

PREDICTORS OF PSYCHOACTIVE SUBSTANCE ABUSE IN ADOLESCENTS: THE ROLE OF EXTRAVERSION, NEUROTICISM, PSYCHOTICISM, AND ENVIRONMENTAL RISK FACTORS

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ABSTRACT

Purpose: Drug abuse refers to a range of behaviours that are regulated by criminal law in many countries. Due to their “social danger” numerous studies have examined different aspects of this phenomenon. Among these, a significant number of works focus on the role of personality traits such as extraversion, psychoticism, and neuroticism in the initiation of drug use and the development of substance dependence. In contrast, studies focusing on drug abuse are relatively rare, especially those that examine the aetiological role of personality traits and their involvement in preventive models.

This paper explores the role of personality traits in drug abuse, specifically the extent to which differences in such behaviour can be predicted based on levels of extraversion, neuroticism, and psychoticism. The theoretical foundation of this research is Eysenck’s theory of crime, one of the most prominent biological–psychological theories explaining criminal behaviour. According to this theory, criminal behaviour arises through the interaction of hereditary predispositions and environmental factors, with socialization and classical conditioning playing a significant role.

Design/Methods/Approach: The sample in this research consists of 458 high school students from Belgrade, aged between 15 and 19. The average age of the participants was 17.72 years, with 67.7% being male and 32.3% female. To assess personality traits, the EPQ-R (Eysenck Personality Questionnaire – Revised) was used, adapted for the Serbian-speaking population.

In addition, a specific questionnaire was constructed to examine students’ behaviours related to drug abuse, which includes questions of various types.

Canonical discriminant analysis was used to analyse the collected data.

Findings: Canonical discriminant analysis showed that there is one discriminant function that is statistically significant for both forms of substance abuse (use and distribution). Extraversion had a strong predictive contribution in discriminating both forms of abuse, while psychoticism had a significant impact, especially in the case of drug distribution. Neuroticism did not show a significant effect in distinguishing between adolescents who abuse drugs and those who do not. Among the environmental risk factors, drug and alcohol abuse among peers, criminal behaviour, changing schools,

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running away from home, and poor family relationships (in the case of drug distribution) significantly contributed to differences in substance abuse.

Originality/Value: Considering that the majority of adolescents begin experimenting with drugs during adolescence or even at a slightly earlier age, it is of utmost importance to implement preventive programs at this stage. The findings of this study, as well as those of other research conducted on adolescent populations, may serve as a foundational basis for the development and implementation of such programs.

Keywords: personality, substance abuse, extraversion, neuroticism, psychoticism.

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INTRODUCTION

Drug abuse encompasses a range of behaviours that are criminalized in many countries, including the unauthorized production, processing, distribution, purchase, facilitation of sale or purchase, provision to others, and possession of small quantities for personal use, among other activities. Owing to the significant social harm associated with such behaviours, a substantial body of research has focused on governmental responses, as well as pharmacological, psychiatric, and psychological treatment approaches for individuals with substance use disorders. Moreover, a considerable number of studies have examined the role of personality traits such as extraversion, psychoticism, and neuroticism in the development of dependence on drugs and other psychoactive substances (Cuomo et al., 2008; Abo-Elwahab & Amin, 2014). In contrast, scholarly work specifically addressing drug abuse, particularly those investigating the aetiological contribution of personality traits and their potential role in preventive frameworks, remains relatively limited.

This study explores the role of personality traits in drug abuse, specifically the extent to which differences in such behaviour can be predicted based on levels of extraversion, neuroticism, and psychoticism



(Oljača, 2022). The theoretical framework for this research is grounded in Eysenck's theory of criminality, one of the most influential biopsychological models for explaining criminal behaviour (Eysenck & Eysenck, 1970; Eysenck, 1977). According to this theory, criminal behaviour arises from the interaction between hereditary predispositions and environmental factors, with particular emphasis on the role of socialization and learning processes. Furthermore, the theory posits that individuals comply with laws and social norms because they have been conditioned to do so. When the process of socialization fails, individuals are more likely to engage in rule-breaking behaviour (Knežević, 2003). Eysenck and his collaborators investigated how personality traits, through the predispositions of the nervous system, influence an individual's capacity to adapt to environmental demands (Radulović, 2006).

