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The relationship between consumption of cola-like drinks and of other stimulants among adolescents and young adults

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Abstract – *Introduction*. Recent years have seen increased consumption of cola-like drinks, energy drinks, coffee and tea among adolescents and young adults. This may have a negative impact on their health due to an excess intake of caffeine. Caffeine can also contribute to the increased consumption of alcohol and to cigarette smoking. The aim of this research was to evaluate the relationship between the frequency of cola-like drinks consumption and of other stimulants (including coffee, tea, alcohol, energy drinks and cigarettes) among adolescents and young adults.
Methods. Purposely selected 118 respondents (persons aged 13–30 years), that declared frequent consumption of cola-like drinks participated in the study. The whole group was divided into two sub-groups – adolescent (n = 65) and young adults (n = 53). The author's own questionnaire was used and statistical analysis was developed using the statistical package SPSS 18 and AMOS 18. The method of structural equation modeling (SEM) was used.
Results. Consumption of cola in adolescents had an indirect effect on alcohol consumption, while in young adults that effect was direct. Consumption of energy drinks directly influenced alcohol consumption among adolescents and cigarette smoking among young adults. Smoking directly influenced the frequency of alcohol consumption in adolescents, while an inverse relationship was shown among adult. The direct impact of coffee consumption on alcohol consumption was observed only among young people.
Conclusions. Our results showed an important relationships between the parallel consumption of various stimulants and the need for monitoring caffeine intake among adolescents and young adults, as well as the need for more education targeting both groups in order to avoid consumption of high doses of caffeine.

Key words: alcohol, caffeine, stimulants, youth

INTRODUCTION

In recent years, attention has been drawn to the negative impact of chronic use of beverages containing caffeine, especially energy drinks, cola, tea and coffee on the health of young people (1–3). Caffeine is also regarded as a psychoactive substance that can also generate risks of addiction (4).

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Energy drinks belong to the group of beverages that contain caffeine, taurine, B vitamins, herbal supplements and sugar or sweeteners. They are commonly used to increase the efficiency of the body, to improve concentration and, in some cases even to reduce body weight (5). A significant share of the products available on the market is designed for adolescents (12–18 years) and young adults (19–25 years) (5, 6). An American study showed that about 34% of people aged between 18 and 24 years regularly consume energy drinks (7). A review of the literature shows that excessive consumption of energy drinks due to caffeine contained in them can have negative health effects especially in children and adolescents (6, 8). Excessive consumption of energy drinks contributes to cardiovascular diseases (including stockpile infarction and heart defects), diabetes, behavioural and mood disorders. In addition, it is emphasized that young people can add to the consumption of energy drinks other stimulants such as alcohol or cigarettes (9).

Recent scientific studies suggest that individuals susceptible to one substance are also often addicted to other psychoactive substances, a phenomenon known as the co-occurrence of addictions. It is commonly observed for example in case of nicotine and alcohol or caffeine and other psychoactive substances. The causes of the co-occurrence of addictions phenomenon are considered to be environmental and genetic factors (10) (e.g. more prone to search for experience and increased activity associated with dopaminergic reward system), regulating of receptors' activities for one substance by another as well as induction of interaction between various neurotransmitters (10, 11). It is suggested that the excessive consumption of caffeine can also contribute to consumption of other stimulants as well as inhibit the CNS (12, 13).

It can be assumed that consumption of various types of psychoactive drugs can be dangerous, especially for adolescents and young adults, who are more likely to undertake various types of risky behaviours. These include trying, regular use or mixing of psychoactive substances such as cigarettes, alcohol, drugs and – as suggested by some scientific reports – of caffeinated beverages. This phenomenon can be partially explained by reference to Erik Erikson's theory of psychosocial development (14: 129–132), according to which teenagers, i.e. those aged 12 to 19 years, are characterized by the search for self-esteem while in the maturation process. During this period, peer groups have a very major impact on their behaviour. Therefore, decisions regarding the consumption of various products, including those containing caffeine, alcohol, and other drugs may be influenced by particular fashion or group pressure. After adolescence comes early adulthood (20–30 years old), when the influence of the group diminishes and a person makes more informed choices, including about nutrition, based on his/her own beliefs and values.

