I. Abstract of the research

The present project will study the relationships between the development of social anxiety and cannabis and alcohol use in teenagers, together with the role of explicit and implicit expectancies about alcohol and cannabis as mediating factors in this relationship. This will be studied through a longitudinal study on young teenagers in full time education. The project will be divided into three phases. In the first phase, the time course of the development of addictive behaviors (cannabis and alcohol use) and anxious symptomatology will be followed for 24 months through the use of well validated self-administered questionnaires. This approach will allow to model the relationship between these behaviors and to suggest hypothetical causal mechanisms that might be further tested in the next phase of the project. In the second phase of the project, we will study how implicit and explicit expectancies about alcohol and cannabis could explain their consumption in teenagers, and more specifically how these expectancies could account for the modeled relationship between anxiety and addictive behaviors. Finally, in the last phase, on the basis of the results of the present studies, we will discuss preventive and therapeutic actions for teenagers in high risk of alcohol and/or cannabis abuse.

II. State of the art

The scientific literature supports the existence of a specific relationship between drug use and psychopathological disorders such as schizophrenia\(^1\), depression\(^2\) or anxiety. Indeed, epidemiological studies indicate that frequent cannabis users are at a greater risk of developing anxious disorders. Conversely, patients with anxious disorders show higher rates of cannabis consumption\(^3\). Even when controlling for the use of other drugs, cannabis consumption remains associated with enhanced depression and anxiety in young adults especially in the case of early and frequent use of cannabis\(^4\). However, the precise relationship between anxiety and cannabis consumption, especially in terms of the causal links between these variables, remains to be clarified. Anxiety is often highlighted as a risk factor for the development of cannabis abuse. However, chronic cannabis use could also induce or exacerbate anxiety symptoms. For example, it has been suggested that the sensitivity to anxiety is a vulnerability factor for anxious responses in young women who regularly consume cannabis\(^5\). Another study reported that the frequent use of cannabis subsequently predicts anxiety, particularly when cannabis is used daily\(^6\). Finally, it is also possible that cannabis use and anxiety are related in a non causal way. This would occur if similar risk factors are associated with both anxiety disorders and cannabis abuse.

Several studies have tried to better characterize which forms of anxious disorder are specifically associated with a higher risk of cannabis abuse. Unfortunately, these studies provided mixed results. Social anxiety has been pointed as a risk factor for the development of both alcohol and cannabis dependence, but not for their simple abuse\(^7\). However, another study concluded that the risk of substance abuse is not enhanced by social phobia, in contrast to generalized anxiety\(^8\). Clearly, further studies are required to clarify this question.

The relationship between anxiety disorders and cannabis use might be explained, mediated or modulated by various variables. For example, peer consumption has been shown to increase
the risk of problematic cannabis use among individuals with social anxiety\(^9\). Another important factor is the concomitant use of other drugs. Various studies have indicated that cannabis abuse and dependence are frequently associated with an increased risk of becoming dependent upon other substances\(^{10}\). For example, teenagers usually combine cannabis and alcohol, making the mixture even more harmful\(^{11}\). When studying the relationship between anxiety and cannabis use, it is therefore necessary to control for the consumption of alcohol. Other important and probably crucial mediating variables between anxiety and cannabis abuse are the expectations regarding the effects of cannabis use\(^{12}\). Indeed, these expectations are believed to be predictive of future consumption, especially when such a consumption is motivated by conformity or coping with anxiety and stress\(^{13}\). It has also been suggested that an intense sensation seeking and a low sensitivity to anxiety could predict increased motivations to drink alcohol, while a high sensitivity to anxiety could predict increased motivations to conform to the peer’s alcohol and cannabis use behaviors\(^{14}\). Expectations are also involved in the ‘tension-reduction’ model, which suggests that individuals with social anxiety use substances to reduce their anxious tensions (physiological symptoms and their perceived capacity to adjust adequately those tensions)\(^{15}\). More specifically, these individuals would consume cannabis and/or alcohol because they expect these substances to have anxiolytic effects. This process might finally lead them to believe that they need these substances to deal with their negative affects, which makes them less inclined to get involved in more adapted coping strategies\(^{16}\). For example, in a recent study, it was shown that social anxiety increases the desire to use marijuana, especially in women. This desire was especially strong in situations inducing high social anxiety\(^{16}\). Although such a form of auto-medication might be highly prevalent in teenagers with anxious disorders, other motivations and expectations are more frequent in non-anxious teenagers\(^{17}\). Confirming this idea, we have recently shown that teenagers report dissimilar expected as well as actually experienced effects of cannabis use according to the fact that they are or not subjected to social anxiety manifestations\(^{18}\).