Eysenck's thesis on the relationship between personality traits and criminal behaviour is now widely accepted (Eysenck, 1994, 1998). Although studies examining the connection between these traits and drug abuse are less prevalent, numerous investigations have highlighted the significance of personality components such as aggression, impulsivity, anxiety, and maladjustment in the context of substance dependence (Mitrović et al., 2006; Cuomo et al., 2008; Šapić, 2008; Abd El Wahab & Amin, 2012).

In addition to Eysenck's model, contemporary theories of impulsivity and self-control can further explain the relationship between personality and risk-taking behaviours. Impulsivity theories emphasize that individuals with a stronger tendency toward rapid and unreflective actions may be more prone to experimenting with psychoactive substances (Khurana & Romer, 2020). Similarly, the theory of self-control (Baumeister et al., 2007) suggests that a lack of impulse regulation and delay of gratification may increase the likelihood of engaging in risky behaviours, including drug abuse. Integrating these contemporary concepts with Eysenck's model provides a broader perspective for understanding etiological factors among adolescents.

The aim of this study is to contribute to the understanding of how personality traits — such as extraversion, neuroticism, and psychoticism can predict behaviours associated with drug abuse, with the broader goal of enhancing prevention efforts among adolescents.

METHOD

Hypotheses

In accordance with the aim of the research, two general hypotheses were formulated:

H1: It is hypothesized that personality traits, extraversion, neuroticism, and psychoticism serve as significant predictors of drug abuse, regardless of the operationalization of the dependent variable.

H2: It is hypothesized that the effect of personality traits on drug abuse is mediated by environmental risk factors.

Variables

The criterion variables refer to two forms of behaviour associated with psychoactive substances:

1. Use of psychoactive substances - A respondent is considered a user if they have consumed any type of psychoactive substance at least twice. This threshold was chosen to exclude single, experimental use (once) that does not reflect a meaningful behavioural pattern, while still including individuals who have used substances multiple times and are therefore more likely to repeat use or develop a habit. However, it is important to note that the threshold of two uses represents a



relatively low cutoff and still includes experimental behaviour; thus, the results should be interpreted within this context.

2. Drug distribution - This variable records instances in which the respondent has given, sold, or offered drugs to another person at least once. The threshold of one occurrence was selected to identify all participants involved in the dissemination of substances, regardless of frequency.

For the purposes of this study, only participants with clearly defined behavioural patterns were included, while those exhibiting mixed behaviours or diagnosed with substance dependence were excluded. These variables are categorical, with the opposing category indicating that the participant has had no contact with drugs.

Predictor variables include the personal traits of the respondents and environmental risk factors:

- Personality traits were operationalized through three dimensions of personality based on Eysenck's model: extraversion, neuroticism, and psychoticism.
- Environmental risk factors consist of a set of 21 variables encompassing various aspects of the respondents' family, school, and peer environments. These factors include, for example, family problems, academic difficulties, peer pressure, and other similar circumstances that may influence the respondents' behaviour.

Sample

The sample consisted of high school students from Belgrade, including one grammar school and three technical schools. The schools were purposefully selected to ensure a sufficient number of students exhibiting the studied disorders, an appropriate gender structure, and variability in key social characteristics, in collaboration with school psychologists. Within the selected schools, students were randomly chosen: one class from the second and third grades and two classes from the fourth grade, including all present students willing to participate.

After eliminating invalid protocols, the final sample comprised 458 participants, of whom 67.7% were male and 32.3% female. The average age was 17.72 years.

Data Collection

Data were collected through group surveys and testing sessions, each lasting between 30 and 45 minutes per group. The testing was conducted on school premises, in collaboration with school psychologists who oversaw the organization and adherence to research protocols. Participation was entirely voluntary and anonymous. Ethical standards in data collection were ensured by safeguarding the privacy and confidentiality of all information obtained during the study.

