensions. Results indicate that some TP dimensions are significant predictors of cannabis risk perceptions (see Table VI). Thus, the more the participants are oriented towards FTP, the less they emphasize a “risk relativization” dimension and the more they emphasize a “risk approval” dimension. Not surprisingly, it is the opposite for PHTP. But in the case of PFTP, higher scores were related to a greater emphasis on “risk approval” as for the FTP. Finally, higher scores on PNTTP are associated with a lower emphasis on “risk relativization”.

Substance use and risk perceptions

In order to examine differences in risk perceptions between cannabis users and non-users, an ANOVA was carried out on the data. The analysis revealed significant differences between groups. Users are more likely to emphasize the “risk relativization” dimension ($M=2.37$) than non-users ($M=1.88$,

$F(1,198)=35.87$, $p=0.000$, $\eta^2=0.15$), and non-users are more likely to emphasize the “risk approval” dimension ($M=2.87$) than users ($M=2.19$, $F(1,198)=44.29$, $p<0.001$, $\eta^2=0.18$).

Regression analyses were performed using consumption level and quantity as predictors and risk perceptions as dependent variables. Consumption level appeared as a significant predictor of the risk perceptions. Thus, a higher consumption level is associated with a greater emphasis on “risk relativization” ($\beta=0.47$, $R^2=0.22$, $p<0.001$) and a lesser one on “risk approval” ($\beta=-0.52$, $R^2=0.27$, $p<0.001$). Consumed quantity was also a significant predictor of the “risk approval” dimension ($\beta=-0.19$, $R^2=0.03$, $p=0.01$). These results showed that a significant negative correlation exists in this sample between the level of cannabis consumption and perceived risks.

Testing the moderating role of TP variable

Within the context of the above results, an important issue relates to whether the individual’s temporal profiles impact the observed relations between a high level of use and risk denial in our sample. This moderating hypothesis postulates that TP will affect the relationship between cannabis use and risk perceptions according to the level of the strength of the relationship and/or its direction. To test this hypothesis, we used multiple regression models (cf. Frazier et al., 2004), after having centred TP and consumption level (coded as 1: *abstinent*, 6: *intensive*) variables. This reconstruction reduced the number of problems associated with multicollinearity (Aiken & West, 1991). We then created terms of interaction by multiplying together the centred predictor (consumption level) and the mediator (TP). This model was tested on each dimension of the ZTPI and each indicator of risk perception (10 models).

The TP moderating effect was studied using hierarchical regression analysis (Cohen & Cohen, 1983; Holmbeck, 1997) in order to determine the increase in the explained variance resulting from the introduction of the interaction term (TP* consumption level, step 2) into the regression equation, compared with the variance when the equation containing only the main effects (step 1). The moderating effect was established if the interaction terms revealed significant regression coefficients and if the increase in variance explained by the model (ΔR^2) between steps 1 and 2 was significant.³ The fact that the interaction terms are significant means that the relation between predictor and dependent is not the same across the moderator. Once the significance of the interaction effect is established, the interpretation of this effect was carried out by plotting simple regression lines representing relationships between the predictor (consumption level) and the outcome variable (risk perceptions) for representative groups created by dichotomizing the moderator variable (TP: +1 and -1 standard deviation above and below the mean; Cohen, Cohen, West, & Aiken, 2003), and examining simple slopes (Aiken & West, 1991).

Table VII shows the results of the moderated regression analyses. Interaction terms did not appear statistically significant in all the cases. Only the Future

Table VII. Hierarchical multiple regression analyses testing moderating effect of TP between consumption level and risk perceptions.

