Substance Use Motives as Mediators of the Associations between Self-Control Constructs and Negative Substance Use Consequences: A Cross-Cultural Examination

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ABSTRACT

The present study sought to examine three distinct research questions: a) are self-control constructs (i.e., negative/positive urgency, self-regulation, and emotion-regulation) indirectly related to negative alcohol/marijuana consequences via substance use motives, b) to what extent are these indirect effects consistent across differing drugs (i.e., alcohol and marijuana), and c) are these models invariant across gender and countries. Participants were 2,230 college students (mean age=20.28, SD=0.40; 71.1% females) across 7 countries (USA, Canada, Spain, England, Argentina, Uruguay, and South Africa) who consumed alcohol and marijuana in the last month. Two (one for alcohol and one for marijuana) fully saturated path models were conducted, such that indirect paths were examined for each self-control construct and substance use motive on negative consequences (e.g., negative urgency → coping motives → negative consequences) within the same model. Within the comprehensive alcohol model, we found that lower self-regulation and higher negative urgency/suppression were related to more alcohol consequences via higher coping and conformity motives. For marijuana, we found that lower self-regulation and higher negative urgency/suppression were related to more marijuana consequences via higher coping motives (not significant for conformity motives). Unique to marijuana, we did find support for higher expansion motives indirectly linking positive urgency to more negative consequences. These results were invariant across gender groups and only minor differences across countries emerged. Prevention and intervention programs of alcohol and marijuana around university campuses may benefit from targeting self-control related skills in addition to motives to drug use to prevent and reduce negative drug-related consequences.

Key words: = alcohol; marijuana; self-control; motives; college students

Given high rates of problematic substance use among young adults, research has focused on identifying factors that influence risk for problematic substance use among this at-risk

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population (Dennhardt & Murphy, 2013; Stone et al., 2012). There is a need to better understand the underlying mechanisms that predict involvement in problematic alcohol and marijuana use, subsequently leading to substance-related issues. The discernment of risk and protective factors associated with substance use is paramount for the formulation and execution of effective interventions. Prior investigations indicate that various facets of self-control, encompassing impulsivity-like traits, emotional regulation, and behavioral regulation, constitute pivotal underpinnings of substance use (Aurora & Klanecky, 2016; Lau-Barraco et al., 2023; Wolkowicz et al., 2021).

Self-control is defined as a set of constructs referring to the self-initiated regulation of thoughts, feelings, and actions to face momentary desires and temptations to achieve a greater goal. To consider the different components that define self-control, researchers have focused on affect regulation (e.g., emotion regulation), behavioral regulation (e.g., self-regulation), and impulsivity as distinct markers of self-control that, in conjunction, impact numerous outcomes (e.g., problematic social media use, Pilatti et al., 2021a), including substance use outcomes (Hagger et al., 2019). Precisely, emotion regulation refers to cognitive and behavioral efforts to control the emotions that one feels, when they occur, and how they are felt or expressed (Gross, 1998; 2015). Self-regulation refers to the capability of delaying immediate satisfaction, that allows people to plan, guide, and monitor their behavior to attain desired goals in the future (Carey et al., 2004; Strauman, 2017). Impulsivity is a multidimensional construct that focuses on the tendency to act without thinking. Positive and negative urgency, which refer to the propensity to act hastily when experiencing abnormally intense positive or negative emotions, respectively, are two impulsivity-like traits that researchers have uniquely examined in association with substance use outcomes (Smith & Cyders, 2016).

Previous literature has focused on examining the association of distal variables (i.e., dispositional, affective and cognitive) with substance use consequences in young people. Pertinent to the present study, research has found that poor emotion regulation (e.g., lower use of cognitive reappraisal, Blanchard et al., 2019), lower self-regulation (Dvorak et al., 2014; Hustad

et al., 2009), and higher positive/negative urgency (Tran et al., 2018; Waddell et al., 2022; Wilson et al., 2018) have all been linked to negative alcohol and marijuana consequences among young adults. Given such patterns, examining potential mechanisms of these associations may also provide avenues for prevention/intervention among this at-risk population.

Substance Use Motives as Mediators

Diverse studies (Anderson et al., 2020; Lucke et al., 2023; Paulus et al., 2021) have supported the indirect association of components of self-control with substance use via motives for substance use. Alcohol and marijuana motives, defined as prominent proximal predictors of substance use outcomes (Simons et al., 2005), have been shown to mediate relationships between distal factors and negative substance use consequences (for a review see Cooper et al., 2016). Among young adults, substance use motives (specifically coping) have been found to mediate the link between self-regulation (Lau-Barraco et al., 2022), negative/positive urgency (Adams et al., 2012), and emotion regulation difficulties (Aurora & Klanecky, 2016) on negative substance use consequences. While there has been a litany of research examining these relationships, fewer research has examined all of these constructs in a single model and questions remains whether such relationships are drug-specific or universal across differing drugs. Moreover, the vast majority of research has focused on North American or Western European populations and whether these indirect effects are universal or culturally specific is a limited area of research.