In the absence of appropriate amount of data and studies that would deal with the phenomenon, we performed our own research. The aim of this research was to attempt to answer the question: is there a relationship between the consumption of cola-like drinks and the use of other stimulants such as alcohol, tobacco

and energy drinks? We also decided to carry out an analysis of the relationship between consumption of cola and coffee on the one hand and tea on the other. This is due to the fact that both coffee and tea, as well as cola-like drinks contain caffeine, and in recent years their consumption has significantly increased (1–3). There is currently no research analysing this relationship. The following research hypotheses were verified:

1) The consumption of cola-type beverages will be correlated with the consumption of other stimulants. People who often consume non-alcoholic beverages containing caffeine are more likely to also use other stimulants such as nicotine, alcohol, coffee and tea.
2) Young adults are more likely than adolescents to use coffee, nicotine and alcohol.
3) Alcohol consumption is associated with the consumption of cola-like beverages and energy drinks which are often combined with alcohol as an additive to drinks.

MATERIAL AND METHODS

The subjects

The selection criteria for the research were based on a review of the literature. In addition, due to the increase of caffeine consumption in all age groups over the past 20 years, including children and adolescents, led us to apply the following inclusion criteria:

1) declaration of consumption of beverages containing caffeine with the question "Do you drink cola-like drinks?" If the answer was 'yes', the respondents received a survey questionnaire and were included in the research, and those who did not declare consumption of these drinks simply did not participate in the research. The inclusion in the research of only respondents declaring drinking cola was aimed at analysing the relationship between consuming these drinks with the use of other stimulants within that group.
2) age – individuals between 13 and 30 years participated in the study. We obtained guardians' permission in the case of minor's participation.

The total number of respondents who qualified for research was 118, of which 75 (64%) were women and 43 (36%) men. Then the research group was divided into two groups and two subgroups based on Erikson's theory of psychosocial development (14:129–132):

- group 1 consisted of adolescents (up to 20 years of age): N = 62 (K = 39, M = 23), where the average age was 17.2 ± 0.2 years.
- group 2 – young adults (20 to 30 years old): N = 56 (K = 33, M = 23), where the average age was 22.6 ± 0.4 years.

Detailed information on age and number of respondents was presented in table 1.

Table 1.
Age and number of respondents

Group 1 Adolescents		Group 2 Young adults	
Age	N	Age	Age
13	2	21	14
14	2	22	3
15	8	24	13
16	19	25	9
17	6	26	5
18	1	27	3
19	12	28	3
20	12	29	3
		30	3

The research procedure

The snowball method was used for the recruitment of subjects. This is used because of the difficulty in locating and finding relevant participants. Recruitment of respondents to the study was made on the basis of opportunity sampling. This involved the selection of individuals who are currently available for the study. Application of the snowball method in this project was based on the fact that the respondents who were enrolled were asked to indicate another person or respondents who would meet the inclusion criteria and were currently available, which was conducted from early 2011 until the end of 2012. Respondents who have expressed interest in participating were asked questions to verify their cola-like drink consumption. Only positive responses were included to the core part of the study. Then the participants were asked to determine the frequency and quantity cola-like drinks consumed over one week. Respondents evaluated the frequency of consumption of coffee, tea, energy drinks, alcohol and cigarettes also within one week.

Research tools

The author's questionnaire was developed on the basis of a review of literature associated with caffeine addiction and the co-occurrence of addictions. The questionnaire contains questions about the frequency of use in the course of the last week of the following products: cola-like drinks, coffee, tea, alcohol, energy drinks and cigarettes. The frequency of use of all substances was evaluated on a 5-point scale (0 – never, 1 – less than once a week, 2 – once a week, 3 – twice or three times a week, 4 – four and more times a week). The option of the answer "never" used in the questionnaire was designed as a criterion to verify whether persons who before the research declared drinking cola-like drinks in fact do so. Within the question concerning alcohol consumption, the respondents were asked to comment on total alcohol consumption including beer, wine and vodka. Then, respondents were asked

to indicate average quantity intake of cola-like beverages in the course of the last week on the basis of a 5-point scale (0 – never, 1 – less than one box (0.33 litre), 2–0.5 litre bottle, 3–1 litre bottle, 4–2 litres bottle and more). The score sheet at the end of the questionnaire contained questions about age.

