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RESEARCH ARTICLE

Relationship Between Dark Triad, Coping Styles, Sensation Seeking And Substance Use Among Youth

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Abstract:

Aims:

This study aimed to analyze the frequency of substance use in young people and to determine to what extent consumption is defined by the Dark triad of Personality, sensation seeking and stress coping styles.

Methods:

The study was conducted on 367 participants aged 18 to 30 years. The questionnaire was composed of the sociodemographic questionnaire, the Short Dark Triad (SD-3), Coping Orientation to Problems Experienced Inventory (COPE), and the Sensation Seeking Scale (SSS-V).

Results:

Our results showed that young people most frequently use marijuana, followed by psychostimulants (cocaine, speed, crystal methamphetamine), psychostimulants with hallucinogenic properties (MDMA) and finally hallucinogenic drugs (LSD, PCP). Reported alcohol use was moderate to frequent. Hierarchical regression analysis showed that statistically significant predictors of psychoactive substance use explaining 45.1% of total variance were age, gender, psychopathy, Machiavellianism, boredom susceptibility, disinhibition and experience seeking. Statistically significant predictors of alcohol use explaining 19.6% of total variance were avoidant coping, disinhibition and sensation seeking.

Conclusion:

These findings are useful in both the theoretical and practical domains of psychology in detecting groups at risk for later development of psychoactive substance use.

Keywords: Alcohol, Substance use, The dark triad of personality, Coping with stress, Sensation seeking, Risk.

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1. INTRODUCTION

The consumption of psychoactive substances in the general population has become one of the major public health problems. It is associated with many social, psychological, and physiological problems [1]. Given the prevalence of substance use among young people and the negative implications associated with abuse, it is crucial to identify the mechanisms behind the increased risk of abuse of psychoactive substances [1]. According to the 2021 report by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), in the last year in European Union (EU) countries, cannabis was consumed by 15.4% of young people, cocaine was consumed by 2.1% of young people, 3,4-methylenedioxy-methamphetamine (MDMA) was consumed by 1.9% of young people and amphetamines were consumed by 1.4% of young people [2].

Machiavellianism, narcissism, and psychopathy are the most prominent personality traits that are socially aversive but still within the normal range of functioning [3]. Machiavellianism is often described as a manipulative personality, narcissism as grandiose and entitled personality, whereas psychopathy includes high impulsivity and thrill-seeking behaviors combined with anxiety and low levels of empathy [3]. Subclinical forms of narcissism, psychopathy and Machiavellianism share certain characteristics such as egocentricity, emotional detachment, manipulativeness, self-promotion, hypocrisy, antagonism, and aggressiveness [4]. All

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three traits of the Dark Triad have significant genetic components, but Machiavellianism appears to be more prone to the influence of the shared environment in comparison to psychopathy and narcissism [5]. Although all three traits are significantly positively correlated, clear differences can be seen only after regression analyses. For example, Machiavellians are most prone to plagiarism and avoidance of risky bets [6]. On the other hand, people with pronounced narcissism are more prone to self-exaltation and aggressive response to threats to their ego, whereas people with pronounced psychopathy are most likely to abuse others and carry out their revenge fantasies [7]. The Dark Triad traits appear in analyses of counterproductive behavior, most often in terms of toxic management, "snakes in suits" and bad superiors [8]. Some research postulates the existence of adaptivity and usefulness of the Dark Triad traits in the business environment [8].

Research has found a significantly positive correlation between all three traits of the Dark Triad and alcohol and drugs consumption, and psychopathy appears to be most significant [9, 10] For example, in a study conducted with college students, the total effect of Dark Triad traits on the frequency of substance use was found to be significant [10]. Moreover, research has shown that individuals high in traits of the Dark Triad are more prone to engage in risky behaviors, such as substance use, due to the decreased sense of fear of facing the consequences [10]. This is further supported by the Reinforcement Sensitivity Theory, which explains the association between high Dark Triad traits and risky behavior using behavioral inhibition and behavioral activation systems [11]. Based on this theory, those high in Dark Triad traits are also high in behavioral activation system, which is known to be activated during times marked by reward or pleasure but are low in the behavioral inhibition system, which is activated during punishment and anxiety [10, 12].