Purpose of Present Study

The present study sought to replicate and extend previous research by examining three distinct research questions: a) are self-control constructs (i.e., negative/positive urgency, self-regulation, and emotion-regulation) indirectly related to negative alcohol/marijuana consequences via substance use motives, b) to what extent are these indirect effects consistent across differing drugs (i.e., alcohol and marijuana), and c) are these models invariant across gender and countries. Based on prior

literature, we expected that coping motives would emerge as the most relevant substance use motive in the pathway between self-control constructs and negative alcohol/marijuana consequences. Given prior research indicating gender (e.g., Heim et al., 2021) and cross-national differences (e.g., Bravo et al., 2019a, 2019b) on substance use study variables, we explored whether findings from our path models were culturally universal or culturally specific by testing the equivalence of estimated paths (i.e., test of moderation) of the model among college students from seven countries.

METHODS

Participants and Procedures

Participants were college students (n=9,171) recruited from 12 universities across seven countries (USA, Canada, Spain, England, Argentina, Uruguay, and South Africa) to complete an online survey exploring risk and protective factors of substance use and addictive behaviors. The analytic sample for the present study was limited to students who reported consuming both alcohol and marijuana at least once in the past 30 days (total sample n=2,232, 69.3% female; USA n=1,144, 67.8% female; Canada n=348, 66% female; South Africa n=213, 80.1% female; Spain, n=107, 64.5% female; Uruguay n=49, 81.6% female; Argentina, n=313, 71.2% female; England, n=58, 69.0% female). Study procedures (see Bravo et al., 2021, for more information) were approved by the institutional review boards (or the international equivalent) for each participating university.

Measures

All appropriate measures exhibit at least metric invariance across the countries, a necessary requirement when examining associations between constructs across different groups (Cieciuch et al., 2019). For all constructs, items were averaged or summed such that higher scores indicate higher endorsement of that construct. Internal reliability of measures of study constructs for the total sample and across countries are presented in Supplemental Table 1.

Self-Control Constructs. Positive and negative urgency were assessed using the Short UPPS-P

Impulsive Behavior Scale (Cyders et al., 2014) and the Spanish version (Bravo et al., 2018; Lozano-Rojas et al., 2018) for Spanish-speaking students. The measure assesses impulsivity-like traits (e.g., negative/positive urgency) on a 4-point scale (1 = strongly agree, 4 = strongly disagree). Self-regulation was assessed using the 31-item Short Self-Regulation Questionnaire (Carey et al., 2004) and the Spanish version (Pichardo et al., 2014) for Spanish-speaking students. Participants indicated their endorsement of items reflecting self-regulation on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Emotion regulation strategies were assessed using the 10-item Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) and the Spanish version (Cabello et al., 2013) for Spanish-speaking students. The measure assesses expressive suppression (i.e., the attempt to hide, inhibit or reduce ongoing emotion-expressive behavior) and cognitive reappraisal (i.e., the attempt to reinterpret an emotion-eliciting situation in a way that alters its meaning and changes its emotional impact) using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Alcohol and Marijuana Use Motives. Drinking motives for the past month were assessed using the 12-item Drinking Motives Questionnaire-Revised Short Form (DMQ-R SF; Kuntsche & Kuntsche, 2009) and the Spanish version (Mezquita et al., 2018a) for Spanish-speaking students. The measure assesses four drinking motive domains on a 5-point response scale (1 = almost never/never, 5 = almost always/always): social, conformity, enhancement, and coping. Marijuana use motives for the past month were assessed using the 15-item Marijuana Motives Questionnaire (MMQ; Simons et al., 1998) and the Spanish version (Mezquita et al., 2019) for Spanish-speaking students. The measure assesses five marijuana motive domains on a 5-point response scale (1 = almost never/never, 5 = almost always/always): social, conformity, enhancement, coping, and expansion.

Alcohol and Marijuana Use Quantity. To evaluate marijuana use, the Marijuana Use Grid (MUG, Pearson et al. [unpublished]) was employed. Participants calculate their estimated gram usage for each 4-hour block of time on each day of a typical week (12–4p on Monday, 4–8p on Monday, etc.). We calculated an estimate of the normal amount of marijuana consumption, which

is the total grams used over a typical week in the past 30 days, by adding up all the numbers across time blocks. For alcohol quantity, we used a similar grid except participants were asked to report at which times they used alcohol during a typical week in the past 30 days as well as the quantity in standard drinks consumed during that time block. We calculated typical quantity of alcohol use by summing the total number of standard drinks consumed across time blocks during the typical week. To make accurate comparisons across countries, the total number of Standard Drink Units (SDUs) consumed (summed) were transformed into grams of alcohol considering country specific SDU rates based on grams of alcohol (quantity estimates for both alcohol and marijuana >3SDs above the mean were Winsorized).