Recently, implicit measures of drug expectancies have been developed (e.g. the implicit attitude test–IAT), although they were mainly used in the field of alcohol and nicotine research\(^{19}\). These measures are used to reach automatic cognitive processes that are not easily accessible through self-administered questionnaire. Additionally, these implicit measures are less prone to self-justification and social desirability. In the field of alcohol research, such implicit measures were shown to better predict future alcohol consumption than explicit measures of alcohol expectancies and motivations\(^{20}\). Whereas explicit cannabis and alcohol expectations and motivations have been widely studied, there are very few studies in which these expectations and motivations were assessed through implicit measures, especially in the case of cannabis. Therefore, the present study is aimed at studying the mediating role of both implicit and explicit expectancies in the relationship between anxiety and cannabis/alcohol use and abuse in teenagers.

**III. Research project**

The current research proposal will involve three phases:

**III.1. Characterization of the relationship between cannabis and alcohol use and the development of social anxiety in teenagers.**

First, we will recruit a large sample of teenagers between 14 and 16 years old through our contact with local schools (several hundreds filled questionnaires are expected, as they may
be administered in class-groups). The participants will be tested three times at an eight months interval in order to get repeated measures of anxiety, cannabis and alcohol use. These data will be obtained through self-administered questionnaires assessing sociocultural data, level of generalized anxiety and social anxiety (e.g. Social Anxiety Scale for Adolescent, La Greca & Lopez, 1998), cannabis use (e.g. Cannabis Abuse Screening Test, OFDT) and alcohol consumption (e.g. The Alcohol Use Disorders Identification Test). Such a longitudinal study will allow to follow the time course of alcohol and cannabis use together with the evolution of anxiety and to answer several questions: Does the use of substances affect the course of different anxious manifestations in young consumers? Does this use precede or follow the occurrence of anxiety disorders? Is social anxiety an important risk factor for the development of drug addiction?

**III.2. Assessment of the implicit and explicit alcohol and cannabis expectancies in teenagers.**

In the second part of the study, we will select sub-samples of teenagers on the basis of either their anxiety symptoms or their alcohol and cannabis use behaviors. The implicit and explicit expectancies and motivations about the effects of alcohol and cannabis will be assessed in these sub-samples through the use of both self-revealing questionnaires (e.g. Marijuana Expectancies Questionnaire; The Alcohol Expectancy Questionnaire, Drinking Motives Questionnaire - Revised) and indirect implicit measures (e.g. Implicit Attitude Test). These results will allow answering questions about the mediating/moderating role of implicit and explicit expectancies in the relationship between anxiety and drug use. Additionally, we will be able to determine whether teenagers with high social anxiety are characterized by specific explicit and implicit expectancies regarding alcohol and cannabis. We also expect implicit expectancies to be more predictive of alcohol and cannabis use than explicit expectancies.

**III.3. Propositions of preventive and therapeutic actions.**

At the end of the research project, we will review the current preventive and therapeutic practices and see whether our results suggest alternative solutions. We hope to be able to identify critical risk factors and ‘precipitating’ factor for alcohol and cannabis abuse that might be targeted. A particular question will be whether it is possible to specifically target implicit attitudes and motivations.

**IV. Working schedule**

This proposed working schedule has to be taken as approximate since phase 3 and the working schedule will be directly dependent upon the results of the previous phases.

**IV.1. Characterization of the relationship between cannabis and alcohol use and the development of social anxiety in teenagers.**

**Stage 1:** Recruitment of the sample (if possible, between 1500 and 2000 participants) within different Belgian schools with general, technical and professional education; distribution of the self-revealing questionnaires to assess alcohol and cannabis consumption and anxious manifestations (test 1 to 3).

**Stage 2:** Development and validation of the implicit measures of cannabis expectancies (Implicit Attitude Test - IAT). Note that our laboratory has already developed and validated an IAT test for alcohol that will be adapted for cannabis.
IV.2. Assessment of the implicit and explicit alcohol and cannabis expectancies in teenagers.

Stage 3: Recruitment of sub-samples of participants for transversal studies of implicit expectations and attitudes. The number of participants will depend on statistical power tests based on our previous studies.

Stage 4: The participants of the sub-samples will be required to fill explicit expectation questionnaires and will be tested on the implicit measures of alcohol and cannabis expectancies and attitudes.

IV.3. Propositions of preventive and therapeutic actions.

Stage 6: Evaluation, through statistical analysis, of the results obtained in the previous phases.