INSTRUMENTS

To assess personality traits, the EPQ-R (Eysenck Personality Questionnaire – Revised) was used, adapted for our language area (Šipka, 1988, 1992). This instrument measures three core dimensions of personality: extraversion, neuroticism, and psychoticism. All scales demonstrated high reliability, with Cronbach's alpha coefficients exceeding .80, indicating adequate internal consistency of the questionnaire.

Additionally, to examine students' behaviours related to drug abuse, a specific questionnaire was developed comprising various types of items, including Likert scales (five-point and three-point), nom-



inal, and dichotomous questions. This questionnaire is used to assess contact with psychoactive substances as well as to identify environmental risk factors. The validity and reliability of this instrument have been evaluated as satisfactory, making it appropriate for use in the present study (Fajgelj, 2009).

The questionnaire items were provided with predetermined response options, and students responded by selecting the number corresponding to one of these options. The majority of the questions (14) were scaled using a Likert-type format, ranging from “Never” to “Yes, multiple times”. Two questions were scaled from 1 to 3, with responses ranging from “I do not use drugs” to “I use occasionally”, while the remaining five questions featured dichotomous response options. Variables related to drug abuse were scaled with responses ranging from 1 to 5 (three variables), whereas one variable was scaled from 1 to 3.

For all individual questionnaire items related to drug abuse and social risk factor variables, coefficients of validity, reliability, and discriminative power were calculated (see Table 1).

Table 1: *Coefficients of validity (r), reliability (h), and discriminative power (dp) were calculated for the variables related to drug abuse (items 1 to 4) and social risk factors (items 5 to 25).*

Variable	r	h	dp	Variable	r	h	dp
1. Non-use of drugs	.773	.827	.680	14. Drug addiction and alcoholism in the family	.329	.500	.274
2. Drug selling	.815	.745	.710	15. Criminal behaviour in the family	.330	.465	.262
3. Borrowing drugs	.738	.744	.699	16. Physical punishment by parents	.344	.474	.285
4. Giving drugs as a gift	.739	.689	.650	17. Running away from home	.456	.448	.353
5. Academic achievement	.402	.507	.318	18. Drug addiction and alcoholism among peers	.481	.671	.391
6. Disciplinary punishment	.624	.514	.499	19. Criminal behaviour in peer groups	.434	.645	.337
7. Changing schools	.340	.594	.244	20. Victim of threats at school	.627	.638	.536
8. Sudden drop in academic performance	.374	.402	.301	21. Victim of threats outside school	.653	.667	.565
9. Inattentiveness in class	.530	.607	.426	22. Victim of physical assault at school	.494	.678	.420
10. Irregular studying	.580	.687	.487	23. Victim of physical assault outside school	.614	.660	.528
11. Irregular completion of homework	.547	.698	.452	24. Victim of student boycott	.461	.539	.377
12. Poor relationships among family members	.301	.590	.250	25. Victim of ridicule	.462	.646	.387
13. Poor parent-adolescent relationships	.327	.547	.267				

The validity of the questionnaire items was assessed by correlating each item with the corresponding first principal component. The resulting coefficients indicate a satisfactory level of validity for all items, particularly those related to drug abuse. The reliability of the items was expressed through communalities, which represent a lower bound estimate of reliability, the actual reliability is likely higher. The reliability of the first principal component for the drug abuse variables was .899, while for the environmental risk factor variables it was .800 (Cronbach's α).

The discriminative validity of the questionnaire was examined by analysing the distribution shape of the total scores, with the hypothesis of deviation from normal distribution being rejected ($p = .290$), indicating satisfactory discriminative power of the test as a whole (Fajgelj, 2009). Additionally, the discriminative capacity of individual items was assessed by correlating each item with the total questionnaire score, with the resulting coefficients confirming an adequate level of differentiation among respondents.



Data Analysis

Given that the criterion variables in this study are categorical in nature, canonical discriminant analysis was applied as the appropriate statistical technique. This method enables the identification of combinations of predictor variables that best distinguish groups of respondents based on their contact with drugs, i.e., users, dealers, and individuals with no contact with drugs.