Variables and indicators

The following variables were analysed in the research:

- Drinking cola-like drinks in the week preceding the research. This problem was analysed using the question: "How often did you drink cola beverages over the last week?" Respondents had a choice of the following response options: never, less than once a week, once a week, twice or three times a week, four times or more per week). The indicator for this variable was the consumption of cola-like beverages at least once during the last week preceding the research.
- The consumption of coffee in the week preceding the study was analysed using the question: "How often did you drink coffee over the last week?" Respondents had a choice of the following response options: never, less than once a week, once a week, twice or three times a week, four times or more per week. The indicator for this variable was the consumption of coffee at least once during the last week preceding the study.
- Consumption of energy drinks in the week preceding the study was analysed using the question: "How often did you drink energy drinks during the last week?" Respondents had a choice of the following response options: never, less than once a week, once a week, twice – three times a week, four times or more per week. The indicator for this variable was the consumption of energy drinks at least once during the last week preceding the study.
- Drinking tea in the week preceding the study was analysed using the question: "How often did you drink tea over the last week?" Respondents had a choice of the following response options: never, less than once a week, once a week, twice or three times a week, four times or more per week. The indicator for this variable was the consumption of tea at least once during the last week preceding the study.
- Overall drinking alcohol in the week preceding the study was analysed using the question: "How often did you drink alcohol (regardless of its type) during the last week?" Respondents had a choice of the following response options: never, less than once a week, once a week, twice or- three times a week, four times or more per week. The indicator for this variable was the consumption of alcohol at least once during the last week preceding the study.
- Cigarette smoking in the week preceding the study was analysed using the question: "How often did you smoke cigarettes during the last week?" Respondents had a choice of the following response options: never, less than once a week, once a week, twice or three times a week, four times or more per week. The indicator for this variable was cigarette smoking at least once during the last week preceding the study.

As can be seen the measuring indicators were the same for all the variables analysed.

Analysis of data

Statistical analysis of the obtained empirical material was performed using the statistical package SPSS 18.0 and AMOS 18.0 program. The resulting variables were nominal or interval, therefore Chi2 test was used to assess differences between analysed groups and Eta coefficient. This coefficient is used to measure the relationship between two variables – the dependent variable measured on the interval scale and the independent variable with limited number values (category). Eta coefficient assumes values in the range from –1 to 1. Values close to 0 reveal a weak relationship between the analysed variables, while values close to 1 indicate a strong relationship between these variables. The Amos 18 statistical program was used to develop models of stimulant consumption in adolescents and young adults. It is a tool that enables Structural Equation Modeling – SEM.

RESULTS

Frequency and quantity of consumed cola-like beverages and stimulants

In the first stage, we analysed the frequency of use of cola drinks (Table 2), and stimulants such as coffee, tea, energy drinks, alcohol, cigarettes (Table 3) during the last week. 37% of adolescents and almost 43% of young adults declared that they consume cola-like beverages once a week (Table 2).

Table 2.
Frequency of consumption of cola-like drinks in the analysed groups

Frequency of consumption of cola-like drinks	Adolescents		Young adults	
	N	%	N	%
Never	0	0.00	0	0.00
Less than once a week	23	37.10	24	42.86
Once a week	14	22.58	9	16.07
2–3 times a week	14	22.58	9	16.07
4 or more times per week	11	17.74	14	25.00

In case of almost 34% of adolescents and 58.93% of young adults, the most frequent declaration was drinking coffee 2–3 times a week. The analysed groups showed a similar frequency of tea consumption (Table 3). As regards energy drinks, 46.77% adolescents and 64.29% young adults usually selected the response 'less than once a week'. Half of the adolescents and 46.43% of young adults who participated in the study drank alcohol at least once a week (Table 3).

Significant statistical differences were noted between the groups in case of the declared frequency of tea, cigarettes and alcohol consumption using multipartite tables and the Chi2 Pearson test. Respondents from group 2 (young adults)