Stage 7: Development of preventive and therapeutic propositions on the basis of the results of our study and on a review of current practices.


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NOTE: This schedule should be considered as approximate and dependent on the progress of the different project phases.
Abstract : The objective of this project is to create an inventory of the literature related to cannabis consumption, social anxiety and to the previously established links between these themes. We will improve our knowledge of the mechanisms underlying the existence of this relationship.

Hypothesis : We expect to find higher social anxiety scores within a group of young occasional consumers than within a group of teetotalers and higher social anxiety scores within a group of regular consumers when compared to the two others. We postulate that there is a significant difference at the level of sought and felt effects during cannabis use among participants presenting high social anxiety scores compared to the ones who don’t show any (a higher frequency of effects orientated towards anxious affects regulation or towards social facilitation for subjects showing high social anxiety scores).

Methodology : We used two self-revealing questionnaires: The ‘Questionnaire sur les effets attendus dans la consommation de cannabis’ (Grall-Bronnec et Balkan) and the «Echelle d’Anxiété Sociale» (Liebowitz). Our sample (n=390) was made up of teenagers attending the general education of high school.

Results : Our first hypothesis was invalidated. A difference between our groups was highlighted but it was orientated in the opposite direction compared to what we had postulated. We also observed different sought and felt effects depending on the presence or the absence of social anxiety. However we didn’t find a precise tendency to consume and, in addition, we didn’t confirm our second hypothesis.

Furthermore, we found the presence of bias constituting the limits of our study. However it seems appropriate to highlight the interest of our results, and they could lead to new perspectives that could be used to develop and go deeper in future research.
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## CURRICULUM VITAE - Psychologist

**SCHMITS Emilie**  
 rue des Prairies, 11  
 4630 Soumagne  
 Phone number: 0473/564016  
 Email address: emilie.schmits@hotmail.com  
 Date of birth: 20/11/1987

### EDUCATION

| High School | 1999-2005, Collège Royal Marie-Thérèse de Herve  
 High School diploma with specialisation in Latin and Languages |
|-------------|---------------------------------------------------------------------------------------------------------------|
| University  | 2005-2010, Université de Liège, Masters in Psychological Science  
 Major : Child and Adolescent Clinical Psychology |
| Thesis      | *Cannabis and Adolescent Social Anxiety* (High Distinction)  
 Department of Psychology of Delinquency and of Psychosocial Development (Professeur Michel Born) |

### PROFESSIONAL EXPERIENCE

| Internships: | 2009 Centres of Functional Readaptation for children and adolescents of Herstal and Visé (Supervisor: Mme Di Croce)  
 2010 Paediatrics Department of Centre Hospitalier Universitaire de Liège (Supervisor : Mme Constant) |
| Employment : | September 2010 ⇒ February 2011 :  
 Psychologist, Centre of Mental Health "Le C.L.I.P.S.", Liège, specialised in the treatment of drug addictions and legally obligated aid.  
 December 2010 ⇒ February 2011 :  
 Researcher, Université de Liège, Department of Psychology of Delinquency and of Psychosocial Development, set up of the tool ‘EVA-GOA’ within the Youth Welfare Services.  
 February 2011 ⇒ Present day :  
 Psychologist, Public Institution for Youth Protection of Fraipont, Juvenile detention (SOORF). |

### CONFERENCES – TRAINING COURSES

- Psychiatric, medical psychology and psychosomatic psychology conferences  
  (Château de Colonster, Domaine Universitaire du Sart-Tilman)  
- Training in ‘travail corporel en thérapie psychomotrice’ (IPEPS)  
- Cycle of conferences ‘Open Ado’ (Maison du Social)  
- Symposium "Viewpoints on cannabis" (Drug Unit of Ulg)  
- Multi-dimensional Family Therapy training course (Cannabis Clinic, CHU Brugmann)
### PUBLICATIONS


### INTERESTS

- Scouting :
  - Participant from 1994 to 2004
  - Leader certified by the Ministry of the French Community and Youth Services from 2004 to 2009
- Musical and artistic performances
- Sport (bike riding, walking and running)

### DIVERS

- Languages : French and English
- IT Proficiency : Word, Excel, Powerpoint, Statistica, Internet
ABSTRACT

**Background:** A connection between social anxiety and cannabis use can be seen in young people. A series of variables can partially explain this link, such as peer influence, gender differences or motivations and expectancies related to cannabis use. However, the mechanisms that explain this gap are still unclear and require further investigation.

