

Open Access Original Research

Comorbid Relationships in the Formation of Addictive Behaviour and Affective Symptoms in Adolescents

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Citation: Dashieva, B.A., Karaush, I.S., and Kupriyanova, I.E. (2021). Comorbid Relationships in the Formation of Addictive Behaviour and Affective Symptoms in Adolescents. *Journal of Concurrent Disorders*, 4 (1), 62-76.

Editor-in-Chief: Mona Nouroozifar

Received: 04/20/2020

Accepted: 06/09/2021

Published: 07/12/2021



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Abstract: The prevalence of substance use, negative attitudes towards it, and emotional issues associated with it in adolescents is a problem that affects their future health. **Objective.** To study the features of chemical addiction development in adolescent students in comprehensive and special education schools, and to determine the nature of the relationship between emerging addictions and the risk of developing depressive symptoms. **Materials and Methods.** A sample of 421 adolescents between age 12 and 17 years (41.6% girls, 58.4% boys) were recruited. The Self-Compiled Questionnaire (SCQ) and the Children's Depression Inventory Scale (CDI) were used. Data collection was carried out between 2015 to 2017. **Results.** Overall, 26.4% of the students smoked, 15.2% drank alcohol, and 2.9% used drugs. The frequency of psychoactive substances use did not significantly differ by gender. Comparison of students from comprehensive and special education schools on the use of certain types of substance use revealed differences only in smoking, which was more frequent in special needs schools for both boys and girls. A high risk of developing depression was found in 8% of students (15.4% of girls and 2.8% of boys). Among girls, there was a significantly higher rate of alcohol use for those at high risk of depression than those without this risk. It is suggested that affective symptoms interrelate with the emerging addictive behaviour in girls. **Discussion.** Psychological features and environmental conditions affecting the development of chemical addictions (alcohol, nicotine, and drugs) in adolescents are discussed. Addictive behaviour is considered as a coping mechanism among adolescent when facing social challenges.

Keywords: comorbidity, addictive behaviour, substance use, risk of depression, adolescents

Introduction

The comorbidity of affective and addictive disorders in adolescents is an issue that has not been sufficiently studied (Amin-Esmaili et al., 2017; Turner et al., 2018). There is, however, evidence in the literature of frequent comorbidity of addictive and affective disorders in adults (Bokhan & Semke, 2009; Shcherbak et al., 2018). Even at a subclinical level, affective disorders in adolescents can affect their functioning and interactions with the environment, exacerbate emotional problems, reduce adaptation and self-esteem, and increase the risk of addictive behaviour (Kenney et al., 2015), suicidal behaviour (Jinnin et al., 2016) and risky behaviour (Hwang et al., 2015). However, diagnosis of affective disorders in adolescents can be difficult because of the instability that is normal during puberty and the vagueness of clinical symptoms, which often present at a subclinical level (Klein, 2009).

The risk factors for the formation of substance use in adolescents are compounded by the influence of environmental conditions. These include living in a city with easy access to psychoactive substances, and more tolerant attitudes towards alcohol use (Cheng & Anthony, 2018; Martynenko & Roshchina, 2015; Slade et al., 2016). Attitudes towards these behaviours during adolescence can also contribute to substance use in adulthood by making it more likely that alcohol addiction will develop in the future (Sawyer et al., 2012; DuPont et al., 2018; Temmen & Crockett, 2018).

In some cases, the predictors of addiction are manifestations of psychiatric disorders in childhood, including problems with behaviour and attention (Tabachnikov et al., 2014). Researchers studying deviant behaviour agree that mental infantilism, a characteristic of adolescents with impaired intelligence, is one of the pre-pathological personality traits that contribute to the formation of dependence (Guzikov et al., 1993; Popova, 2016).