Evidence from personality and clinical research has demonstrated that narcissism and psychopathy are associated with substance-related and non-substance-related addictive behavior across non-clinical and clinical populations, whereas Machiavellianism is not [13]. Research conducted with a non-clinical college-aged population also did not find a correlation between Machiavellianism and substance use, unlike psychopathy and narcissism [14]. One study found that only psychopathy was consistently associated with and predictive of both substance use and influencing others to use substances [15]. Athletes with pronounced narcissism, Machiavellianism and psychopathy also show more positive attitudes toward the use of performance-enhancing substances in sports [16]. One study found that psychopaths in prisons showed a higher prevalence of alcohol abuse and other psychoactive substances, and the mediator was impulsivity [17]. However, it is important to note that these findings cannot necessarily be applied to the general population.

Previous research suggested that there is a direct impact of sensation-seeking on future alcohol and marijuana consumption, while the impact of an individual's personal sensation seeking was indirect [18]. One meta-analysis found a correlation between the overall scores on the sensation seeking and alcohol consumption scales [19]. They also found that disinhibition as a subfactor of sensation seeking showed the highest correlation with alcohol consumption. Research conducted on pairs of brothers and sisters, one of whom was using psychostimulants while the other was not, showed that users of psychostimulants had statistically significantly higher scores on the sensation seeking scale as opposed to their siblings and control group [19].

When looking at the relationship between stress and alcohol use, a statistically significant correlation between the amount of stress and problematic alcohol use was found [20]. Number of present stressors and their severity are significantly correlated with increased alcohol use [1]. However, when looking into the association between stress coping strategies and the consumption of psychoactive substances, it was shown that different ways of coping styles do not correlate with the consumption frequency of psychoactive substances [21]. Most of the research on this topic has dealt with the influence or connection between certain stressors and coping with these stressors through alcohol consumption and/or psychoactive substances. There is insufficient research on how specific stress-coping strategies contribute to the use of psychoactive substances.

The aim of our study was to examine the frequency of substance use in young people in Croatia who are 18 to 30 years old. Moreover, our aim was to determine the extent to which the consumption of psychoactive substances is influenced by a Dark Triad of personality (Machiavellianism, narcissism, and psychopathy), the tendency to sensation seeking and stress coping styles. Based on the theoretical framework and previous literature, our proposed hypothesis was that there would be a statistically significant positive association between psychopathy, narcissism, seeking excitement, avoidant coping, frequency of alcohol consumption, and frequency of consumption of illegal psychoactive substances.

2. MATERIALS AND METHODS

2.1. Participants

The study was conducted through snowball sampling and participants had to be between 18 and 30 years old. Responses from 367 Croatian participants were collected between the ages of 18 and 30 (M=23.77, SD= 2,846). The sample consisted of 125 men (34.1%) and 242 women (65.9%). There were 170 participants with a high school degree (46.3%), 111 with a bachelor's degree (30.2%), 73 with a master's degree (19.9%) and 13 with PhD (3.5%). Furthermore, regarding the employment status of our sample, there were 249 students (67.8%), 41 unemployed participants (11.2%) and 77 employed participants (21.0%). Data was collected in May 2020.

2.2. Measures

The sociodemographic data questionnaire was designed for the purposes of this study and contained questions regarding age, gender, highest completed level of education and current employment status of participants.

2.2.1. Short Dark Triad – SD-3

The Dark Triad questionnaire measures the expression of three separate "dark" personality traits: Machiavellianism, narcissism, and psychopathy. Questionnaire has the following coefficients of internal consistency: Machiavellianism (Cronbach's alpha=0.71), narcissism (Cronbach's alpha=0.77), and psychopathy (Cronbach's alpha=0.74). In this study, similar coefficients of internal consistency were obtained; for the scale of Machiavellianism Cronbach's alpha was 0.77, for the scale of narcissism Cronbach's alpha was 0.70 and for the scale of psychopathy Cronbach's alpha was 0.72, which shows satisfactory reliability [4, 22].

2.2.2. Coping Orientation to Problems Experienced (COPE) Inventory

The shortened version consists of 15 items, of which 7 items measure problem-focused coping, 3 items measure emotion-focused coping, and 5 items measure avoidant coping. The authors listed the following internal consistency coefficients for the scales: problem-focused coping (Cronbach's alpha=0.82), emotion-focused coping (Cronbach's alpha=0.85) and avoidant coping (Cronbach's alpha=0.66) [23, 24].

2.2.3. Sensation Seeking Scale (SSS) –Form V

Sensation-seeking is a multidimensional construct and contains four factors: thrill and adventure seeking, experience seeking, disinhibition and boredom susceptibility. Cronbach's alpha for the entire scale (SSS) ranges between 0.83 and 0.86, indicating good scale reliability. The Cronbach's alphas for each separate subscale are from 0.77 to 0.82 for the thrill and adventure seeking (TAS), from 0.61 to 0.67 for the experience seeking (ES), from 0.74 to 0.78 for the disinhibition (DIS) and from 0.56 to 0.65 for the boredom susceptibility (BS). In this study, the internal consistency coefficients are: Cronbach's alpha=0.77 for SSS, Cronbach's alpha=0.76 for TAS, Cronbach's alpha=0.65 for ES, Cronbach's alpha=0.72 for DIS and Cronbach's alpha=0.64 for BS [25, 26].