Negative Alcohol and Marijuana Use Consequences. Past 30-day negative alcohol-related consequences were assessed using the 24-item Brief-Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005) and its Spanish version (Pilatti et al., 2014) for Spanish-speaking students. Past 30-day negative marijuana-related consequences were assessed using the 21-item Brief Marijuana Consequences Questionnaire (B-MACQ; Simons et al., 2012) and its Spanish version (Bravo et al., 2019a) for Spanish-speaking students. For both measures, we summed all items to create a composite score reflective of the number of distinct alcohol/marijuana consequences experienced in the past 30-days.

Data Analyses Plan

Two (one for alcohol and one for marijuana) fully saturated path models were conducted using Mplus 8.7 (Muthén & Muthén, 1998-2022), such that indirect paths were examined for each self-control construct and substance use motive on negative consequences (e.g., negative urgency → coping motives → negative consequences) within the same model. Further, alcohol and marijuana use quantities were entered as covariates in the models. Statistical significance of total, indirect, and direct effects of each predictor variable on alcohol/marijuana consequences was determined by 99% bias-corrected bootstrapped confidence intervals (10,000 bootstrapped samples) not containing zero. In order to test whether our mediation models were culturally specific or culturally universal, we conducted multi-group models comparing a freely estimated multi-group model to a constrained multi-group model (i.e., constraining the paths of the mediation model) to determine whether constraining the paths to be equivalent across countries and gender resulted in a worse fitting model. Given the small sample size in Uruguay, we combined that sample with the Argentinian sample to create a "South America" sample, as done in prior research (Pilatti et al., 2021b). Given that the χ^2 test statistic is sensitive to sample size (Brown, 2015), we relied on a more stringent alpha level (.01) to determine model invariance.

RESULTS

Bivariate correlations and descriptive statistics of all study variables in the total sample are presented in Supplemental Table 2. The total, indirect, and direct effects for the alcohol model are summarized in Table 1 and Figure 1 and for the marijuana model in Table 2 and Figure 2.

Table 1. *Summary of total, indirect, and direct effects of comprehensive alcohol mediation path model*
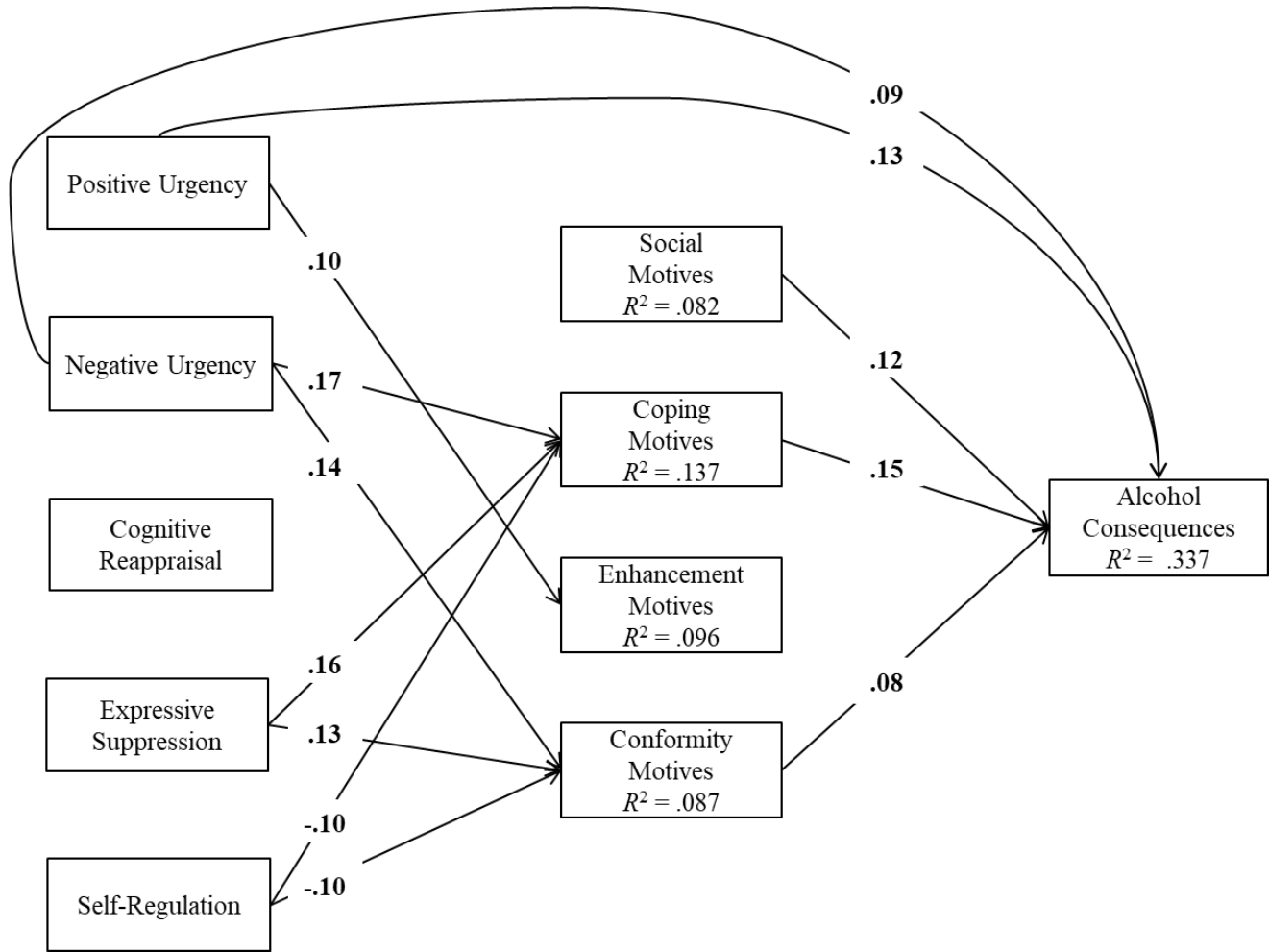
	Negative Consequences	
Predictor Variable: *Positive Urgency*	ß	99% CI
Total	**.163**	**0.09, 0.24**
Total indirect[a]	**.029**	**0.004, 0.06**
Social Motives	.008	-0.002, 0.02
Coping Motives	.011	-0.002, 0.03
Enhancement Motives	.006	0.000, 0.02*
Conformity Motives	.005	0.000, 0.02*
Direct	**.134**	**0.06, 0.20**

