Anxiety and severity of illicit substance use in adolescence: Evaluating the mediating role of perceived coping styles

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ABSTRACT

The purpose of this study was to examine whether coping styles (Active coping, Internal coping and Withdrawal coping) mediated the relationships between anxiety and severity of illicit substance use among a sample of 110 Swiss adolescents ages 12-19 (*M*=16.3, *SD*=1.66). The current study tested two competing models of anxiety on severity of illicit substance use. In the first model, we tested the direct effect of trait anxiety (STAI-Y anxiety score) on severity of illicit substance use (ADAD drug use severity rating), while in the second models we examined the mediating role of coping styles in the link between trait anxiety and severity of illicit substance use. Path models indicated that the associations between trait anxiety and severity of illicit substance use are partially mediated by active and withdrawal coping styles. Limitations of the findings and implications for prevention of substance use in adolescence are discussed.

INTRODUCTION

Adolescence is often described as a time of experimentation with "risky" behaviors (Steinberg, 2007). Substance use is one such behavior that is initiated during adolescence and very common and popular in most teenagers living in developed countries (Hibell, 2004). In fact, numerous data from epidemiological studies indicate that adolescent substance use is relatively common during this developmental period (Currie, et al., 2008; Johnston, Malley, Bachman, & Schulenberg, 2011). Among illicit substances, cannabis is overwhelmingly the most popular drug used by the young in North America and several European countries (Currie, et al., 2008; Johnston, et al. 2011). In the United States, data from the Monitoring the Future (MTF; Johnston, et al., 2011) indicated that in 2010 approximately 33 % and 44 % of respectively 10^{th} and 12^{th} graders (15 to 18 years old) used at least once cannabis in their lifetimes, with respectively 27.5% and 34.8% using in the past year. In Switzerland, according to the recent data of the 2010 "Health Behaviour in School-aged Children" (HBSC) school survey, we observed a similar situation indicating that approximately 35.7 % of the 15-year-old schoolboys and 24.8 % of the 15-year-old schoolgirls had tried cannabis at least once in their life (Windlin, Delgrande Jordan, & Kuntsche, 2011).

According to negative affect and stress-coping models of substance use, illicit drugs might have affect – regulating functions for adolescents and might be used as coping strategies to alleviate negative affects (Hyman & Sinha, 2009). This is in line with the fact that among the national representative 15-year-old cannabis-using pupils surveyed in 2010 during the Swiss part of the HBSC project, coping motives (evaluated through the Drinking Motives Questionnaire - DMQ-R SF items; see Kuntsche, & Kuntsche, 2009) like "to cheer up when in bad mood" and "to forget about problems" have been mentioned respectively by one third to half of the adolescents (that used cannabis in the past 12 months). It is also in accordance with the widely held "self-medication hypothesis" (Khantzian, 1997; Kushner, Sher, & Beitman, 1990), which highlights that drug use is motivated by a wish to cope with psychological distress. Numerous results in the literature suggest for example that perceived mood alteration (relaxation, stress and anxiety reduction) was for example an important motive for cannabis use (e.g. Bonn-Miller, Zvolensky, & Bernstein, 2007; Boys, Marsden, Griffiths, Fountain, Stillwell, & Strang, 1999). Although this model is intuitively attractive, prospective research investigating the role of negative affect in adolescents substance use has produced contradictory findings, and alternative models have suggested that negative mood might be a consequence rather than a cause of adolescent substance use (Kavanagh & Connolly, 2009). However, these inconsistent associations between negative affect and adolescent substance use may reflect the presence of potential moderating

or mediating variables. Thus, the goal of the present study was to explore potential mechanisms responsible for the link between anxiety and illicit substance use in adolescence using statistical tests of mediation. We were particularly interested in examining coping style as possible mediators of these relationships.