One trend characterizing the drug addiction situation in adolescents is the elimination of gender differences in the rates of drug and alcohol consumption, with the increasing prevalence of alcohol use among girls (Egorov, 2004; Morojele et al., 2018). Alcohol abuse in adolescent girls is often combined with smoking, which they usually start between one year and 18 months before their first alcohol use. Understanding the initial manifestations of the formation of substance use in adolescent girls is therefore relevant in the context of the study of female's health.

The issue of the comorbid interrelationships of addictive and affective disorders in adolescence is not well understood. Therefore, the present study can contribute to addressing this knowledge gap by investigating the issues of early use of alcohol, nicotine, and drugs by adolescents at the stage of testing psychoactive substances and the formation of affective symptoms.

Research Objective

The objective of this study was to examine the features of chemical addiction formation (alcohol, nicotine, and drugs) in adolescent students in comprehensive and special needs schools, and to determine the nature of the relationship of emerging addictions with the risk of developing depressive symptoms.

Materials and Methods

A continuous sampling method was used to recruit adolescents between the ages 12 and 17 years ($n = 421$). Of these, 198 were students in comprehensive education (85 urban and 113 rural) and 223 were in special needs schools in Tomsk and Tomsk District. Girls made up 41.6% of the sample ($n = 175$), and boys were 58.4% ($n = 246$). In special education schools, 79% of adolescents with disabilities had severe hearing and visual impairment (sensorineural hearing loss of III-IV-degree, deafness, congenital anomalies of the organ of vision) and concomitant mental psychopathology. Among those with mental disorders, the dominant category was mixed specific developmental disorders (F83 - 42.4%), followed by organic disorders (F06 - 13.3%), and mild mental retardation (F70 - 12.5%). Depending on the nature of the concomitant mental disorders, adolescents with hearing and visual impairment were trained in either special education programs or adapted comprehensive education programs in a boarding school.

The study was approved by the local ethics committee of the Mental Health Research Institute. Inclusion criteria comprised being between age 12 and 17 years and receipt of informed consent from their parents or guardians. Exclusion criteria were being younger than age 12, lack of informed consent, or the presence of intellectual deficiency that would impede understanding of the text for the scales used.

The assessment tools used were the Self-Compiled Questionnaire (SCQ) scale and the Children's Depression Inventory (CDI). Due to the non-normal distribution of traits, the central tendencies and variances of quantitative traits are presented as medians (Me) and quartiles (Q25%; Q75%). Comparison of the quantitative traits was carried out according to the Mann-Whitney criterion, and comparison of the qualitative traits used 2×2 contingency tables tested with the Pearson Chi-Squared criterion. The software used was STATISTICA v.10.0.

The study included a screening of students in general education (urban and rural) and special needs schools using the CDI and the SCQ scales. Based on the results of the screening, groups of adolescents were identified for a clinical examination (second stage) and organizing psychological, psycho-correctional, and psychotherapeutic assistance (third stage). Drug use (episodic or regular) was scored with the SCQ.

Results

According to self-reports, 26.4% of the students smoked, 15.2% used alcohol, and 2.9% used drugs. The most common answer for the frequency of alcohol consumption was “1-2 times in the last month,” followed by “3-5 times in the last month.” For smoking, the most frequent answer was “3-5 cigarettes a day,” followed by “more than 5 cigarettes a day” in the last month.

Smoking was the most common type of addictive behaviour among special needs students, with a significantly higher proportion of them engaging in it than those in comprehensive schools. Students from special needs schools also reported slightly more alcohol consumption than those in comprehensive schools, however the difference was not statistically significant (Table 1).

Table 1

Substance use by students in general and special needs schools.