**Methods:** This cross-sectional study examined the co-occurrence between these two problems among teenagers in high school and college. It also estimated, among cannabis users, the various effects felt and sought during cannabis use. On the basis of a self-report instrument, 390 participants were tested and the data was treated using statistical software (Statistical Analysis System 9.1).

**Results:** Cannabis use was associated with the social anxiety insofar as the subjects who did not consume the substance reported more symptoms of social anxiety. The effects felt and sought by the subjects during their cannabis use proved to be different according to the level of anxiety they faced.

**Conclusion:** This data provides a new inside into the mechanisms which are likely to highlight the link between cannabis use and social anxiety during adolescence. Therefore this study seems to open the way to new research prospects.

KEYWORDS: Cannabis. Anxiety Disorders. Adolescence.
To whom it may concern,

I am writing to strongly support the application of Emilie Schmits to a Ph.D. fellowship financed by the AXA Research Fund. Emilie Schmits has obtained her master degree last year with high honors. Since then, she has been employed as a professional psychologist in several places, while continuing to work on her Ph.D. project, often during her free time. During this year, she managed to write down two scientific papers, one of which reports the main results of her master thesis. Such a dedication to science unquestionably shows that Emilie Schmits possess all the qualities required to accomplish a productive and creative PhD thesis. She has demonstrated her knowledge of the scientific literature in her field of science, her mastery of the methodological aspects of research and her ability to bring a study to its closing stages.

Additionally, her research project on the relationship between anxiety and cannabis and alcohol consumption is very promising. Very few studies have investigated the role of implicit expectancies in cannabis abuse, such that this research project is very likely to produce important results that will published in international high-visibility journals. Our research team, including five Ph.D. students, has been working on the behavioral aspects of drug and alcohol addiction using both human and animal models for years, as evidenced by our publication records. One of our Ph.D. students, Fanny Kreusch, is already studying the role of implicit cognition in alcoholism, such that Emilie Schmits will be included in a productive research team. Additionally, we have developed international cooperations and contacts with several leaders in the fields of both human and animal addiction research. For example, and of major interest for Emilie Schmits, we have developed collaborations with Reinout Wiers from the University of Amsterdam, one of the international leaders in the field of implicit cognition in addiction. Finally, as the project of Emilie Schmits will involve sophisticated statistical analyses, I should also mention that we have developed a particular expertise in the field of statistical analyses since I teach statistics at both the faculty of Psychology and the school of Criminology.

All the above-mentioned qualities make Emilie Schmits an ideal candidate for a doctoral fellowship and there is no doubt to me that she will be successful in her PhD studies. Therefore, I enthusiastically support her application to a Ph.D. fellowship financed by the AXA Research Fund and certify that I will supervise her Ph.D. research.

Prof. Etienne Quertemont
Subject : Letter of Recommendation - Emilie SCHMITS

Dear Sir, Dear Madam,

With this letter, I strongly recommend the application of Miss Emilie Schmits for the “AXA” scholarship in the field of psychological sciences.

Throughout her academic course, this student has shown a high level of commitment and investment that led her to receive her master degree with high honours. The conclusive outcome of the research that she carried out for her thesis served to reinforce the very good opinion I had.

Five years of studying for a Master degree have permitted her to acquire a sense of organization and of independence. Ms Schmits has also shown relational, empathetic and communicational abilities. These capabilities were evident during her clinical internship.

The work she has carried out in my department allowed me to evaluate her qualities as a researcher. In fact, Ms Schmits showed a thirst for learning, discovering and observing new considerations. She proved to be curious, creative but also rigorous and she achieved successfully the objectives. Whether theoretical, methodological or scientific areas, Ms Schmits revealed that she was able to create innovative projects, features that are, with any doubt, necessary for adequate investment in scientific research.

Ms Schmits has shown herself capable of taking responsibility and working in collaboration with others, as well as the ability to make critical observations and competently manage time and budgetary constraints.

Taking into account all these aspects, I believe that Ms Emilie Schmits is a very promising element within our department. Her project is well grounded and thought-out, and its completion will improve our current knowledge.

So, it is with the greatest enthusiasm that I recommend Ms Schmits for a doctorate position within the research unit of the University of Liège.

Should you need any further information, please do not hesitate to contact me.

Yours faithfully,

Professor Michel Born
Madame, Monsieur,

Suite au dépôt de ma candidature à l'Administration R&D pour une bourse de doctorat du Fonds AXA, je m'engage sincèrement à postuler la bourse si le présent dossier se voyait sélectionné par l'Université de Liège.

Veuillez recevoir, Madame, Monsieur, l'assurance de ma considération distinguée.

SCHMITS Emilie