In western societies, adolescence is recognized to be a transition period where an individual deals with issues of autonomy, identity and socialization (Coleman, 1974, 2010). Facing this set of developmental tasks and challenges, adolescents are confronted with a wide range of novel stressors, which may tax their still developing cognitive and emotional resources (Patterson & McCubbin, 1987; Seiffge-Krenke, 2004; Zimmermann, 2011). The development of coping during this period is thus seen as an essential process for successful subsequent development (Compas, & Reeslund, 2009). According to Lazarus and Folkman (1984), coping refers to the cognitive and behavioral responses a person uses to manage specific internal and external demands that exceed his resources. Despite the rapid growth in research on coping in children and adolescents over the last 25 years (for a review, see Compas, Connor-Smith, Saltzman, Thomsen, &Wadsworth, 2001), there are still confusion and lack of consensus about the dimensions and categories of coping explicitly concerned with adolescence (Compas, & Reeslund, 2009; Skinner, Edge, Altman, & Sherwood, 2003). Seiffge-Krenke (1995), whose coping instrument has been used by many authors around the world and is employed in the present study, has distinguished three coping styles in adolescence: (1) Active coping, which involves activities such as seeking advices or information and discussing the problems with peers, parents, or other concerned individuals (2) Internal coping, referring to cognitive strategies that require internal reflections about possible solutions and anticipating results and (3) Withdrawal coping (i.e. avoidant), which includes responses characterized as efforts to retreat from the situations, to look for distraction or to seek emotional outlets (Gelhaar, et al., 2007). Coping has been repeatedly considered a mediator in the relationships between stress and physical and psychological health (Somerfield, & McCrae, 2000), but research has also shown that coping could mediate the effects of emotions or personality traits in stressful encounters (Folkman, & Lazarus, 1988; Gomez, 1998). In the field of substance use, previous results with undergraduates' college students or individuals with panic disorders suggested for example that the relationships between emotional distress (i.e. anxiety) and substance use were higher for those who expect substance use tension-reduction effects (Kushner, Sher, Wood, & Wood, 1994 ; Kushner, Abrams, Thuras, & Hanson, 2000). Using data from a previously published study on cannabis dependence in adolescence (Cascone, Zimmermann, Auckenthaler, & Robert-Tissot, 2011), the objective of these new analyses was therefore to examine how coping styles in the period of adolescence mediate effects of anxiety on the severity of

illicit substance use.

Extrapolating from the self-medication hypothesis and prior research in this theoretical framework (e.g. Menary, Kushner, Maurer, & Thuras 2011; Robinson, Sareen, Cox, & Bolton, 2009), it was expected that coping styles mediate the relations between anxiety and substance use, such that: (1) greater anxiety would be related to an increased use of withdrawal coping style, which, in turn would lead to greater severity of illicit substance use, and (2) greater anxiety would be related to a decreased use of adaptative and approach-oriented coping styles (i.e. active and internal), which, in turn would lead to lower severity of illicit substance use.

METHOD

Sample

Participants were 12- to 19-year-old volunteer adolescents (N=110, 47 girls and 63 boys, Mean age = 16.27) who were recruited in the French part of Switzerland to participate in a cross-sectional study exploring intrapersonal and interpersonal aspects of cannabis dependence in adolescence (for details, see Cascone, et al., 2011).

Instruments

The measures utilized in this study included two self-report questionnaires and one structured interview.

The Adolescent Drug Abuse Diagnosis (ADAD). The severity of illicit substance use was assessed with the drug use section of the validated French-language version of the ADAD (Bolognini, et al., 2001), which is multidimensional structured interview evaluating psychosocial and interpersonal problems or difficulties in nine domains of the adolescent's life (e.g school, social, family, psychological) on the basis of 150 questions (Friedman & Utada, 1989). On the basis of the adolescent's information, the interviewer gives each of the nine areas a 'severity rating', ranging from 0 (*No real problem*) to 9 (*Extreme problem, need for treatment*) on the basis of the adolescents' reports and self-perception of adolescents' situation. In this study, we only used the drug use severity rating.

The State-Trait Anxiety Inventory for Youth (STAI-Y). Anxiety was assessed with the validated French-language version of STAI-Y (Bruchon-Schweitzer & Paulhan, 1993; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1986). The STAI-Y is a 40-item self-report measure consists of two 20-item subscales, the first assessing State anxiety (Y-A), and the second assessing Trait anxiety (Y-B). State anxiety captures transitory states of apprehension, the way an individual feels "here and now" and is thought to change over time and context. In contrast, Trait anxiety captures the construct of anxiety proneness, the way an individual "generally feels" and is thought to be a relatively stable measure of anxiety. Adolescents responded on a 4-point Likert scale ranging from 1

(*No*) to 4 (*Yes*). Cronbach's alphas of the "State" and "Trait" subscales in the present study were high (respectively .85 and .81). In this study, we only used the Trait anxiety score.