Addictive behaviour	Students in comprehensive education, <i>n</i> = 198		Students in special education, <i>n</i> = 223		χ^2	<i>p</i>
	abs	%	abs	%		
Smoking	19	9.6	92	41.3	32.55	< .001
Alcohol use	27	13.6	37	16.6	0.52	.469
Drug use	12	6.1	-	-	-	-

Among adolescents in comprehensive schools, 6.1% were identified as drug users. Students in special needs schools were not given drug tests. We assume that the absence of drug use (more precisely - the lack of positive responses about drug use) among adolescents in special education can be explained by the conditions of study and living in a boarding school (for some children), which is accompanied (according to our assumption) by increased control by teachers and educators, which makes it difficult to access drugs. In schools where drugs are more accessible, higher rates of their use are found, which indicates a relationship between the likelihood of alcohol and drug use and their availability (Shcherbak et al., 2018).

A comparison of substance use between school types is shown for boys in Table 2, and for girls in Table 3. The same pattern observed in the overall data holds among both boys and girls, with those in special needs

schools being smokers more often, but no significant difference in alcohol use.

Table 2

Substance use by boys in comprehensive and special needs schools.

Addictive behaviour	Boys in comprehensive education, $n = 115$		Boys in special education, $n = 131$		Total, $n = 246$	
	abs	%	abs	%	abs	%
Smoking	12	10.4*	64	48.8*	76	30.9
Alcohol use	13	11.3	22	16.8	35	14.2
Drug use	7	6.1	-	-	7	2.8

* $\chi^2 = 23.3$, $p < .001$, $df = 1$.

Table 3

Substance use in girls studying in general and special needs schools.

Addictive behaviour	Girls in comprehensive education, $n = 83$		Girls in special education, $n = 92$		Total, $n = 175$	
	abs	%	abs	%	abs	%
Smoking	7	8.4*	28	30.4*	35	20
Alcohol use	12	14.5	15	16.3	29	16.6
Drug use	5	6.0	-	-	5	2.9

* $\chi^2 = 8.96$, $p = .003$, $df = 1$.

Among girls, 20% of students were smokers, 16.6% confessed alcohol use, and 2.9% admitted to using drugs (Table 3). Among girls in comprehensive schools, 8.4% reported smoking, compared with 30.4% in

special education schools, which is a significant difference, $\chi^2 (1, N = 175) = 8.96, p = .003$. Alcohol use was 14.5% and 16.3% respectively, which were not significantly different. Among girls in comprehensive schools, 6% said they had tried drugs.

The revealed differences in smoking between students in comprehensive and special education schools are largely due to differences in male adolescents. Comparison of boys and girls showed no significant differences in use of alcohol, drugs, or smoking, but there was a tendency ($p = .054$) for a higher smoking rate among boys (Figure 1).

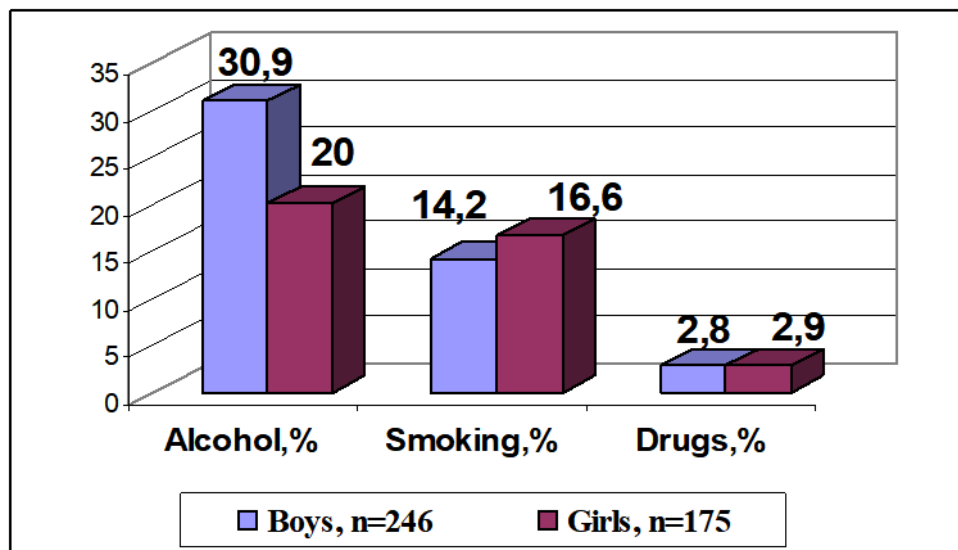


Figure 1. *Smoking, alcohol, and drug use by adolescents, depending on gender (%).*

Overall, adolescents in comprehensive and special education schools did not significantly differ by gender in their rates of substance use, which was approximately one in three boys and one in four girls (Table 4). This corresponds to the current trend towards equalization of gender differences in substance use and the earlier involvement of adolescents in addictive behaviour.