Self-Control, Substance Use Motives, and Substance Use Problems

Predictor Variable: *Negative Urgency*	ß	99% CI
Total	.140	**0.06, 0.22**
Total indirect[a]	.049	**0.02, 0.08**
Social Motives	.008	-0.003, 0.02
Coping Motives	.025	**0.01, 0.044**
Enhancement Motives	.005	0.000, 0.02*
Conformity Motives	.011	**0.002, 0.03**
Direct	.091	**0.02, 0.17**
Predictor Variable: *Reappraisal*	ß	99% CI
Total	.052	-0.02, 0.12
Total indirect[a]	.005	-0.02, 0.03
Social Motives	.008	-0.002, 0.02
Coping Motives	-.005	-0.02, 0.01
Enhancement Motives	.002	-0.002, 0.01
Conformity Motives	.001	-0.01, 0.01
Direct	.046	-0.02, 0.11
Predictor Variable: *Suppression*	ß	99% CI
Total	.012	-0.50, 0.08
Total indirect[a]	.047	**0.02, 0.07**
Social Motives	.009	0.000, 0.02*
Coping Motives	.025	**0.01, 0.04**
Enhancement Motives	.003	0.000, 0.01*
Conformity Motives	.010	**0.002, 0.02**
Direct	-.036	-0.10, 0.03
Predictor Variable: *Self-Regulation*	ß	99% CI
Total	-.094	**-0.17, -0.02**
Total indirect[a]	-.031	**-0.06, -0.004**
Social Motives	-.007	-0.02, 0.003
Coping Motives	-.015	**-0.03, -0.002**
Enhancement Motives	-.001	-0.009, 0.01
Conformity Motives	-.008	**-0.02, -0.001**
Direct	-.064	-0.13, 0.01

Note. Significant associations are in bold typeface for emphasis and were determined by a 99% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. [a] Reflects the combined indirect associations within the model. * = significant indirect effect but caution should be taken given non-significant a (i.e., self-control variable à alcohol use motive) and/or b (i.e., alcohol use motive à negative consequences) path (see Figure 1).