The Coping Across Situations Questionnaire (CASQ). Coping styles were evaluated with the CASQ, which encompasses twenty coping strategies in eight different domains: parents, peers, leisure time, school, self, romantic relationships, teachers and future (Seiffge-Krenke, 1995). Originally, adolescents can choose as many strategies they usually used in the different area. In this study, adolescents were asked to indicate on a 3-point rating scale (from *Never* to *Often*) their use of the twenty coping strategies for each area. The questionnaire explores three factors that correspond to Active coping, Internal coping and Withdrawal coping. An independent translator adapted the English version of the CASQ into French according to the recommendations of the International Test commission (Hambleton, 2001). Then, an independent bilingual native English speaker performed a backward translation, which was identical in content with the original items of the CASQ. Cronbach's alphas for the active, internal and avoidant dimensions on our sample were respectively .89, .83, and .95.

RESULTS

To test the hypothesized mediation effects, we used a 3-variable mediation analyses (see figure 1) following Shrout and Bolger's (2002) revised approach of Baron and Kenny's method (1986). Figure 1 contains the results of the mediation analyses where Trait anxiety is the independent variable, the severity of substance use the dependent variable, and coping styles (model B1: withdrawal coping, model B2: Active coping and model B3: Internal coping) are the assumed mediating variables. They have proposed four steps in establishing the presence of partial or complete mediation that are relevant for the analyses presented here.

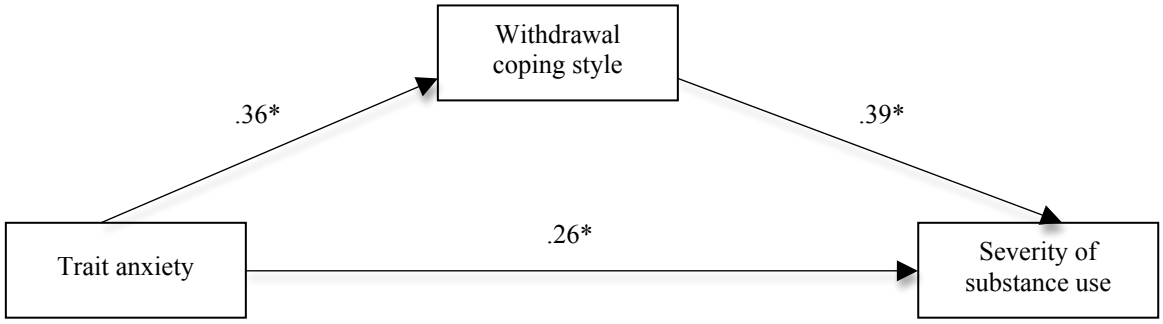
Step 1 – Model A in Figure 1 represents the simple path model depicting the relationship between Trait anxiety and Severity of substance use. The path is statistically significant ($z = 4.58$, $p < .01$), fulfilling step 1of Shrout and Bolger's method (2002).

Step 2 – The path on the left side of model B1, B2 and B3 which depicts the association between Trait anxiety and respectively Withdrawal coping style, Active coping style and Internal Coping style are statistically significant (model B1, $z = 3.99$, $p < .01$; model B2, $z = -.2.48$, $p < .05$; model B3, $z = 3.51$, $p < .01$), satisfying step 2. Adolescents who are higher on Trait anxiety tend to use withdrawal and internal coping strategies to a greater extent and active coping strategies to a lesser extent.