Predictors	Risk perception: “Relativization”			Risk perception: “Approval”			
	Step 1		Step 2	Step 1		Step 2	
	B (SE)	β	B (SE) β	B (SE)	β	B (SE) β	
FTP	-0.12 (0.05)	-0.14*	-0.10 (0.05)	0.23 (0.06)	0.20***	0.17 (0.06)	0.15**
Consumption	0.13 (0.02)	0.44***	0.13 (0.02)	-0.18 (0.02)	-0.48***	-0.18 (0.02)	-0.48***
FTP*Cons.			0.14 (0.01)			-0.13 (0.03)	-0.20***
R ² (ΔR ²)	0.27***		0.26*** (0.02*)	0.30***		0.35*** (0.05***)	
PFTP	0.20 (0.07)	0.18**	0.19 (0.07)	-0.21 (0.07)	-0.15**	-0.18 (0.07)	-0.14**
Consumption	0.13 (0.02)	0.43***	0.13 (0.02)	-0.19 (0.02)	-0.54***	-0.20 (0.02)	-0.55***
PFTP*Cons.			-0.03 (0.03)			0.09 (0.04)	0.11*
R ² (ΔR ²)	0.25***		0.25*** (0.00)	0.34***		0.36*** (0.02**)	
PPFTP	0.05 (0.05)	0.06	0.05 (0.05)	0.03 (0.06)	0.03	0.05 (0.06)	0.04
Consumption	0.14 (0.02)	0.47	0.14 (0.02)	-0.20 (0.02)	-0.52***	-0.20 (0.02)	-0.53***
PPFTP*Cons.			-0.05 (0.03)			0.11 (0.03)	0.17**
R ² (ΔR ²)	0.23***		0.24*** (0.01)	0.27***		0.30*** (0.03***)	
PNTF	-0.02 (0.04)	-0.03	-0.02 (0.04)	0.04 (0.05)	0.04	0.05 (0.05)	0.05
Consumption	0.14 (0.02)	0.47***	0.14 (0.01)	-0.19 (0.02)	-0.52***	-0.20 (0.02)	-0.51***
PNTF*Cons.			-0.01 (0.02)			0.08 (0.03)	0.12*
R ² (ΔR ²)	0.22***		0.22*** (0.00)	0.27***		0.29*** (0.02*)	
PPTP	-0.07 (0.05)	-0.08	-0.06 (0.05)	0.00 (0.07)	0.00	-0.02 (0.07)	-0.01
Consumption	0.14 (0.02)	0.47***	0.14 (0.02)	-0.20 (0.02)	-0.52***	-0.20 (0.02)	-0.52***
PPTP*Cons.			0.03 (0.03)			-0.05 (0.03)	-0.08
R ² (ΔR ²)	0.22***		0.23*** (0.00)	0.27***		0.27*** (0.00)	

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.
Notes: R² = explanation rate for each step, ΔR^2 = change in explanation rate between step 1 and step 2.

TP dimension acted as a moderator in the link between consumption level and the “risk relativization” dimension. Simple slopes indicated that when scores on FTP were higher, the positive link between consumption level and “risk relativization” was stronger ($B = 0.20$, $t = 3.06$, $p = 0.0005$) than when scores on FTP were lower ($B = 0.06$, $t = 1.21$, *ns*). Thus, the FTP seemed to support the relativistic view related to a high consumption.

Concerning the “risk approval” indicator, findings showed that all TP dimensions, except PPTP, acted as moderators. Thus, simple slopes revealed that the negative relationship between consumption level and “risk approval” was weaker for individuals who were highly oriented towards PFTP ($B = -0.11$, $t = -1.53$, *ns*) than for those who were less oriented towards this dimension ($B = -0.29$, $t = -4.23$, $p = 0.0002$). The same effect was observed for the present-hedonistic dimension and negative relation between consumption level and “risk approval” appeared weaker for high scores on PHTP ($B = -0.15$, $t = -2.44$, $p = 0.02$) than for low scores ($B = -0.29$, $t = -4.23$, $p = 0.0002$). In this case, the two slopes were significantly different from zero in the same direction, but, according to Cohen et al. (2003), the significance of the interaction term and of the increment in explained variance in the regression equation (see Table VII) attested the existence of the moderating effect. A moderating effect also appeared for past-negative, with a weaker relation between consumption level and “risk approval” for high scores on PNTP ($B = -0.05$, $t = -0.32$, *ns*) than for low scores ($B = -0.26$, $t = -3.79$, $p = 0.0006$). However, when we considered the FTP, we observed the opposite effect. Thus, the negative relationship between consumption level and the “approval” indicator was stronger when individuals were more future oriented ($B = -0.33$, $t = -4.89$, $p < 0.0001$) than when individuals were less oriented towards this dimension ($B = -0.04$, $t = -0.85$, *ns*).