2.2.4. Scale of Life Prevalence of Illegal Psychoactive Substances use and Scale of Alcohol use Frequency

The lifetime prevalence of psychoactive substance use, and the alcohol use frequency scales were constructed for the purposes of this study.

The lifetime prevalence of psychoactive substances use measures how many times in life participants have consumed the following psychoactive substances: marijuana/hashish, lysergic acid diethylamide (LSD)/psychoactive mushrooms/phencyclidine, cocaine/speed/crystal methamphetamine, MDMA on the following scale: 0 times (encoded as 0), 1-2 times (encoded as 1), 3-4 times (encoded as 2), 5-10 times (encoded as 3), 11-20 times (encoded as 4) and 21 and more times (encoded as 5). The total result is formed as a linear combination of results on the questions for each illegal psychoactive substance, so that the minimum score is 0 and the maximum is 20. The reliability coefficient for the overall scale of life prevalence of consumption of illegal psychoactive substances obtained in this study is α=0.83, indicating good reliability of the constructed scale.

The alcohol use frequency scale examines the frequency of alcohol consumption in the last year and participants respond on the following scale: 0 times (encoded as 0), once a year, up to 6 times a year, once a month, 2-3 times a month, once a week, several times a week and every day. Since this scale consists of only one question, the possible range of the total result is from 0 to 7.

The research was conducted online and using snowball sampling. The questionnaire was created in Google Forms and sent to different Facebook groups and student email groups.

3. RESULTS

Participants had the highest average values on the Machiavellianism scale, slightly lower on the narcissism scale, and the lowest on the psychopathy scale (Table **1**). All three subscales have similar standard deviations. In terms of coping with stress, participants most often use the problem-focused coping mechanism, which is evident from the high minimum value of participants on this scale (min = 9), and the high average value (M = 17.11) with respect to possible total range (TR = 0-24). Participants used emotion-focused coping moderately and less often avoidant-focused coping. The overall demand for excitement indicates a medium expression of the general demand for excitement among young people. Of the four sensation-seeking subscales, participants scored highest on experience-seeking (M = 7.53). The results on the of thrill and adventure seeking were slightly higher, while on the disinhibition subscale they were average. Participants achieved the lowest results on boredom susceptibility (M = 3.38). Results on the lifetime prevalence of psychoactive substance use scale indicated a wide range of responses, from those who have never tried any psychoactive substances to those who have tried all the psychoactive substances listed in this study.

Table 1. Descriptive statistics of included variables.

-					Asymmetry		-
-	Min	Max	M	SD	Coefficient	SE	K-S[a]
Machiavellianism	1	4.78	2.89	.68	.092	.127	.061
Narcissism	1	4.33	2.65	.62	-.062	.127	.053
Psychopathy	1	4.56	2.17	.63	.560	.127	.073
Problem-focused coping	9	24	17.11	3.06	-.151	.127	.121
Emotion-focused coping	0	12	7.43	2.83	-.187	.127	.074
Avoidant coping	1	15	7.75	2.54	.300	.127	.128

(Table 1) contd.....

-					Asymmetry		-
-	Min	Max	M	SD	Coefficient	SE	K-S[a]
Sensation seeking	7	36	23.08	5.66	-.237	.127	.063
Thrill and sensation	0	10	6.46	2.61	-.481	.127	.134
Experience	2	10	7.53	1.94	-.529	.127	.117
Disinhibition	0	10	5.71	2.16	-.193	.127	.156
Boredom susceptibility	0	8	3.38	1.93	.278	.127	.140
Psychoactive substances use	0	20	7.62	5.62	.596	.127	.156
Alcohol use	0	7	4.20	1.50	-.387	.127	.175

Note: Min-Minimum; Max-Maximum; M-Mean: SD-Standard deviation; SE-Standard error; K-S- Kolmogorov-Smirnov test.