RESULTS

To examine the significance of the discriminant functions, the analysis began with testing the significance of the canonical functions and their correlations (Table 2).

Table 2: Tests of importance of extracted canonical functions and their canonical correlations

Dependent Variable	Function	Eigenvalue ()	Variance Explained (%)	Canonical Correlation	Wilks lambda	Chi Squared	Df	p
Using drugs	1.	.510	100,0	.581	.563	251,621	84	.000
Drug distribution	1.	.173	100,0	.384	.853	64.37	29	.000

The results indicate that both discriminant functions are statistically significant ($p < .001$), confirming the appropriateness of further analysis. For the variable , the significant canonical correlation is 0.581, indicating a stronger effect of the discriminant function in differentiating between drug users and non-users. For the variable , the canonical correlation is 0.384. Although statistically significant ($p < .001$), its magnitude indicates a moderate effect of the discriminant function, suggesting that while there are significant differences between participants who have distributed drugs and those who have not, the influence of the predictors is weaker compared to the variable.

Further insight into the nature of the discriminant functions is provided through the standardized discriminant coefficients and the structure of the functions (Table 3).

Table 3: Standardized canonical discriminant coefficients and structure of canonical discriminant functions

	Using drugs		Drug distribution	
	Function 1		Function 1	
	Discrim. coef.	Struc. func.	Discrim. coef.	Struc. func.
Extraversion	-.461	-.197	-.343	-.102
Neuroticism	-.043	.131	-.083	-.030
Psychoticism	.115	.448	.438	.570
School performance	.146	.327	.157	.291
School punishments	.276	.542	.003	.320
Changing schools	.163	.413	.158	.330
Grades dropped suddenly	.169	.279	-.287	-.015
Not paying attention in classes	.129	.321	.111	.301
Not studying regularly	.092	.272	.151	.294



Not doing homework regularly	-.075	.229	.053	.266
Family relationships	.024	.071	.116	.227
Family members' attitude towards the student	.049	.227	.354	.432
Drugs and alcohol in the family	-.056	.142	-.202	.012
Crime within the family	.168	.262	.191	.286
Physical punishment in the family	-.019	.102	-.037	.155
Running away from home	.265	.509	.155	.326
Drugs and alcohol in the group of peers	.383	.472	.111	.323
Crime within the group of peers	.076	.372	.228	.399
Victim of bullying at school	.000	.348	-.293	.161
Victim of bullying outside of school	.139	.419	.097	.278
Victim of physical assaults at school	-.089	.186	-.320	.233
Victim of physical assaults outside of school	.138	.331	-.078	.214
Victim of boycott	.041	.210	.062	.187
Victim of mockery	-.169	.112	-.157	.014

The results of the canonical discriminant analysis indicate that drug users differ most notably from individuals who have not had contact with drugs in terms of personality traits, primarily psychoticism and extraversion as well as school-related behavioural problems, including disciplinary warnings, frequent school changes, and inattentiveness in class. In addition, the social environment plays a significant role, particularly the presence of drugs and alcohol among peers. Taken together, these factors suggest that personality, school problems, and the immediate social environment contribute to the risk of drug involvement.

Regarding drug distribution, psychoticism emerges as the most important differentiating factor, while family relationships, particularly negative attitudes of family members toward the student, running away from home, and peer group criminality, further contribute to distinguishing participants who are actively involved in drug distribution from those who are not. These results indicate that, in addition to personality, both family and peer contexts exert a strong influence on risky behaviour related to drug distribution.

Overall, the discriminant functions clearly differentiate drug users and distributors from participants who are not involved in these activities, with personality traits, the school environment, family relationships, and peer influences playing a key role in distinguishing these groups.

Table 4: *Centroids of the groups*

	Using drugs	Drug distribution
Group 1 (No drug use)	-.362	-.082
Group 2 (Drug use)	2.221	2.085

The analysis of group centroids on the canonical discriminant function further confirms the clear separation between respondents who have used or distributed drugs and those who have not.