Table 4

Rates of substance use (%) for adolescents in comprehensive schools (urban and rural), compared by gender (n = 421).

Substance use	Girls, n = 175	Boys, n = 246	Significance
Uses substances	23.4	32.1	$p = .14$
Does not use substances	76.6	67.9	$p = .42$

In a previous study, we compared data of substance use with data regarding the frequency of affective symptoms and found no relationship between the early signs of affective and addictive disorders in the group of adolescents with “above average” or “high” risk of developing depression (Bokhan et al., 2018). In this subsequent analysis of the CDI scale data, a group of 34 students (27 girls and 7 boys, 8% of the study sample) was identified with only a “high” risk of developing depressive symptoms. Thus, 15.4% of girls and 2.8% of boys had a high risk of developing depression, and this was significantly higher for girls than for boys, $\chi^2(1, N = 421) = 18.25, p < 0.001$. Given the absence of gender differences in the frequency of substance use and the small number of boys with high risk of depression, these girls were the primary group for studying the combination of the initial signs of addictive and affective symptoms, as well as the features of the formation of chemical addictions in adolescence.

For a comparative analysis of the frequency of substance use in girls with different risk levels for depression, the group with a high level of risk was compared to girls without a high risk (Table 5).

Table 5

The frequency of substance use in girls with different levels of risk of developing depressive symptoms (%).

Substance use	With high risk for depression, $n = 27$	Without high risk for depression, $n = 148$	Total, $n = 175$
Alcohol	33.3*	13.5	16.6
Nicotine	37.0	16.9	20.0
Drugs	7.4	2	2.9
Use substances	37.0	20.9	23.4
Do not use substances	63.0	79.1	76.6

* $\chi^2 = 4.17, p = .041$.

Table 5 shows a comparison of the frequency of substance use in girls with and without high risk of depression. This comparison showed that girls with a high risk of depression were significantly more likely to drink alcohol than others, $\chi^2 (1, N = 175) = 4.17, p = .041$. They did not differ significantly in smoking, drugs, or overall substance use.

Among girls with a high risk of depression, the comparison between those in comprehensive and special education schools did not reveal any difference in smoking frequency. No comparison of drug use was carried out due to the absence of drug use data in special needs schools and only isolated cases in comprehensive schools. It should be noted that data on the use of alcohol and nicotine by adolescents are more readily available, while students may be reluctant to confess drug use because they assume it may entail certain sanctions from adults. This behaviour is noted when filling out test forms: previously recorded positive answers about drug use are then crossed out. These adolescents may be at risk for substance use and require more attention in clinical interviews. In adolescents with a high risk of developing depression, an analysis of the individual subscales of the CDI was also performed (Table 6).

Table 6

Indices of subscales of M. Kovacs Children's Depression Inventory in the group of adolescents with high level of risk for depression (n = 34) Me [Q25%; Q75%].

Scale	Girls, n = 27	Boys, n = 7	Total, n = 34
A-Negative mood	70 [64; 75]	64 [54; 76]	70 [64; 75]
B-Interpersonal problems	84 [74; 100]	74 [69; 78]	84 [74; 100]
C-Inefficiency	66 [59; 74]	64 [64; 69]	66 [59; 74]
D-Anhedonia	67 [63; 78]	67 [62; 76]	67 [63; 76]
E-Negative self-esteem	76 [64; 83]	72 [71; 81]	76 [68; 83]
Total score	74 [71; 89]	73 [71; 77]	73,5 [71; 86]

The comparison between girls and boys using the Mann-Whitney U test did not reveal any significant differences in CDI scores. However, there was a tendency among boys towards lower absolute values of the indices of individual subscales. Within the group of girls, comprehensive school students had significantly higher scores than special needs students both in the general indicator of the depression scale and in the anhedonia and negative mood subscales (Table 7).