Regarding the alcohol use frequency in the past year, participants reported moderate consummation. Given the asymmetry coefficient results, we can conclude that the variables Machiavellianism, narcissism, problem-focused coping, emotion-focused coping, and disinhibition show satisfactory symmetry in the distribution of participants 'outcomes. More mild and moderate positive asymmetry was shown by the results on the psychopathy, avoidant-focused coping, boredom susceptibility and the lifetime prevalence of psychoactive substances use. More mild and moderate negative asymmetry was shown by the results on sensation seeking, thrill and adventure seeking, experience seeking and alcohol use frequency. According to the Kolmogorov-Smirnov test (K-S) of the normality of the distribution, all variables deviate from the normal distribution ($p < .05$) (Table **1**).

Regarding psychoactive substance use, most participants consumed at one point in their life marijuana and hashish (Table **2**). Two-thirds of participants (67.3%) tried cannabinoids over 21 times, and only 8.7% of participants did not consume cannabinoids at all. After marijuana and hashish, the frequency of consumption is followed by psychostimulants (cocaine, speed, and crystal methamphetamine), although half of the participants have never consumed them (54%). Most of the participants who consumed psychostimulants tried them either 1-2 times (11.7%) or 21 or more times (16.1%). Psychostimulants with the characteristics of hallucinogenic drugs (MDMA) were never consumed by 56.7% of participants and as with cocaine, speed, and crystal methamphetamine, of those who have consumed MDMA, most tried them either 1-2 times (11. 2%) or 21 or more times (12.5%). The least frequently consumed were hallucinogenic drugs (LDS, psychoactive mushrooms, and phencyclidine). 62.1% of participants had never consumed them in their lives. Of those who did consume hallucinogenic drugs, most had tried them only 1-2 times (16.9%), while only 5.2% of participants had consumed hallucinogenic drugs over 11 times in their lifetime (Table **2**).

Table 2. Frequency of psychoactive substances use (N=367).

-		Frequency	%	Cumulative %
Cannabis/Hashish	0 times	32	8.7	8.7
	1-2 times	20	5.4	14.2
	3-4 times	20	5.4	19.6
	5-10 times	29	7.9	27.5
	11-20 times	19	5.2	32.7
	21+ times	247	67.3	100.0
LSD/Psychoactive mushrooms/ Phencyclidine	0 times	228	62.1	62.1
	1-2 times	62	16.9	79.0
	3-4 times	29	7.9	86.9
	5-10 times	29	7.9	94.8
	11-20 times	7	1.9	96.7
	21+ times	12	3.3	100.0
Cocaine/Speed/Crystal methamphetamine	0 times	198	54.0	54.0
	1-2 times	43	11.7	65.7
	3-4 times	17	4.6	70.3
	5-10 times	21	5.7	76.0
	11-20 times	29	7.9	83.9
	21+ times	59	16.1	100.0

(Table 2) contd.....

-		Frequency	%	Cumulative %
MDMA	0 times	208	56.7	56.7
	1-2 times	41	11.2	67.8
	3-4 times	21	5.7	73.6
	5-10 times	25	6.8	80.4
	11-20 times	26	7.1	87.5
	21+ times	46	12.5	100.0

Table 3. Frequency of alcohol use (N=367).

-	Frequency	%	Cumulative %
Never	6	1.6	1.6
Rarely	51	13.9	15.5
Moderately	149	40.6	56.1
Often	149	40.6	96.7
Every day	12	3.3	100.0

Alcohol use is divided into the following categories to show the frequency of alcohol consumption more clearly: never, rarely (once to six times a year), moderate (once to a couple of times a month), often (once to a couple of times a week) and daily. Most participants fall into two categories of alcohol frequency: moderate (40.6%) and frequent (40.6%) (Table **3**). Only 6 people (1.6%) did not consume alcohol at all in the past year, while 12 (3.3%) consumed alcohol daily. The results show that participants achieve higher values of the frequency of alcohol consumption.

The lifetime prevalence of psychoactive substances use showed a statistically significant positive correlation with the alcohol use frequency, gender, and age (all p's <. 01), where men and older age were associated with higher scores on the lifetime prevalence of psychoactive substance use scale. The alcohol frequency use did not show a statistically significant relationship with the participants' gender and age. Regarding the Dark Triad traits, psychopathy showed the highest statistically significant association with the lifetime prevalence of psychoactive substances use (p <. 01). Narcissism was, in comparison to psychopathy less statistically significant with the lifetime prevalence of psychoactive substances use (p <.05). Machiavellianism did not show any statistically significant association. The alcohol use frequency also showed statistically significant relationship with psychopathy and narcissism, but not with Machiavellianism. No statistically significant association was found between lifetime prevalence of psychoactive substances use and alcohol use frequency with problem-focused and emotion-focused stress. However, avoidant-focused coping showed a statistically significant correlation with both the lifetime prevalence of psychoactive substances use and the alcohol use frequency (p <.01). The lifetime prevalence of psychoactive substances use and the alcohol use frequency correlate statistically significantly with the overall result on the sensation seeking scale (p <.01) (Table **4**).