Regarding the drug use criterion, the centroid for the group that did not use drugs is $-.362$, while the centroid for the group that did use drugs is significantly higher, at 2.221 . This difference indicates that the first discriminant function effectively separates the two groups, as the divergence in their mean



values along the discriminant axis is substantial and consistent with the patterns identified in the previous coefficient analysis.

A similar pattern is observed for the drug distribution criterion, where the group not involved in distribution has a centroid of $-.082$, while the group that did engage in distribution has a centroid of 2.085 . This also demonstrates a clear separation between the groups, further supporting the strong discriminative power of the first function. It confirms that the identified predictors — personality traits, school-related factors, family circumstances, and peer influences successfully differentiate individuals involved in the distribution of psychoactive substances from those who are not.

To assess the accuracy of the model in classifying respondents into the appropriate groups based on their responses to variables related to drug abuse, the following analysis was conducted, presented in Table 5.

Table 5: *Classification Accuracy – Actual and Predicted Group Membership*

Using drugs													
Forecasted belonging													
Actual belonging	Predicted affiliation						Actual belonging	Predicted affiliation					
	Group 1		Group 2		Total			Group 1		Group 2		Total	
	N	%	N	%	N	%		N	%	N	%	N	%
Group 1	396	97.3	11	2.7	407	100	Group 1	400	98.8	5	1.2	405	100
Group 2	27	56.2	21	43.8	48	100	Group 2	11	68.8	5	31.3	16	100
Other	2	/	1	/	3	/	Other	32	86.5	5	13.5	37	100
80% actual group members successfully classified							96.2% actual group members successfully classified						

The results of the classification performance analysis indicate a high accuracy of the model in predicting group membership. For the criterion 'drug use', 80% of actual group members were successfully classified, while for the criterion 'drug dealing', the classification accuracy was even higher, with 96.2% correct predictions. This indicates a good level of model accuracy in classifying respondents based on their answers.

DISCUSSION

The results of this study clearly highlight the significance of extraversion in distinguishing between adolescents who use drugs and those who do not. These findings are consistent with the majority of previous research (e.g., Soloff et al., 2000; Brook et al., 2000), but differ from the results of Spotts and colleagues (Spotts & Shontz, 1984), who identified introversion as a factor associated with the use of cocaine and opiates. Additionally, the findings partially diverge from those of Lovrić (2009), who emphasized the role of loneliness in differentiating drug users. It is important to note that experimenting with drugs is not equivalent to addiction, and that loneliness is not necessarily a reflection of introversion — it may result from stressful experiences, a lack of close relationships, feelings of alienation, or other factors (Rokach, 2000). Similar conclusions are supported by more recent research, such as the work of Efendić-Spačić and colleagues (2021), who found personality trait differences between heroin addicts and non-users, with addicts scoring lower on the extraversion dimension. Furthermore, Despotović et al. (2013), in their study on drug abuse among adolescents, emphasized the importance of psychological and social factors including personality in understanding youth drug use.



Extraversion also demonstrated a strong predictive value in the case of adolescents involved in selling, giving away, or lending drugs. Such behaviour naturally implies frequent and intense social interaction, pronounced impulsivity, and aggressiveness all of which are consistent with characteristics commonly associated with extraverted individuals (Eysenck et al., 1993; Conner et al., 2010; Giancola & Mezzich, 2003).

Psychoticism, as the second personality trait included in the analysis, showed a weaker but statistically significant predictive influence on drug use, while its correlation with the latent dimension was also significant. However, its contribution to distinguishing adolescents involved in drug distribution was considerably more pronounced, showing a strong correlation with the discriminative function. Traits associated with psychoticism, such as aggressiveness, emotional coldness, disregard for social norms, and a tendency toward risk-taking behaviour are directly aligned with behavioural patterns characteristic of drug dealing. These findings are consistent with previous research (Soloff et al., 2000; Šapić, 2008; Mitrović et al., 2006).