Discussion

This work adds an important contribution to the literature on both substance use and time perspective. Several findings highlight the complexity of cannabis use and abuse as social behaviours and the importance of the TP variable for analyzing this complexity. Our article contributes by exploring the impact that TP has in the ‘reciprocal’ link between risky behaviours and risk perceptions in the case of cannabis consumption among young adults in the French context.

Firstly, this study provides further support to the results already established in the literature concerning the important value of TP in predicting reported substance use (Keough et al., 1999). In accordance with previous studies, substance use and cannabis consumption are positively linked to a PHTP, and negatively linked to a future-oriented one. Secondly, findings showed a link between TP and cannabis risk perceptions that had not previously been considered. The future orientation appears associated with a more risky perception of the substance while it is the contrary for the present-hedonistic one. With regard to the two risk perception indicators used in the present study, one

might consider that items included in each dimension could partially explain these results: short-term benefits and risks for the “risk relativization” dimension; long-term consequences for the “risk approval” dimension. This possible interpretation, based on the correspondence between temporal frames and considerations of short-term or long-term consequences, appears blurred by the fact that PFTP is positively related to the “risk approval” dimension. Hence, our results suggest the necessity to take into account not only the temporal orientation but also the related attitudes in order to analyze the relations between time perspective and risk perceptions. Thirdly, observed relations between level of cannabis use and risk perceptions are coherent with previous conclusions on a lower level of perceived risks among heavier users. With regard to our indicators, high levels of use are related to perceptions of the substance that seem to fill the objective of neutralizing risky label by relativizing and by rejecting risks associated with cannabis use. Even if this result is coherent with previous ones concerning risk denial in order to reduce inconsistency (Peretti-Watel, 2003), it must be tempered by the cross-sectional nature of the study design which prevents us from making conclusions on any causal relation or temporal order (*cognitive adaptation or behavioural adaptation*).

Nevertheless, examining the moderating role of TP variable in this link provides useful but complex results. These results give support to the hypothesis of an intervening TP variable in the observed relation between a high level of use and risk denial view (relativistic and disapproval). The fact that TP intervenes specifically in the case of the “risk approval” dimension, shows that the two cognitive neutralization strategies measured in the present study could be considered as partially distinct and are based on user specific reasoning. Appreciating the potential harmful effects of cannabis use by disapproval of the risks associated to the “hard drug-taker” universe, thus appears to be marked in a multidimensional way by several temporal components. On the other hand, only the future temporal frame marks the relativistic view. One conclusion that can be drawn from these findings is that the moderating effect acts in different ways according to certain temporal frames. Additionally, when consumption level, related risk perceptions and TP variable are simultaneously taken into account, TP effects seem to be more complicated than was previously established. Results appear to be apparently paradoxical, particularly concerning the moderating effect of future and present-hedonistic dimensions. Planning attitude, as represented by FTP scale, appears to allow the possibility to reinforce a risk-denial perception associated with high levels of use, and to support a vision of the substance adapted to these levels of use. More precisely, the way in which FTP acts as a moderator suggests that, far from establishing a protective factor in all cases, focusing on the future could give rise to a less problematic vision of risks associated with the substance in relation to high levels of use. Thus, if focusing on the FTP constitutes, and as is generally considered, a brake in the initiation of consumption, this result suggests that it may in fact facilitate a more regular consumption by supporting cognitive adjustments represented by neutralization cognitive strategies. In the same apparently paradoxical way, PHTP seems to attenuate this kind

of “cognitive adaptation”. These results demonstrate the temporally marked character of substance use behaviours, and beyond the level of these behaviours, their cognitive anchoring in a more present- or future-oriented TP.