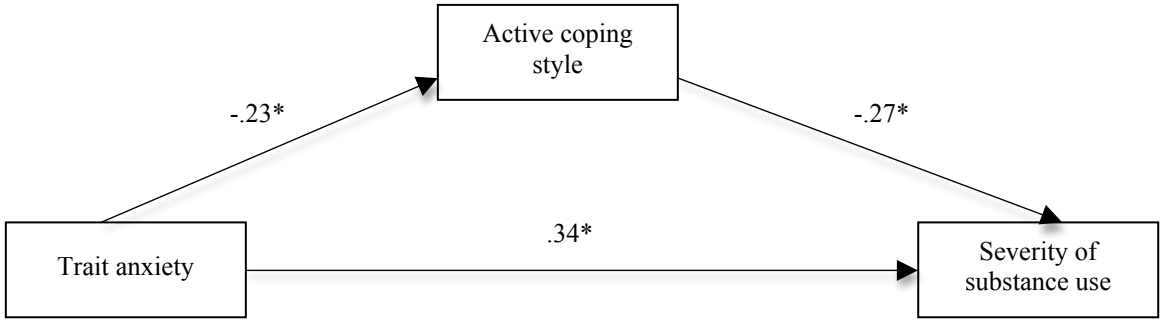
Figure 1. Mediation analyses

Model A

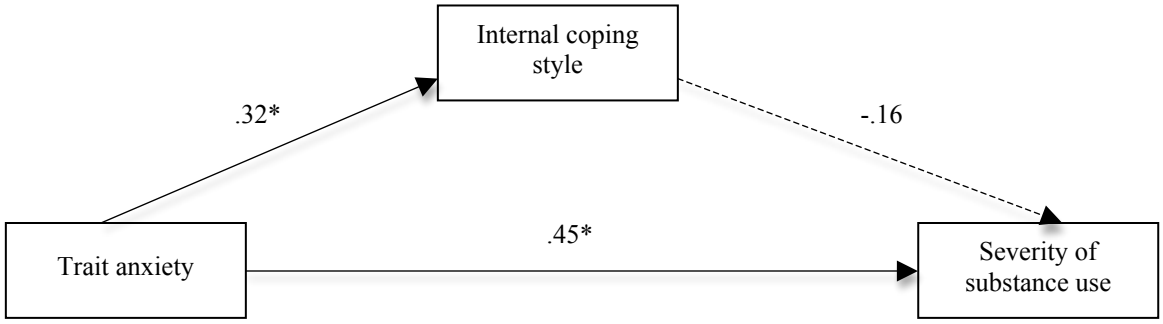
Model B1



Model B2



Model B3



Note. →: Significant path, --->: Non-significant path
* $p < .01$

Step 3 – The path on the right side of model B1, B2 and B3 is representing the association between respectively Withdrawal coping style, Active coping style and Internal Coping style and Severity of substance use. In accordance with step 3, these paths are statistically significant in model B1 (Withdrawal coping, $z = 4.81$, $p <. 01$) and model B2 (Active coping, $z = -.3.18$, $p <. 01$). These associations are independent of the relationship between Trait anxiety and Severity of substance use. Concerning Internal coping (model B3), the path is on contrary not statistically significant ($z = -1.87$, $p >. 05$) suggesting that Internal coping style does not mediate the relationship between anxiety and severity of substance use. Since this step was not significant in model B3, no further mediation analyses were conducted regarding Internal coping style.

Step 4 – The path at the bottom of model B1 and B2 represent the relationship between Trait anxiety and Severity of substance use after controlling respectively for the effect of Withdrawal coping style and Active coping style. These paths are statistically significant (model B1, $z = 3.27$, $p <. 01$; model B2, $z = 4.05$, $p <. 01$). Compared to the same path in Model A, these paths are reduced in magnitude suggesting partial mediation effects in both models.

When mediation has occurred, we expect that the indirect effect Trait anxiety x Coping style (i.e. Withdrawal coping in model B1 and Active coping in model B2), should be non-zero (Shrout & Bolger, 2002). We report in Table 1 the decomposition effects based on bootstrap analyses. Bootstrapping techniques are particularly useful in cross-sectional mediation path models when the sample size is small to moderate and variables are not normally distributed. In addition, bootstrapping has been found to increase power and accuracy by not depending on normal theory assumptions but, instead, drawing estimates from the data (Shrout & Bolger, 2002).