Table 3.
Frequency of consumption / use of stimulants in the analysed groups

	Coffee [%]	Tea [%]	Energy drinks [%]	Alcohol [%]	Cigarettes [%]
Adolescents					
Never	30.65	20.97	40.32	24.19	67.74
Less than once a week	24.19	0.00	46.77	50.00	11.29
Once a week	11.29	20.97	3.23	24.19	6.45
2–3 times a week	33.87	58.06	9.68	1.61	14.52
4 or more times per week	0.00	0.00	0.00	0.00	0.00
Young a dults					
Never	17.86	1.79	30.36	7.14	58.93
Less than once a week	8.93	7.14	64.29	46.43	8.93
Once a week	14.29	8.93	1.79	35.71	3.57
2–3 times a week	58.93	82.14	3.57	10.71	28.57
4 or more times per week	0.00	0.00	0.00	0.00	0.00

much more often reported consumption of tea (Chi2 = 12.56, p = 0.027), alcohol (Chi2 = 11.98, p = 0.017) and cigarettes (Chi2 = 12.6, p = 0.027). In case of coffee (Chi2 = 7.94, p = 0.160), energy drinks (Chi2 = 7.891, p = 0.162), and cola-like drinks (Chi2 = 2.877, p = 0.579) there were no such relationships.

Consumption of cola-like drinks in quantities less than one can per week was declared by 30.65% adolescents, whereas 37.50% of young adults declared they consumed 0.5 liter of these drinks per week (Table 4). There were no statistically significant differences between teenagers and young adults in terms of quantity of consumed cola-like drinks as shown using Chi2 test (Ch2 = 7.843, p = 0.098).

Table 4.
Amount of cola-like beverages consumed in the analysed groups

Amount of cola-like beverages consumed	Adolescents		Young adults	
	N	%	N	%
Never	9	14.52	7	12.50
Less than one can (0.33 litre)	19	30.65	15	26.79
0.5 litre bottle	16	25.81	21	37.50
1 litre bottle	14	22.58	6	10.71
2 litres bottle and more	4	6.45	7	12.50

Consumption of cola-like beverages and of other stimulants

The correlation between the frequency of consumption of cola-like beverages and of other stimulants was examined on the basis of the results obtained using the Eta coefficient. In adolescents, increased consumption of cola-like beverages

correlates with an increased intake of energy drinks, and in young adults with increased consumption of tea, alcohol and cigarettes. In both groups the Eta coefficient value between the frequency of consumption of cola-like drinks and coffee was comparable (Table 5).

Table 5
The relationship between the frequency of consumption of cola-like beverages and other stimulants

Correlations	Analysis of the frequency Value of Eta coefficient	
	Adolescents	Young adults
Cola-type beverages and coffee	0.244	0.283
Cola-type beverages and tea	0.242	0.524
Cola-type beverages and energy drink	0.454	0.296
Cola-type beverages and alcohol	0.316	0.410
Cola-type beverages and cigarettes	0.226	0.405

In order to evaluate more deeply the empirical material, we analysed the correlation between the amount of consumed cola beverages and other stimulants using the Eta coefficient. In adolescents, the amount of consumption of cola-like beverages correlates with the amount of coffee and alcohol consumption as well as cigarette smoking (Table 6).

Table 6.
The relationship between the amount of consumed cola-like beverages and other stimulants

Correlations	Analysis of the frequency Value of Eta coefficient	
	Adolescents	Young adults
Cola-type beverages and coffee	0.212	0.149
Cola-type beverages and tea	0.347	0.230
Cola-type beverages and energy drink	0.203	0.288
Cola-type beverages and alcohol	0.305	0.063
Cola-type beverages and cigarettes	0.341	0.297

The frequency of consumption of energy drinks by adolescents was characterized by a strong relationship with the frequency of alcohol consumption (Eta = 0.502). In case of young adults, the relationship was slightly weaker (Eta = 0.318). The relationship between the frequency of cigarette smoking and consumption of energy drinks was higher in young adults than in adolescents (Table 7).

In the next stage, the relationship between the consumption of various stimulants in both groups was analysed. Coffee consumption significantly correlated with

Table 7.
The relationship between the frequency of consumption of energy drinks and other stimulants

Correlations	Analysis of the frequency Value of Eta coefficient	
	Adolescents	Young adults
Energy drink and coffee	0.319	0.272
Energy drink and tea	0.204	0.242
Energy drink and alcohol	0.502	0.318
Energy drink and cigarettes	0.244	0.366

alcohol consumption among young adults (Eta = 0.459) as well as in adolescents (Eta = 0.583). The relationship between tea consumption and alcohol was slightly higher in adolescents (Eta = 0.275) than in young adults (Eta = 0.194). Moreover, the consumption of energy drinks correlated with the frequency of alcohol consumption in young adults (Eta = 0.318) and much strongly correlated in group of adolescents (Eta = 0.534). Cigarette smoking and consumption of alcohol significantly correlated in adolescents (Eta = 0.527). The analysed relationship was significantly lower in young adults (Eta = 0.285) (Table 8). And finally, a similar relationship was observed between the frequency of consumption of coffee and cigarette smoking in young adults (Eta = 0.312) and adolescents (Eta = 0.319).