Interpreting these results is quite difficult given the cross-sectional nature of the study. In addition, the moderating effects do not allow us to conclude on the nature of the process involved in these counterintuitive interesting findings. The observed effects concern the strength of these links and not their direction (buffering and not antagonistic effects). According to Frazier et al. (2004), these moderating effects acknowledge in this sample “when” and/or “for whom” cannabis use is more or less strongly related to risk perceptions with regard to TP, and not “how” or “why” these links occur. Nevertheless, cognitive dissonance theory, and related work concerning the role of more general cognitive variables (e.g., self-esteem; Gerrard et al., 2000) in the link between risk behaviour and risk perception, support one working hypothesis opened by these results. Indeed, one might consider that when they are future-oriented, consumers have to manage a greater level of inconsistency. Consumption with a planning attitude connecting actual behaviour and future outcomes can lead to anchor the behaviour not just in the present, but also in the anticipated future. This particular dimension given to the behaviour by marking it with a future temporal component can imply further need to reduce cognitive inconsistency and then to construct a self-protective image of the substance. Instead, this may be interpreted as a “self-serving cognitive strategy” for consumers who have to manage with both public health and social order, which could be perceived as accusatory or threatening. In the case of cannabis, a way to elaborate a protective strategy might be to cope with the relativization of the related risks and to distance it from its current association with “hard-drugs” and the risks generally associated to them. In fact, the necessity appears for further research to understand exactly how FTP affects cognitions related to engagement in risky behaviours and to provide empirical information in order to analyze the function it can serve for those who engage in risky behaviours and simultaneously have high FTP. Then, taking into account the TP variable could offer crucial implications for the renewal of the study of the cognitive dissonance process, which may operate on the complex relations between the increase in risky behaviours and the perception of related risks in the area of substance use.

In addition, these results highlight the stakes that contemporary cannabis use raises. If the relationship with the substance and the related socio-cognitive dimensions for analyzing cannabis use are taken into account, it suggests that an appropriate description of cannabis users may be more complex than that of simply “drug-takers”. It is also relevant to think about the significance of a planning attitude, as is measured by FTP, when substance consumption plays an important part in individuals’ lives. This question may have theoretical and empirical applications according to economists’ perspective for the explanation of addictive behaviours. This perspective suggests the hypothesis that future time oriented preference could be analyzed as a contributory cause

(Bretteville-Jensen, 1999). However, further study must be undertaken to provide additional insight into this process. As mentioned above, and in order to understand how cannabis use fits into users' everyday lives more precisely and effectively, it is necessary to study the "normalization" context concerning the use among young adults. As cannabis use becomes a more prevalent mass behaviour, it is no longer possible to analyze the nuances and the complexities of how it fits only into abnormal or deviant-derived explanations (Hammersley et al., 2001). The fundamental contradictory character of cannabis and the social debates that it provokes highlight the necessity to understand how users deal with this contradiction with regard to their level of use. Findings show that this level cannot be considered as linearly linked to substance perceptions when related socio-cognitive variables are taken into account.

Limitations

Several limitations of the findings of this study should be noted. Firstly, our sample was constituted of young university students, and clearly, results from such a group might not be generalized for all other groups. Secondly, limitations inherent in the scale used for measuring TP must be extended to the findings. Thus, ZTPI cannot thoroughly describe the temporality of individuals or groups even if this scale does it more fully than any other TP scale. This element emphasizes the fact that temporality is a more complex object than TP measured by ZTPI, especially the FTP which is related specifically to a planning and achievement dimension when other future dimensions might be considered (optimistic, pessimistic...). Thirdly, the measures employed for substance use were all self-reported. It would be useful in future studies to consider obtaining behaviour reports from peers.