Figure 1. *Depicts the significant standardized effects of the alcohol comprehensive mediation path model tested in the total sample. Significant associations were determined by a 99% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. The disturbances among motives were allowed to correlate. Non-significant path coefficients are not shown in the figure for reasons of parsimony but are available on the OSF page.*

Model Results

Within the comprehensive alcohol model, we found that self-regulation, suppression, and negative urgency were indirectly associated with negative alcohol-related consequences via coping and conformity motives. Specifically, lower self-regulation and higher negative urgency/suppression were related to more negative alcohol-related consequences via higher coping and conformity motives. Consistent with the alcohol model, we found that self-regulation, suppression, 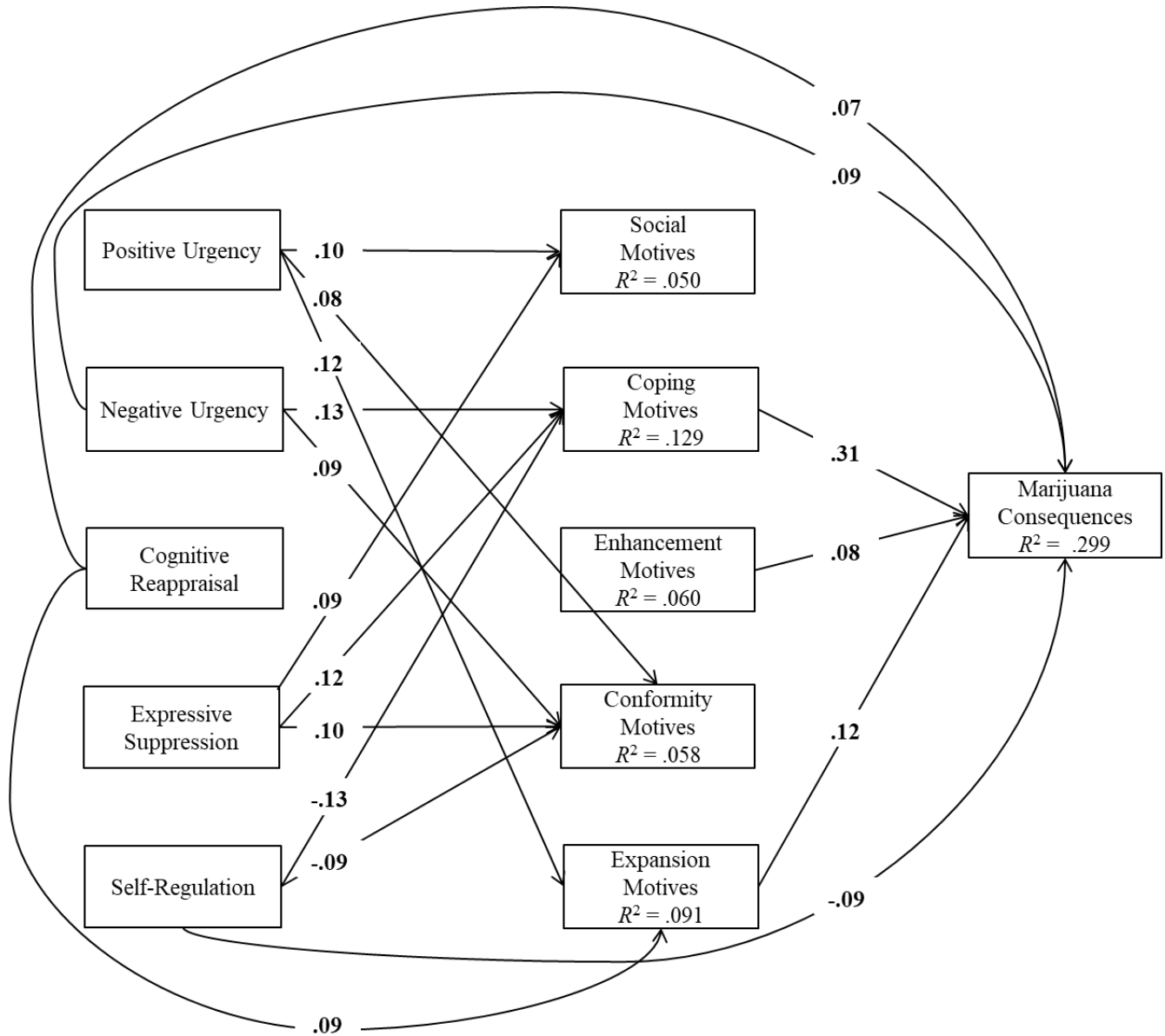and negative urgency were indirectly associated with negative marijuana-related consequences via coping motives. Specifically, lower self-regulation and higher negative urgency/suppression were related to more negative marijuana-related consequences via higher coping motives. Compared to the alcohol model, no statistically significant indirect effects via conformity motives were found in the marijuana model. Unique to marijuana, we did find support for expansion motives indirectly linking positive urgency and cognitive reappraisal to more negative marijuana-related consequences via higher expansion motives.