Table 1. Bootstrapping mediation effect decomposition

	Severity of illicit substance use	
Trait anxiety	*Standardized Estimate*	*95 % CI*
Model B1 – Withdrawal coping		
Direct effect	0.26	0.07-0.42
Indirect effect	0.14	0.06-0.25
Total effect	0.40	0.24-0.54
Model B2 – Active coping		
Direct effect	0.34	0.16-0.47
Indirect effect	0.06	0.01-0.05
Total effect	0.40	0.24-0.54

Note: Direct effect = Trait anxiety → Severity of substance use; Indirect effect = Trait anxiety → Coping style → Severity of substance use.

As shown in Table 1, ninety-five percent (95 % CI) of the bootstrap estimates of indirect effect for model B1 and B2 are respectively ranging from 0.06 to 0.25 and from 0.01 to 0.05 indicating that these indirect effects of Trait anxiety and respectively Withdrawal coping and Active coping are significantly different from zero. The data are therefore consistent with partial mediation of these two coping styles. In order to quantify the strength of these mediations, we compute the ratio of the indirect effect over the total effect (PM – "effect proportion mediated"). For model B1, PM is equal to 0.34, indicating that Withdrawal coping style accounts for about one-third of the effect of Trait anxiety on Severity of illicit substance use. For model B2, PM is equal to 0.15, indicating that Active coping style accounts for fifteen percent of the effect of Trait anxiety on Severity of illicit substance use.

A final index of mediation is the change in variance accounted for by the inclusion of coping style (mediator) in the model. This is established by significance test of the R^2 change associated with the introduction of the mediator in the model. Initial model (Model A) explains 16.2 % of the variance of Severity of illicit substance use, whereas mediational models B1 and B2 explains respectively 29.3 % and 22.9 % of the variance of Severity of illicit substance use. The change in R^2 associated with adding Withdrawal coping style in the model accounts for an additional statistically significant 13.1 % of the variance (*F-change*(1,107) = 19.83, $p < .01$), and the change in R^2 associated with adding Active coping style in the model accounts for an additional statistically significant 6.7 % of the variance (*F-change*(1,107) = 9.30, $p < .01$).

CONCLUSION

The purpose of this paper was to explore the mediating role of coping styles in the relationships between anxiety and severity of illicit substance use among adolescents. Globally, the findings of path analyses revealed that adolescents' withdrawal and active coping styles mediated the association between anxiety and severity of illicit substance use. Bootstrapping procedures, moreover, confirmed the statistical significance of the mediation effect. Thus, consistent with our hypotheses, anxiety increased its explanatory effect through indirect effect of the coping strategies. On one hand, our results suggested that anxiety was positively related to withdrawal coping style involving effort to distract, ignore or remove from distress, which was positively associated with the severity of illicit substance use. On the other hand, anxiety was negatively related to active coping style including strategies like support-seeking and discussing the problem with significant others, which was negatively associated with the severity of illicit substance use. These results provide preliminary evidence that a mechanism by which anxiety is related to substance use in adolescence is partly through the use of coping strategies. That is, the use of active coping

strategies in adolescence seems to have a resilience effect against negative affect and anxiety, whereas on the contrary withdrawal coping strategies may act as a conduit to substance use or may increase the attractiveness of substance use when dealing with negative affect and anxiety. Finally, contrary to expectation, the relationship between anxiety and severity of illicit substance use was not mediated by internal coping style, which encompasses cognitive ways of dealing with the situation. Although, internal coping style did not mediate associations between anxiety and severity of illicit substance use in the present study, other studies have suggested for example that cognitive coping strategies protect adolescents from alcohol and tobacco use (Brady, Tschann, Pasch, Flores, & Ozer, 2009).

Globally, these results were consistent with extrapolations derived from the self-medication hypothesis (Khantzian, 1997; Kushner, Sher, & Beitman, 1990), which explains the relationships between drug use and anxiety in terms of the tension-reducing properties of the psychoactive substances and suggest that adolescents may use substances to cope with psychological distress associated with developmental tasks of this period (Damphousse & Kaplan, 1998). They were also in line with previous theoretical stress-coping and substance use models suggesting for example that avoidant coping strategies, often considered as maladaptive, increased the risk for substance abuse "because the individual is not disposed to deal with problematic situations but rather to seek the path of least resistance toward restoring affective balance" (Wills & Hirky, 1996, p.284). In addition, our findings converge with many other studies that have stressed the importance of diverse risk factors including lack of adaptative coping strategies as contributing to adolescent alcohol and substance abuse (e.g. Steinhausen, Eschmann, Heimgartner, & Winkler Metzke, 2008; Laurent, Catanzaro, & Callan, 1997).