Additionally, one main limitation is linked to the cross-sectional design of the study, which does not allow the analysis of the causal connection between risky behaviours and perceived risk. Nevertheless, the study is useful for exploring the psychosocial dynamics of consumption behaviours, and offers relevant observations for further theoretical developments within future longitudinal studies. Longitudinal studies can make it possible to establish causal and/or anteriority relations concerning the relations between the level of cannabis use and risk perceptions, for example, by studying relapses and quitting and then determine when changes in risk perceptions occur (cf. *risk reappraisal hypothesis*: Brewer et al., 2004). Moreover, such data will permit the generation of more causal hypotheses, especially mediational ones, which imply strictly causal chains and acknowledge "how" and "why" one variable predicts another. In this perspective, TP can represent a pertinent and useful variable when studying the generative mechanisms through which the relations between risky behaviours and risk perceptions occur. It may be possible therefore to examine the role played by TP in these processes more accurately, and also to interpret the nature of the TP variable more appropriately (e.g., moderator or mediator effects as two alternative hypotheses). On the other hand, longitudinal studies

can contribute to the exploration of possible effects of variations in TP caused by life events (social mobility, traumatizing events...).

Finally, the specific character of cannabis risk perceptions studied here limits the findings. Measuring “risk perception” may refer to several meanings (Weinstein & Nicolich, 1993). The two indicators of risk perception (“risk relativization” and “risk approval”) used in this study deal, on the one hand, with risks associated with the substance use behaviour (e.g., physical, psychological and social consequences), and on the other hand, with several other salient dimensions (e.g., perceived benefits, labelling as a drug, association with the “hard drug-taker” behaviour). The measured constructs reflect a sort of common-sense thinking (Joffe, 2003) regarding perceived risks and regarding employed cognitive processes to deny the risky label (e.g., trivialization of the substance, comparison with the other licit or illicit ones). As such, these constructs do not measure several aspects of the apprehension of risk regarding the involvement in substance use (e.g., one’s present risk). Moreover, in focusing on this limitation, one can observe this lack of thoroughness in the results of factorial analysis (i.e., percentage of explained variance). Future studies must be carried in order to complete and extend these results, by using other dimensions of risk perception, for example, the likelihood and the severity of perceived risks, and by evaluating the substance perception more thoroughly.

Despite these limitations, this study has established interesting points for analyzing the correlates of substance use, and offers a useful approach in the study of consumption development, quitting or relapse. In particular, the moderating role played here by TP has implications for the development of prevention programmes, by highlighting the fact that the temporality in which individuals find themselves can give different significance for similar behaviours. This last element highlights the need for future research aimed at a more detailed understanding of firstly the relationship between the maintenance of consumption behaviours and the perceptions of the consumed substance, and secondly, the psychosocial dynamics implied in the progression of consumption. Such a perspective necessitates taking into account socio-cognitive dimensions that intervene in the development and the dynamics of the significations attached to the behaviours, and highlights the interest of a non-pathological approach to substance use behaviours. This suggests that for health psychology, future research focusing on these different dimensions may allow for more precise analyses of these complex social behaviours related to contemporary cannabis use in European countries, and in other countries where cannabis use is high.

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Notes

- [1] In the French validation, two items of the original scale were removed (items 15 and 36) and three items were categorized differently (items 24, 37, and 52) (For details, see Apostolidis & Fieulaine, 2004).
- [2] The measures of the several levels of use were defined in the questionnaire as follow: abstinent, (*to have never smoked cannabis*); experimental, (*to have smoked cannabis but not during the last 12 months*); occasional, (*to have smoked cannabis less than 10 times during the last 12 months*); repeated, (*to have smoked cannabis less than 10 times during the last 30 days*); regular, (*to have smoked cannabis more than 10 times during the last 30 days*); intensive, (*to have smoked cannabis at least once per day*).
- [3] Test of significance of the R^2 increment (ΔR^2) is provided by the F test: $F = [(R_2^2 - R_1^2) / (k_2 - k_1)] / [(1 - R_2^2) / (n - k_2 - 1)]$; where DL are $(k_2 - k_1)$ and $(n - k_2 - 1)$, n = total sample size; k_2 = number of predictors at step 2, k_1 = number of predictors at step 1; R_1^2 and R_2^2 = explained variance for the first and the second model (Cohen & Cohen, 1983).

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