Table 8.
The relationship between the frequency of consumption of alcohol and of other stimulants

Correlations	Analysis of the frequency Value of Eta coefficient	
	Adolescents	Young adults
Alcohol and coffee	0.583	0.459
Alcohol and tea	0.275	0.194
Alcohol and energy drinks	0.534	0.318
Alcohol and cigarettes	0.527	0.285

The relationship between consumption of cola-like beverages and of stimulants examined using SEM models

Path analysis was performed using the statistical package AMOS 18 for SPSS 18. This analysis was used to develop the model of simultaneous use of stimulants by teenagers (Figure 1) and young adults (Figure 2). Gender was a significant factor influencing the frequency of use of analysed stimulants in both elaborated models. Men took stimulants more likely than women. Standardized regression weights

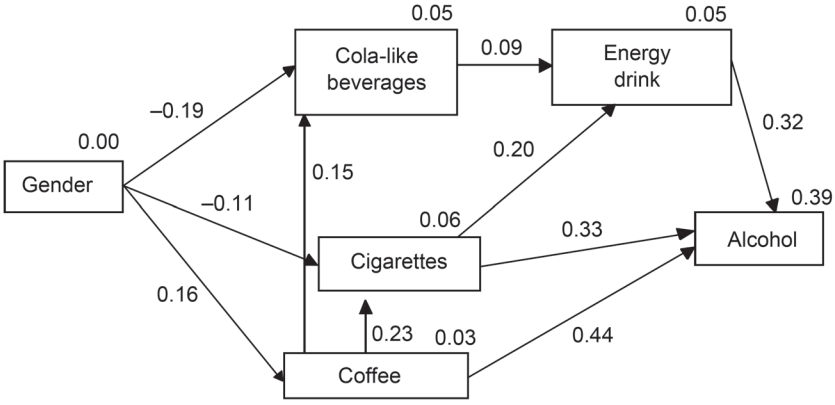

Figure 1.
Model for adolescents calculated on the basis of the frequency of consumption of cola beverages and of stimulants. ($X2$ (11) = 6.046, $p > .05$ ($p = 0.302$), CFI = 0.981 and RMSEA = 0.057, being removed the tracks that are not statistically significant).

assessing the strength of relationship between the variables showed a negative value for the frequency of consumption of cola-like beverages and smoking, and a positive value for the frequency of coffee intake as regards the model for teenagers. In other words, the frequency of drinking cola-like beverages reveals a direct correlation with the frequency of coffee consumption. Coffee intake has both a direct effect on alcohol consumption, as well as an indirect one through mediating variables such as consumption of cola-like beverages and energy drinks. Similar relationships were observed in case of cigarettes. The frequency of cigarette smoking and coffee intake significantly influences the frequency of intake of other stimulants, including alcohol, in the model for adolescents (Figure 1).

Gender showed negative values of standardized regression weights with a frequency of cola-like beverages, energy drinks and alcohol intake in the model for young adults (Figure 2). This means that men drink the beverages in question more often than women. In case of young adults, coffee consumption had no significant effect on the frequency of consumption of other stimulants as was the case in the model for teenagers. The direction of the relationship between alcohol consumption and cigarette smoking also changed in young adults. Alcohol consumption among young adults has a direct impact on the frequency of cigarette smoking. In adolescents smoking affects the frequency of alcohol consumption (Figure 1). The intake of alcohol and energy drinks was directly related to gender in young adults, while the said relation was characterized by intermediate relationship in the model developed for adolescents. It should be noted that the relationship between the consumption of cola beverages and alcohol consumption is indirect among adolescents and direct in young adults.