Two separate hierarchical regression analyses were performed to determine the contribution of gender, age, Dark Triad, coping with stress, and tendency to sensation seeking. The first analysis was looking at the contribution of these predictors to the lifetime prevalence of psychoactive substances use, and the other explored contribution of the same predictors to the alcohol use frequency among young people. The first block of variables contained gender and age, the second block of variables referred to the Dark Triad traits (Machiavellianism, narcissism, psychopathy), the third block of predictors contains coping with stress styles (emotion-focused coping, problem-focused coping, avoidant focused coping), and the last, fourth block, contained four factors of sensation seeking: thrill and adventure seeking, experience seeking, disinhibition, and boredom susceptibility.

The first block of predictors containing gender and age contributed statistically significantly to the prediction of the lifetime prevalence of psychoactive substances use with 15.3%, where age was a stronger predictor than gender. By introducing the Dark Triad into the second block of predictors, an additional 10.1% of the variance for the lifetime prevalence of psychoactive substance use was explained, with psychopathy being the best predictor. Machiavellianism also showed a significant prediction of lifetime prevalence of psychoactive substances use, while narcissism has not been shown as a significant predictor.

Table 4. Pearson correlations among analyzed variables.

S.No.	-	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.	Psychoactive substances use	-	.210**	-.179**	.367**	-.093	.131*	.230**	.016	-.020	.215**	.441**
2.	Alcohol use		-	.021	.031	-.010	.145**	.136**	.013	.055	.287**	.369**
3.	Gender			-	-.126*	-.149*	-.049	-.275*	-.015	.321**	-.022	-.120*
4.	Age				-	-.147**	-.012	-.049	.073	.028	.104*	.079

(Table 4) contd.....

S.No.	-	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
5.	Machiavellianism					-	.270**	.552**	.020	-.204**	.173**	.090
6.	Narcissism						-	.332**	.049	.024	.100	.295**
7.	Psychopathy							-	-.119*	-.187*	.285**	.308**
8.	Problem-focused coping								-	.206**	.020	.029
9.	Emotion-focused coping									-	.018	-.073
10.	Avoidant coping										-	.326**
11.	Sensation seeking											-

Note: * p<.05; ** p<.01.

With the introduction of the third block of predictors related to ways of coping with stress, the percentage of explained variance for the lifetime prevalence of psychoactive substance use increased by only 1.6%. Only avoidant-focused coping has proven to be a significant predictor. The last block of predictors, which contained four factors of sensation seeking, contributed to the prediction of the lifetime prevalence of psychoactive substances used by 18.1%. Experience seeking proved to be the best predictor of the lifetime prevalence of psychoactive substance use whereas thrill and adventure seeking has not been shown to be a significant predictor. The best predictor after introducing all blocks for the lifetime prevalence of psychoactive substance use is experience seeking, followed by the importance of prediction: age, psychopathy, disinhibition, Machiavellianism, and boredom susceptibility. Avoidant-focused coping ceased to be significant with the introduction of the last predictor block (Tables **5a** & **5b**).

Table 5a. Hierarchical regression analysis results of the contribution of individual blocks predicting the lifetime prevalence of consumption of illegal psychoactive substances.

Model	R	R^2	Adjusted R^2	Standard Forecast Error	ΔR^2	ΔF	df_1	df_2	P
1	.391	.153	.148	5.185	.153	32.843	2	364	.000
2	.503	.253	.243	4.888	.101	16.197	3	361	.000
3	.519	.270	.253	4.854	.016	2.672	3	358	.047
4	.671	.451	.432	4.234	.181	29.130	4	354	.000

Table 5b. Standardized and non-standardized coefficients of the predictors of lifetime prevalence of consumption of psychoactive substances.