Table 2. *Summary of total, indirect, and direct effects of comprehensive marijuana mediation path model*

	Negative Consequences	
Predictor Variable: *Positive Urgency*	ß	99% CI
Total	.017	-0.06, 0.09
Total indirect[a]	.027	-0.01, 0.06
Social Motives	-.001	-0.01, 0.01
Coping Motives	.010	-0.02, 0.04
Enhancement Motives	.003	-0.003, 0.01
Conformity Motives	.001	-0.004, 0.01
Expansion Motives	**.014**	**0.004, 0.03**
Direct	-.010	-0.08, 0.06
Predictor Variable: *Negative Urgency*	ß	99% CI
Total	**.143**	**0.06, 0.22**
Total indirect[a]	**.050**	**0.01, 0.09**
Social Motives	.000	-0.002, 0.01
Coping Motives	**.040**	**0.01, 0.07**
Enhancement Motives	.004	-0.003, 0.01
Conformity Motives	.001	-0.01, 0.01
Expansion Motives	.005	-0.01, 0.02
Direct	**.093**	**0.02, 0.16**
Predictor Variable: *Reappraisal*	ß	99% CI
Total	**.082**	**0.01, 0.15**
Total indirect[a]	.012	-0.02, 0.05
Social Motives	-.001	-0.01, 0.003
Coping Motives	-.003	-0.03, 0.02
Enhancement Motives	.005	-0.001, 0.01
Conformity Motives	.000	-0.002, 0.01
Expansion Motives	**.011**	**0.002, 0.03**
Direct	**.070**	**0.002, 0.14**
Predictor Variable: *Suppression*	ß	99% CI
Total	.047	-0.02, 0.11
Total indirect[a]	**.047**	**0.02, 0.08**
Social Motives	-.001	-0.01, 0.01
Coping Motives	**.036**	**0.01, 0.06**
Enhancement Motives	.003	-0.003, 0.01
Conformity Motives	.001	-0.01, 0.01
Expansion Motives	.008	0.000, 0.020*
Direct	.000	-0.06, 0.06
Predictor Variable: *Self-Regulation*	ß	99% CI
Total	**-.127**	**-0.20, -0.05**
Total indirect[a]	**-.038**	**-0.08, -0.004**
Social Motives	.001	-0.003, 0.01
Coping Motives	**-.039**	**-0.07, -0.013**
Enhancement Motives	-.002	-0.01, 0.01
Conformity Motives	-.001	-0.01, 0.01
Expansion Motives	.003	-0.01, 0.02
Direct	**-.089**	**-0.16, -0.02**

Note. Significant associations are in bold typeface for emphasis and were determined by a 99% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. [a] Reflects the combined indirect associations within the model. * = significant indirect effect but caution should be taken given non-significant a (i.e., self-control variable à marijuana use motive) and/or b (i.e., marijuana use motive à negative consequences) path (see Figure 2).

Figure 2. *Depicts the significant standardized effects of the marijuana comprehensive mediation path model tested in the total sample. Significant associations were determined by a 99% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. The disturbances among motives were allowed to correlate. Non-significant path coefficients are not shown in the figure for reasons of parsimony but are available on the OSF page.*

Multi-Group Models

Constrained multi-group models compared to the freely estimated model indicated model invariance across gender for alcohol (χ^2 [29] = 33.39; p = .26) and marijuana models (χ^2 [35] = 44.92; p = .12) but not for countries (alcohol: χ^2 [145] = 215.42; p < .001; marijuana: χ^2 [175] = 271.07, p < .001). To identify where the lack of invariance in the models for country arose, we identified the paths with the greatest contribution to reducing model fit within the fully constrained models. Given differences in sample sizes across countries, it is important to not over-interpret "statistically significant associations" (or lack thereof) within each country as some countries (e.g., England) may not have the statistical power to find statistically significant results even if associations are stronger than other countries.

In the final multi-group model for alcohol [χ^2 [140] = 180.10; p = .013], all associations were constrained between countries except for one path: positive urgency → conformity motives. Positive urgency was significantly negatively associated with conformity motives in the South America sample (ß=-.33, 99%CI [-.56, -.11]), significantly positively associated with conformity motives in the U.S. (ß=.10, 99%CI [.002, .19]), and was not statistically significantly associated with conformity motives in Spain (ß=.30, 99%CI [-.16, .60]), England (ß=-.15, 99%CI [-.56, .28]), Canada (ß=.07, 99%CI [-.08, .21]), and South Africa (ß=.09, 99%CI [-.16, .33]).