Following that the respondents were divided into two groups. It was designed to compare the relationship between the alcohol intake and the consumption of

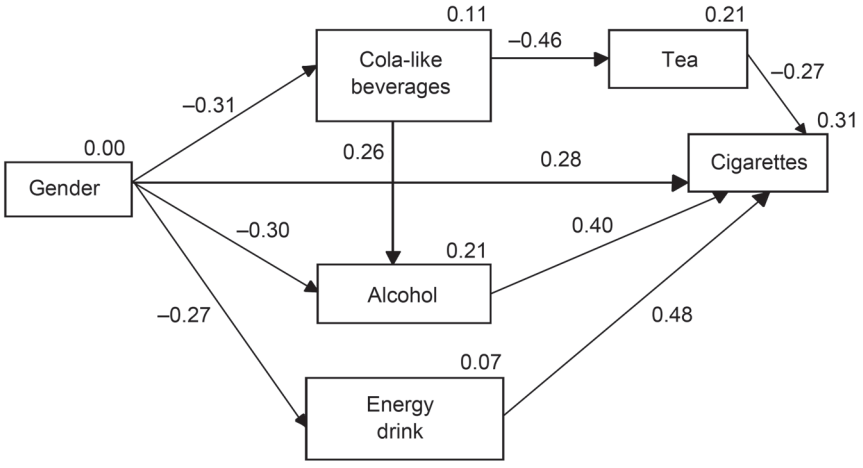

Figure 2.
Model for young adults is calculated on the basis of the frequency of consumption of cola beverages and of stimulants. (X 2 (11) = 11.588, p > .05 (p = 0.358), CFI = 0.986 and RMSEA = 0.032, being removed the tracks that are not statistically significant).

caffeine-alcohol mixtures. First group consisted of respondents declaring consumption of cola-type beverages in combination with alcohol (for example in form of drinks). Second group was composed of those not combining cola-type beverages with alcohol. Using Chi2 test (Chi2 = 1.501; p = 0.682) we found that there were no statistically significant differences between the groups in terms of frequency of alcohol consumption. Respondents from the first group more often reported coffee consumption compared to the second group. The observed differences were statistically significant (Chi2 = 9.651; p = 0.023).

Analysis of Eta correlation coefficient evaluating relationship between the use of stimulants and consumption of cola-type beverages with alcohol was used only for the first group. Cigarette smoking was characterized by a positive correlation with the consumption of cola-like beverages together with alcohol in this group (Eta = 0.313). Similar correlations were also revealed in the case of energy drinks (Eta = 0.307) and coffee (Eta = 0.425).

DISCUSSION

In the study, both groups of young adults and adolescents there was more frequent use of alcohol than cigarettes. However, young adults used these stimulants more often. An interesting relationship was noted in the analysis of structural equations; alcohol consumption among adolescents was directly related to the consumption of coffee, cola-like drinks, energy drinks and cigarette smoking. In young adults we came to different conclusions. The alcohol consumption directly affected frequency of

cigarette smoking in this group, while the consumption of cola-like beverages showed a direct impact on the frequency of alcohol consumption. The observed results can be explained by psychosocial factors. The literature highlights the aggressive market policy of manufacturers of caffeinated beverages, of which a significant proportion is addressed to adolescents and young adults (5, 6). This can make drinking these beverages a sort of fashion. The peer group will be a relevant factor for adolescents in terms of psychosocial factors, because a young person's social group influences their behavioural activity, including the frequency of stimulant use (15, 16). The peer group is more important in adolescents than in young adults. The modern busy lifestyle requires constant commitment and willingness to work, especially in young people. It can contribute to stimulant use by young adults in the long term (17, 18). Caffeine is characterized by such properties. Young adults may resort to beverages containing this substance (including energy drinks) to improve their performance in order to meet the requirements of the environment. That is why an analysis of the mentioned motives for the use of these stimulants and beverages requires further verification.

The study showed a significant correlation between the consumption of and the use of certain psychoactive substances such as coffee, energy drinks or cigarettes. In addition, respondents who consumed alcohol more often had a cup of coffee than those who did not declare alcohol consumption. This result confirms other authors' findings that suggest there is a relationship between frequent consumption of caffeine and alcohol (19, 20). However, this relationship is only relevant in the case of heavy consumption of both discussed substances. It is probable that alcohol abusers consume large amounts of caffeine to counteract behavioural sedative effects of alcohol intake or to antagonize the increase in adenosine induced by alcohol (19). The presented analysis of pathways suggests that said regularity may be one of the explanations based on those obtained in the model for teenagers. The consumption of cola-like beverages directly affects consumption of alcohol in the model for young adults. Therefore, one cannot talk about mitigating the effects of large doses of alcohol through consumption of cola-like beverages. This confirms the need for further research including analysis of factors that motivate to combine drinking cola-like beverages with alcohol.