Neuroticism, the third personality trait examined, did not show a significant effect in differentiating adolescents who abuse drugs from those who do not. However, this finding should be interpreted with caution. The absence of a significant effect does not imply that neuroticism is irrelevant; rather, it may reflect limitations of the cross-sectional design, sample characteristics, or measurement methods. It is possible that cultural context, the developmental stage of the participants, or specific manifestations of neuroticism during adolescence influence its weaker association with drug use. Future research should examine these relationships in greater detail using longitudinal approaches and more differentiated measures of emotional instability (Hicks et al., 2004).

It is important to emphasize that the results of this study indicate associations rather than causal relationships between personality traits and drug-related behaviours. Given the cross-sectional design and the use of discriminant analysis, no conclusions can be drawn about the direct influence of extraversion and psychoticism on such behaviours. Instead, the findings suggest that these traits contribute to differentiating adolescents in terms of risky behavioural patterns, likely in interaction with environmental factors.

In addition to personality traits, environmental risk factors (Baić, 2018; Baić et al., 2015), also play a role in distinguishing adolescents based on behavioural patterns. In the case of drug use, the most significant predictor is the presence of drug addiction and alcoholism within the peer group, followed by disciplinary actions at school (e.g., formal warnings) and running away from home. When it comes to drug distribution, the influence of these factors diminishes, while greater impact is observed from poor family relationships with the adolescent and delinquent behaviour among peers. These findings are consistent with some previous studies by domestic authors conducted on similar populations (Radovanović et al., 2019; Radovanović et al., 2024). Additionally, certain victimization variables emerge as suppressors, highlighting the need for further research.

Particularly significant is the finding that drug addiction and alcoholism within the peer group is the strongest predictor of drug use (see Nevid et al., 2020), highlighting the need for this factor to be a central focus of systematic preventive interventions. On the other hand, in the case of drug distribution, the key factor is poor family relationships, including physical punishment, neglect, abuse, and other forms of negative treatment. These family circumstances are not significant predictors of drug use itself, as confirmed by low coefficient values, but they have a strong influence on the prediction of drug distribution.

This difference in the predictive power of peer and family environment factors points to the need for further research into environmental influences, in order to more precisely determine the mechanisms through which they operate and their specific roles in relation to different forms of drug abuse.

LIMITATIONS OF THE STUDY

A key limitation of this study lies in its exclusive reliance on self-reports and its focus on the adolescent population, without control for socially desirable responding (Oljača et al., 2018) and without a longitudinal perspective. Future research should incorporate longitudinal approaches, data from multiple sources (such as schools and families), and examine additional personal and environmental factors, in order to gain a deeper understanding of the complex interactions that lead to drug abuse.

CONCLUSION

The study showed that extraversion and psychoticism are key personality traits that differentiate adolescents who engage in drug abuse from those who do not, which is consistent with recent findings by Escamilla et al. (2024). Extraversion emerged as a significant predictor of both drug use and distribution, while psychoticism was particularly associated with drug distribution. Neuroticism did not prove to be relevant in explaining drug abuse in this sample.

Environmental factors, particularly those related to peer groups (e.g., drug addiction, alcoholism, delinquency), as well as family and school-related factors (e.g., running away from home, poor family relationships, disciplinary problems at school) (Sullivan & Rudisill, 2012), demonstrated significant predictive power. Personality traits did not serve as mediators in the relationship between environmental factors and adolescent behaviour.

The findings obtained apply exclusively to the adolescent population and cannot be automatically generalized to other age groups. However, considering that adolescence represents a critical period for the initiation of drug abuse (Radovanović, 2010), the results of this study provide a valuable foundation for the development of targeted prevention programs.

Preventive implications point to the need for school-based programs that strengthen positive peer relationships, social skills, and resilience to peer pressure in order to reduce the risk of drug abuse. Family interventions should promote improved communication, emotional support, and supervision of adolescents. At the public policy level, the development of integrated strategies connecting schools, families, and communities is recommended to enable early identification and support of at-risk adolescents, thereby reducing both drug use and distribution among youth.

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