In the final multi-group model for marijuana [χ^2 [160] = 200.17; p = .017], all associations were constrained between countries except for three paths: negative urgency → conformity motives, self-regulation → expansion motives, and coping motives → negative marijuana-related consequences. Regarding the negative urgency → conformity motives direct effect, we found that negative urgency was significantly negatively associated with conformity motives in the South America sample (ß=-.33 [-.60, -.12]), significantly positively associated with conformity motives in Canada (ß=.16 [.002, .32]) and South Africa (ß=.26 [.01, .47]), and was not statistically significantly associated with conformity motives in the U.S. (ß=.08 [-.02, .18]), Spain (ß=.23 [-.07, .48]), and England (ß=-.17 [-.57, .16]). Regarding the self-regulation → expansion motives direct effect, we found no statistically significant associations in all countries although directionality of associations differed: South America (ß=-.04 [-.24, .16]), U.S. (ß=.03 [-.07, .13]), Spain (ß=-.09 [-.40, .22]), England (ß=.26 [-.17, .62]), Canada (ß=.08 [-.08, .23]), and South Africa (ß=-.13 [-.31, .08]). Regarding the coping motives → negative marijuana-related consequences direct effect, we found that coping motives were significantly positively associated with marijuana consequences in all countries (ßs ranged = .30-.39) except England (ß=-.05 [-.39, .25]).

DISCUSSION

The present study aimed to examine three different research questions: a) are self-control constructs indirectly related to negative alcohol/marijuana consequences via substance use motives, b) to what extent are these indirect effects consistent across differing drugs, and c) are these models invariant across gender and countries. In examining the first question, we found that self-regulation, negative urgency, and suppression were indirectly associated with negative alcohol-related consequences via coping and conformity motives. When examining marijuana consequences, we found significant indirect effects between self-regulation/suppression/negative urgency and negative marijuana consequences via coping motives. Unique to marijuana, we found support for expansion motives indirectly linking positive urgency and cognitive reappraisal to more negative consequences via higher expansion motives.

The prominent role of coping motives is congruent with motivational models of affect regulation (Cooper et al., 2016) which propose that psychoactive substance use serves as a (maladaptive) coping strategy to decrease negative affect (Mezquita et al., 2018b). Our results, which are similar to past research (Anderson et al., 2020; Yang et al., 2019), suggest that the tendency to act rashly while experiencing intense negative emotions increases the motivation to drink and use marijuana to cope with the distress and/or to avoid rejection, thereby placing these individuals at even higher risk for negative consequences of substance use. Relatedly, and in accordance with previous findings (Bagheri & Cox, 2023), self-regulation appears to have a protective role lowering the likelihood of experiencing alcohol-related consequences. Specifically, students with increased behavioral regulation appear to be more capable of avoiding engaging in substance use to regulate negative mood (Lau-Barraco et al., 2023) and/or to feel accepted by or integrated into their group of peers. That is, individuals with increased self-regulation seem to be more efficient at selecting alternatives that will not interfere with their long-term goals (e.g., adjusting their drinking patterns to avoid binge drinking and/or alcohol-related negative consequences).

In examining our second question, we found support for coping motives being a mechanism that consistently links self-control variables to negative substance use consequences across differing drugs. However, unique findings were found across drugs, particularly involving conformity and expansion motives. Conformity

motives mediated the relationship between self-regulation/suppression/negative urgency and alcohol use problems. These motives involving the use of substances to avoid rejection, similar to coping motives, are considered riskier and less adaptive motives than those motivated by approaching goals like social motives (Cooper et al., 2016). Previous studies also show evidence of indirect associations between negative urgency and negative alcohol-related consequences via conformity motives (Anderson et al., 2020; Yang et al., 2019). Expansion motives significantly linked positive urgency and cognitive reappraisal to more negative marijuana-related consequences. Because expansion motives are not tested within the alcohol model (nor conceptualized within the drinking motives literature, see Cooper et al., 2016), these "unique" findings could not be replicated across models. These findings were also consistent with prior research in which positive urgency was positively associated with marijuana problems (Pilatti et al., 2021b) and expansion was a mediator of other distal variables (e.g., negative affect) and negative marijuana-related consequences (Bravo et al., 2020). Previous studies also observed that expansion motives were implicated with mood-related variables (e.g., symptoms of depression and anxiety, Glodosky & Cuttler, 2020; neuroticism, Chowdhury et al., 2016), suggesting expansion motives are a potential link to better understand the association between the tendency to act rashly in response to intense positive affect and marijuana outcomes.