Recently, there is a growing popularity of combining alcohol with cola-like beverages and energy drinks containing caffeine (21). This phenomenon was confirmed in an earlier research of these authors, where the consumption of cola-like beverages as an addition to alcohol (e.g. in drinks) was declared by 66.1% of respondents (3). This study suggests that the consumption of energy drinks directly affects alcohol consumption among adolescents, which was not observed in young adults.

The results of some other studies suggest that mixing alcohol and energy drinks may reduce the subjective symptoms of intoxication and sedative effects of alcohol in particular headaches, weakness, dry mouth and loss of coordination (22). In addition, this is associated with more frequent and intense alcohol intake and also with longer episodes of consumption (23). This is especially dangerous for adolescents, where the observed relationship was stronger than in young adults.

Caffeine consumption can also have a bearing on the frequency of smoking since both acute and chronic exposure to caffeine may influence the pharmacological and behavioural effects of nicotine. This study showed significant links between the consumption of popular non-alcoholic and carbonated cola-like beverages with cigarette smoking in the group of young adults. A similar relationship was observed in case of smoking and coffee intake. However, in the case of energy drinks (usually containing higher doses of caffeine), a positive correlation between the two analysed groups was revealed. Path analysis showed that frequency of cigarette smoking directly affects the frequency of consumption of energy drinks among adolescents. This relationship is reversed in young adults.

The frequency of consumption of energy drinks directly affects the frequency of cigarette smoking in young adults. These results suggest that smokers often take caffeine or consume it during smoking to enhance the effect of nicotine. This relationship has been confirmed in previous studies both in case of humans and animals (24–26). In addition, some researchers suggested that smokers consumed more caffeine than non-smokers. This effect may be explained by the increased metabolism of caffeine among smokers (27). This phenomenon is particularly worrying because caffeine produces not only physiological effects, but also strengthens the subjective effect of nicotine on the body. Consumption of high doses of caffeine by adolescents should be particularly monitored. Research proved that abuse at a young age may contribute to intensive smoking and use of other intoxicating substances (24).

The influence of energy drink consumption frequency on smoking frequency in young adults may be explained by the need to demonstrate continuous readiness and commitment to cope with the requirements of the environment on the one hand and by high levels of stress on the other hand.

Energy drink consumption by young adults may be important as a stimulant, enabling them to meet particular requirements. At the same time, smoking may be a form of reducing excess emotional tension and stress related to social requirement.

The researchers speculate that excessive caffeine intake can also contribute to the dependence on other substances and stimulants (27) and can cause co-occurrence of addictions associated with the risk of developing a variety of mental disorders (12). High caffeine intake can lead to caffeine addiction in young people, which can negatively influence their physical development Very frequent diarrhoea and vomiting can lead to nutrient deficiencies and deprive the body of substances that are necessary for its proper development. Nervousness, explosiveness and excitement can contribute to the development of aggression and possibly lead to disturbances of concentration needed for learning. The symptoms of caffeine addiction such as sleep problems and insomnia are also worrying because of the regenerative properties of sleep and its role in learning and memory, which is especially so important in adolescents. Abuse of caffeine by adolescents and risk of other addictions associated with it may contribute to the development of physical, mental and psychosocial disorders.

High caffeine intake by young adults and adolescents can lead to several negative health effects of both a somatic and psychological nature. Therefore, caffeine intake

should be monitored among adolescents and young adults. This monitoring should prevent the consumption of high doses of caffeine with different products as well as the mixing caffeine with alcohol and other stimulants among young people.

It should be noted that the results of research reveal many limitations that should be taken into account in further empirical studies. These limitations are inter alia the small group which was not randomly selected and the lack of detailed analysis in terms of quantity of consumed beverages and stimulants. All these limitations suggest that the data should be interpreted with caution.

Nevertheless, the presented results show important relationships concerning mutual use of various beverages and stimulants. Further analysis of the reasons for consumption of energy drinks and cola-like beverages by young adults and teenagers that influence directly or indirectly the consumption of alcohol and cigarette smoking would be of great interest.

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