-	-	Unstandardized Coefficient		Standardized Coefficient	-	-
Model		**b**	**SE**	**ß**	**t**	**P**
1	**Constant**	-6.172	2.597		-2.377	.018
	Gender	-1.597	.576	-.135	-2.774	.006
	Age	.692	.096	.350	7.204	.000
2	**Constant**	-8.939	3.079		-2.904	.004
	Gender	-.921	.567	-.078	-1.625	.105
	Age	.663	.092	.336	7.220	.000
	Machiavellianism	-2.242	.461	-.270	-4.859	.000
	Narcissism	.818	.443	.090	1.847	.066
	Psychopathy	3.066	.514	.344	5.965	.000
3	**Constant**	-10.002	3.322		-3.011	.003
	Gender	-.990	.592	-.084	-1.671	.096
	Age	.625	.092	.317	6.766	.000
	Machiavellianism	-2.338	.467	-.281	-5.008	.000
	Narcissism	.808	.443	.089	1.825	.069
	Psychopathy	2.784	.534	.312	5.209	.000
	Emotion-focused coping	-.024	.099	-.012	-.242	.809
	Problem-focused coping	.055	.087	.030	.636	.525
	Avoidant coping	.289	.106	.131	2.733	.007
4	**Constant**	-17.376	2.979		-5.834	.000
	Gender	-1.314	.523	-.111	-2.513	.012
	Age	.600	.081	.304	7.409	.000
	Machiavellianism	-1.446	.424	-.174	-3.407	.001

(Table 5b) contd.....

-	-	Unstandardized Coefficient		Standardized Coefficient	-	-
Model		**b**	**SE**	**ß**	**t**	**P**
	Narcissism	.347	.400	.038	.869	.386
	Psychopathy	2.542	.479	.285	5.307	.000
	Emotion-focused coping	.039	.088	.020	.444	.657
	Problem-focused coping	.034	.078	.018	.434	.665
	Avoidant coping	.006	.098	.003	.061	.951
	Boredom susceptibility	-.434	.135	-.149	-3.222	.001
	Disinhibition	.552	.123	.212	4.495	.000
	Experience	.950	.133	.328	7.145	.000
	Thrill and sensation	.143	.097	.066	1.480	.140

Table 6a. Hierarchical regression analysis results of the contribution of individual blocks predicting alcohol use frequency.

Model	R	R^2	Adjusted R^2	Standard Forecast Error	ΔR^2	ΔF	df_1	df_2	P
1	.040	.002	-.004	1.501	.002	.291	2	364	.747
2	.216	.047	.043	1.473	.045	5.697	3	361	.001
3	.337	.113	.094	1.427	.067	8.981	3	358	.000
4	.442	.196	.169	1.366	.082	9.059	4	354	.000

Table 6b. Standardized and non-standardized coefficients of the predictors of the alcohol use frequency.

-	-	Non-standardized Coefficients		Standardized Coefficients	-	-
Model		**b**	**SE**	**ß**	**T**	**P**
1	**Constant**	3.635	.752		4.834	.000
	Gender	.081	.167	.026	.483	.629
	Age	.018	.028	.034	.647	.518
2	**Constant**	2.597	.928		2.799	.005
	Gender	.198	.171	.063	1.158	.248
	Age	.016	.028	.030	.571	.569
	Machiavellianism	-.295	.139	-.133	-2.122	.035
	Narcissism	.296	.133	.122	2.221	.027
	Psychopathy	.445	.155	.187	2.875	.004
3	**Constant**	2.245	.976		2.299	.022
	Gender	.106	.174	.034	.611	.541
	Age	-.004	.027	-.008	-.164	.870
	Machiavellianism	-.318	.137	-.143	-2.314	.021
	Narcissism	.289	.130	.119	2.223	.027
	Psychopathy	.271	.157	.114	1.728	.085
	Emotion-focused coping	.014	.029	.026	.477	.633
	Problem-focused coping	.007	.025	.014	.269	.788
	Avoidant coping	.158	.031	.269	5.100	.000
4	**Constant**	1.402	.961		1.458	.146
	Gender	.165	.169	.052	.979	.328
	Age	-.005	.026	-.009	-.184	.854
	Machiavellianism	-.245	.137	-.110	-1.786	.075
	Narcissism	.135	.129	.055	1.046	.296
	Psychopathy	.112	.155	.047	.727	.468
	Emotion-focused coping	.015	.029	.028	.516	.606
	Problem-focused coping	.005	.025	.010	.199	.843
	Avoidant coping	.111	.032	.189	3.528	.000
	Boredom susceptibility	.018	.044	.023	.409	.683
	Disinhibition	.166	.040	.239	4.191	.000

(Table 6b) contd.....