A number of limitations of the current exploratory study should be considered when interpreting the results. First, the study sample is relatively small, and therefore our findings must be regarded as preliminary and considered with proper reservations. Second, in this study, we did not assess the severity of use for particular illicit substances (e.g. severity of cannabis use, ecstasy use, cocaine use, etc.), whereas specific pharmacological effects of drugs may be associated to different patterns of relations between trait anxiety, coping style and specific substance use (Comeau, Stewart, & Loba, 2001). Third, the design of the study is cross-sectional and consequently we cannot make claims about the causal directionality or relationship of effects of the tested models. For example, whether anxiety leads to higher use of dysfunctional coping strategies (i.e. withdrawal) or whether dysfunctional coping leads to anxiety cannot be determined. Hence, further research using longitudinal design with careful consideration of

mediating variables would be useful to explore this in more details. Evaluations over time are all the more important that recent results suggest changes in coping strategies during adolescence (Seiffge-Krenke, Aunola, & Nurmi, 2009). Fourth, we did not examine gender issues, whereas research indicates that adolescent boys and girls may differ in the coping styles they are likely to employ (Kort-Butler, 2009; Tamres, Janicki, & Hegelson, 2002). Fifth, in the current study, despite the fact that the CASQ allowed us to explore how adolescents usually coped with stressors in different domains (e.g. parents, peers, or school), we operationalized coping styles as general adolescents' dispositional characteristics (person-oriented approach) without paying attention to situational differences in coping. However, numerous works have repeatedly shown that the choice of coping strategies in adolescence depends of the types of situational factors and stressors (Seiffge-Krenke, et al., 2009; Seiffge-Krenke, 2011). Exploring the role of different stressful situations (i.e. minor to traumatic) on coping style associated with substance use may be a fruitful avenue for further research. Finally, we did not examine several variables, such as adolescent expectancies and motives, whereas numerous studies have found that expected outcomes and motives were important proximal predictors of substance use in adolescence (e.g. McCarthy, Pedersen & D'Amico, 2009; Alfonso, & Dunn, 2007). Moreover, recent results suggested that coping does not directly impact on substance use, but may rather influence substance- related cognitions which in turn are associated to use (Hasking, Lyvers, & Carlopio, 2011).

Despite the above limitations, these results may have interesting implications regarding the manner in which parents, teachers and evidently clinical professionals address the issue of illicit substance use in adolescence. Prima facie, our results support the importance of prevention or treatment programs that attempt to build adaptive coping strategies (e.g. seeking help instead of smoking marijuana when facing a stressor and negative affect) and to develop resilience (i.e. the ability to spring back in face of difficulty) in adolescence (Hyman & Sinha, 2009; Seiffge-Krenke, 2011). For example, in Australia, Frydenberg and colleagues (2004) provided preliminary evidence of effectiveness of the "Best of Coping" school-based program when implemented by well-trained teachers supported by psychologists. However, as underlined by Frydenberg (2004) and Hyman and Shina (2009), other contextual factors like family, peer, school and social resources may "contribute to resilience over and above coping skills" (Frydenberg, 2004, p.21), and should consequently be addressed in interventions. Furthermore, as illicit substance use seems to be more and more tolerated or perceived as "beneficial" by young people and consequently not regarded problematic by them (Allen, 2003; Zimmermann, 2010), it is questionable whether adolescents are receptive to these programs and motivated to seek help for illicit substance use. In this respect, non paternalistic

intervention styles like Motivational Interviewing (MI; Miller & Rollnick, 2002) that acknowledge autonomy as one of the basic human needs (Deci & Ryan, 2008) and a key developmental task in adolescence should be encouraged and promoted (for a comprehensive review of MI with adolescents, see Baer & Peterson, 2002 and Naar-King & Suarez, 2011).

In conclusion, this study represents another step toward the understanding of the coping mechanisms responsible for the links between anxiety and illicit substance use. Future longitudinal work is warranted to investigate the relationships between anxiety, coping styles and illicit substance use in adolescence.

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