Cross-National Differences

In examining our third research question, we found invariance of our effects in both models across gender but not countries. In examining country differences, we found that positive and negative urgency were significantly negatively associated with conformity motives for alcohol and marijuana use only in the South America sample. Instead, for the rest of the countries, this relationship was significant and positive (i.e., for alcohol: U.S.; for marijuana: Canada and South Africa) or not statistically significant (i.e., for alcohol: Spain, England, Canada, and South Africa; for marijuana: U.S., Spain, and England). Consistent with our results, previous studies found that higher levels of impulsivity in the context of positive and negative intense emotions were associated with higher conformity motives for alcohol use in samples from the U.S. (Anderson et al., 2020; Yang et al., 2019). Similar results (i.e., significant positive association) were also found with college students from England (Jones et al., 2014), which is different from the present study. Previous studies in college students showed that personality is related to alcohol outcomes mainly through internal drinking motives (Mezquita et al., 2010, 2014), and that substance use to avoid social rejection (i.e., conformity motives) present weak and inconsistent associations with personality traits (Cooper et al., 2016; Votaw & Witkiewitz, 2021). Likewise, conformity motives appear to be less commonly reported for college students who use alcohol and marijuana (Votaw & Witkiewitz, 2021). Previous results also show that endorsement of conformity motives may be affected by the cultural characteristics of students (Pilatti et al., 2022). More investigation is needed to better understand the explanatory mechanisms of these differences across different nationalities.

The association between self-regulation and expansion motives was non-significant in all countries but negative in South Africa, South America, and Spain and positive in U.S., England, and Canada. Future research is needed to determine if these cross-cultural differences are replicable or just a statistical artifact. Regarding the relationship between marijuana coping motives and negative consequences, all countries except England showed a significant and positive relationship between coping motives and negative consequences of marijuana use. A large body of research has supported the use of marijuana to reduce emotional distress as an important predictor of marijuana use problems (Bresin & Mekawi, 2019; Cooper et al., 2016). The absence of a significant association in the sample from England is most likely related to the small sample size which may have affected its statistical power to reflect the association between these constructs.

Implications

Interventions targeting adaptive mood-related factors could result in increased use of adaptive coping strategies and less motivation to use drugs as a coping strategy for distress. Similar approaches have been applied to personality-

targeted interventions of individuals predisposed to use a substance for a specific motive (e.g., sensation seeking and enhancement motives, Conrod et al., 2008). Studies by Cameron et al. (2018) and Pedrini et al. (2022) indicated that vulnerable populations (e.g., individuals with a tendency to act rashly when experiencing intense emotions) may benefit from interventions aimed at improving impulse control particularly when it is activated by intense emotional states. The evidence so far has been promising regarding the effectiveness of interventions (e.g., those targeting emotion expression or that promote mindfulness) aimed at improving emotion regulation ability (Davis et al., 2019; Moore et al., 2022). Furthermore, college students could benefit from training programs targeting a change in motives for substance use. For instance, interventions based on cognitive behavioral treatment and motivational enhancement therapy appear effective to reduce motives for marijuana use which in turn is associated with less marijuana problems (Banes et al., 2014; Blevins et al., 2016; Winters et al., 2021). Behavioral economic-based motivational interventions like substance-free activity sessions (Murphy et al., 2019; Yurasek et al., 2015) and computerized interventions tailored to drinking motives (Canale et al., 2015) were also efficient in preventing problematic alcohol use.

Limitations and Future Directions

Several limitations constrain the impact of the present study. First, a cross-sectional research design was used which prevents strong causal inferences from being made. Further, our analytic sample consisted of college students who reported both alcohol and marijuana use in the past month, and whether findings are consistent among students who only use alcohol or marijuana needs further research, including comparisons between only alcohol/marijuana users vs. dual users. For assessment of marijuana, we focused primarily on estimates of flower, creating a limitation that could be addressed in future studies by including a more comprehensive examination of multiple products (e.g., edibles) and routes of administration. Limitations also exist within the chosen measures for this study including the Emotion Regulation Questionnaire (ERQ). Future research could utilize other emotional dysregulation questionnaires (e.g., Difficulties in

Emotion Regulation Scale; Gratz & Roemer, 2004), which may be more comprehensive. Also, further research is needed to determine if our results are replicable in differing populations (including clinical samples). Finally, the study relied on self-report measures of alcohol and marijuana use which is susceptible to recall bias (Gmel et al., 2007) and biased estimates (Prince et al., 2018).

Conclusions

Overall, the present research highlights the indirect role of coping motives in the association between self-control related constructs (i.e., negative urgency, suppression and self-regulation) and negative alcohol/marijuana consequences in a large sample of college students from seven different countries. In addition, differences between substances also emerged, as conformity motives indirectly influenced the association of negative urgency, suppression and self-regulation with negative alcohol-related consequences, while expansion motives indirectly influenced the association of positive urgency and reappraisal with negative marijuana-related consequences. These results were invariant across gender groups and only minor differences across countries emerged. Prevention and intervention programs of alcohol and marijuana around university campuses may benefit from targeting self-control related skills in addition to motives for drug use to prevent and reduce negative consequences.

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