-	-	Non-standardized Coefficients		Standardized Coefficients	-	-
Model		**b**	**SE**	**ß**	**T**	**P**
	Experience	.024	.043	.031	.553	.581
	Thrill and sensation	.077	.031	.134	2.472	.014

First block did not show statistical significance to the prediction of alcohol use frequency (p >. 05) (Table **6a**). Since the first block of predictors proved to be insignificant in predicting the alcohol use frequency, the second block of predictors explained a total of 4.7% of the variance. In this case, all three traits of the Dark Triad proved to be significant predictors of the frequency of alcohol consumption, with psychopathy being the best predictor, while Machiavellianism and narcissism were somewhat worse. With the introduction of the third block of predictors related to ways of coping with stress, the percentage of explained variance in the alcohol use frequency increased by 6.7%. As with psychoactive substances, only avoidant coping proved to be a statistically significant predictor. The last block of predictors contributed to the prediction of the alcohol use frequency with 8.2%. Disinhibition showed to be the best predictors (Table **6b**). Experience seeking and boredom susceptibility did not significantly predict alcohol use frequency. After the introduction of all predictor blocks, disinhibition proved to be the best predictor, followed by avoidant coping and thrill and adventure seeking (Table **6b**). Psychopathy and Machiavellianism, which were significant at the beginning of the analysis, ceased to be significant with the introduction of the last block of predictors.

4. DISCUSSION

Our study showed that 91.3% of participants consumed marijuana and/or hashish at least once in their lives, of which the largest percentage of participants (67.3%) consumed cannabinoids over 21 times in their lives. In terms of alcohol use frequency, 40.6% of participants consume alcohol in moderation (once to a couple of times a month) and an equal percentage of, 40.6%, consume alcohol frequently (once to a couple of times a week). Only 1.6% of our sample have not consumed alcohol in the past year, while 3.3% consume alcohol daily.

This research shows that psychopathy and Machiavellianism significantly predict the consumption of psychoactive substances. These finding are in line with previous research and suggest a significant association and predictive role of psychopathy in the psychoactive substance use [9 - 11, 23]. However, previous research differs somewhat in the relationship between Machiavellianism and narcissism when it comes to the psychoactive substance use. While some studies support our results [9, 15], other studies did not find Machiavellianism to be predictive of psychoactive substance use [12 - 14]. We suggest that the predictive effect of Machiavellianism in our research could be explained with the fact that Machiavellians, although not showing a tendency to impulsive behavior, proved to mediate the consumption of psychoactive substances in people with severe psychopathy [17], show openness to the psychoactive substances use [16], which could be the reason for them experimenting with psychoactive substances at least once. As far as narcissism is concerned, some research suggests it is predictive of psychoactive substance use [15].

Ways of coping with stress explained only 1.6% of the variance for the use of psychoactive substances, and only avoidant coping showed a statistically significant, although very weak predictor. Problem-focused and emotion-focused coping is a "healthier" way of coping with stress than avoidant [27], which could explain why they do not contribute to psychoactive substance use. Avoidance, on the other hand, is an "unhealthy" way of dealing with stress because a person either does not respond to stress at all or distracts himself/herself in various ways [26]. Either way, stressor remains present, and all the symptoms are affecting everyday functioning. This may explain why this construct has predicted the psychoactive substance use.

Sensation seeking turned out to be the strongest predictor of psychoactive substance use (significant predictors were experience seeking, disinhibition, and boredom susceptibility). The search for excitement and adventure did not prove to be a significant predictor. These results are consistent with previous research on the prediction of psychoactive substance use based on sensation seeking [14, 28 - 31]. Sensation seeking is a strong factor in predicting the consumption of psychoactive substances, as a person can satisfy his or her need to seek arousal by consuming psychoactive substances that provide new, unusual, and risky experiences.

According to the results of the research, gender and age did not prove to be good predictors of the alcohol use frequency. Age probably did not prove to be significant, as most participants were students who often consume alcohol, and younger people aged 18 to 30 who are more prone to alcohol consumption [19]. All three traits of Dark Triad significantly predicted alcohol use frequency until we introduced sensation-seeking factors, of which disinhibition and thrill and adventure seeking were found significant. Older research on the relationship between sensation seeking and alcohol consumption confirms these findings [21, 32, 33] Regarding the coping mechanisms, only avoidant coping style was a significant predictor of alcohol use. People prone to avoidance as a way of coping with stress can use alcohol to "forget about their problems". Avoidance more strongly predicts alcohol use than psychoactive substance use. This is probably due to the availability and legality of alcohol and its calming effect on the central nervous system. Not enough studies have studied the association between alcohol and psychoactive substance consumption and avoidant-focused coping.

While comparing the results of the hierarchical regression analysis of predictions of psychoactive substance use and alcohol use, it is obvious how the variables analyzed in this study explained as twice as many variances for psychoactive substance use (R^2 = 45.1%) than for alcohol consumption (R^2 =

19.6%). These results can be explained by analyzing the characteristics of the population of people who consume psychoactive substances and people who consume alcohol. People who consume alcohol represent a much wider and more diverse group of people, as opposed to consumers of psychoactive substances.

4.1. Limitations and Future Directions

A circumstance that has certainly affected the results of this research in some way is the global COVID-19 pandemic. This global situation could potentially affect the participants' results on the scales of coping with stress and seeking excitement in a way that people experienced more stress than they would have prior to the COVID-pandemic due to the spread of fear in the media and general feeling of uncertainty. Therefore, they may have felt unable to control the stress and felt helpless. Also, due to the social isolation that was caused by COVID-19 restrictions (clubs and bars closed or working significantly less), participants may have experienced a more pronounced need for excitement than they would exhibit in usual circumstances.

About 12 million people worldwide die annually from the consumption of psychoactive substances [33]. Alcohol and psychoactive substances use is a centuries-old problem in the world that is the cause of various ailments, such as physiological, psychological, emotional, and social problems [1]. Apart from giving guidelines for conducting more in-depth research on alcohol and psychoactive substance use, the results of this research contribute to broadening the knowledge about the characteristics of people prone to alcohol and psychoactive substance use.

In addition to the theoretical contribution, there is also the practical value of the conducted research. People high on the sensation-seeking scale who are prone to consuming psychoactive substances can be directed towards healthier ways of meeting their needs, such as engaging in a variety of sports and recreational activities. Furthermore, people scoring high on the Dark Triad personality traits scale (especially on psychopathy) should be considered as a risk group for consuming psychoactive substances. When it comes to the coping orientation to problems experienced, people should be taught how to deal with stress in a "healthy" way, as avoidant-focused coping is predictive of both alcohol and psychoactive substance use.

There is a growing trend in the consumption of psychoactive substances and their availability [2]. Therefore, it is imperative to conduct as much research as possible on the predictors of consumption of these substances, so that young people at risk could be detected as early as possible and potentially prevented from development of addiction. Future research should try to obtain probabilistically sampled groups whose results could show a representative picture of alcohol and psychoactive substance consumption among certain population. Moreover, it would be very interesting to explore possible correlations between dark triad and substance use in terms of the specific effect of certain drugs as well as economic repercussions.

CONCLUSION

Youth most frequently consume marijuana from illegal psychoactive substances, followed by psychostimulants (cocaine, speed, crystal methamphetamine), then psychostimulants with hallucinogenic characteristics (MDMA) and finally hallucinogenic drugs (LSD), psychoactive mushrooms), while they drink alcohol moderately to often. After hierarchical regression analyzes, a statistically significant predictive effect of age, sex, psychopathy, Machiavellianism, susceptibility to boredom, disinhibition and experience-seeking was found in the life prevalence of psychoactive substance use, with predictors together explaining 45.1% Avoidant coping, disinhibition, and sensation seeking thrill and adventure seeking showed a statistically significant contribution to the prediction of the alcohol use frequency, explaining 19.6% of the variance. The findings of this study are useful not only for theoretical but also for practical application in the detection of young people at risk for later consumption of psychoactive substances and alcohol use.

AUTHORS' CONTRIBUTIONS

LB, KJ, and VK contributed to concept and design, acquisition, and interpretation of the data, and drafting of the manuscript. LB, KJ and VK contributed to the critical revision of the manuscript. LB and KJ contributed to statistical analysis. LB supervised the research. All authors have read and approved the final manuscript.

LIST OF ABBREVIATIONS

SD-3	=	Short Dark Triad
COPE	=	Coping Orientation to Problems Experienced Inventory
SSS-V	=	Sensation Seeking Scale
EMCDDA	=	European Monitoring Centre for Drugs and Drug Addiction
EU	=	European Union
TAS	=	Thrill and Adventure Seeking
ES	=	Experience Seeking
DIS	=	Disinhibition
MDMA	=	Methylenedioxy-Methamphetamine
SSS	=	Sensation Seeking Scale
LSD	=	Lysergic Acid Diethylamide
TR	=	Total Range
K-S	=	Kolmogorov-Smirnov Test

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee at the University of Zagreb Faculty of Croatian Studies (protocol 2020-359, approved 16 April 2020).

HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All the humans were used in accordance with the

ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931)

CONSENT FOR PUBLICATION

Informed consent was obtained from all subjects involved in the study.

AVAILABILITY OF DATA AND MATERIAL

The data supporting the conclusions of this article will be made available by the authors without undue reservation.

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CONFLICTS OF INTEREST

The author declares no conflict of interest, financial or otherwise.

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