Table 7

Indices of subscales of M. Kovacs Children's Depression Inventory in groups of girls with high level of risk for depression.

Scales	Girls, n = 27 Me [Q25%; Q75%]		Significance and U statistic
	From comprehensive schools, n = 17	From special schools, n = 10	
A- Negative mood	74 [70; 75]	61.5 [54; 70]	p = .001. U = 19.5

B- Interpersonal problems	84 [74; 100]	84 [74; 100]	NS
C- Inefficiency	66 [59; 74]	62 [52; 74]	NS
D- Anhedonia	71 [63; 82]	63 [56; 67]	$p = .042$. $U = 44$
E- Negative self-esteem	76 [64; 83]	73 [68; 76]	NS
Total score	82 [74; 89]	71 [70; 73]	$p = .007$. $U = 31$

The highest rates were found for the “Interpersonal Problems” scale, from both comprehensive education schools and special education schools, which is common for girls with high CDI scores (Table 7). High values were also obtained for the “Negative self-esteem” subscale, without significant differences between comprehensive and special education schools. This subscale contains questions regarding suicidal behaviour. The main reasons associated with the emergence of suicidal thoughts and tendencies in girls were problems of relationships with their peers (e.g., conflicts, unrequited love) and parents (e.g., misunderstanding on the part of parents, excessive demands, excessive control). It should be noted that respondents reported the substance use as a coping method for emotional experiences in conflict situations. In some cases, the substance use was a provoking factor for the actualization of suicidal thoughts and intentions.

Girls in comprehensive schools scored significantly higher than girls in special education in their total score, $U = 31$, $p = .007$, as well as the “Negative mood”, $U = 19.5$, $p = .001$, and “Anhedonia” subscales, $U = 44$, $p = .042$. Individual affective symptoms detected during clinical conversation with adolescents did not correspond to the level of depressive disorders and were considered by us in the framework of subthreshold conditions (Egorov, 2004). In general, for girls with affective symptoms of a subclinical level, a combination of symptoms was typical, including periods of low mood with instability of self-esteem, lack of self-confidence, anxiety in the situation of evaluating from the outside, fixing on negative experiences and a negative vision of the future.

Our observations show that girls with emerging addictive behaviour did not actively complain of low mood or depression. The most noticeable affective symptoms, both for the girls themselves and for the social environment, was a lack of mental energy (slowness, disorganization, and increased fatigue) which are manifested primarily as difficulties in learning and are also reflected in interpersonal interaction. Features of their environment included conflict, resentment, refusal to fulfill school requirements, and demonstrative non-involvement in family life.

Discussion

Our study aimed to identify signs of substance use in adolescents at early stages in the formation of addictive behaviour, in comprehensive and special education schools. There has been a scarcity of research related to the mental and narcological health of children with disabilities in the scientific literature, particularly for adolescents with sensory defects. Our study partially addresses these gaps by identifying negative substance-use behaviours among such adolescents.

The stark difference in rates of smoking between comprehensive (10.4%) and special needs schools (48.8%) can be explained by the following circumstances. Firstly, it can be explained by the so-called “phenomenon of concealment of addictive behavior” (Temmen & Crockett, 2018; Sawyer et al., 2012) in adolescents studying in comprehensive schools. Students may be afraid of negative consequences when revealing the fact of their substance use. In addition, adolescents with addictive behaviour tend to fantasize or lie to embellish their image or justify their actions (Akopov, 2008 Azarova, 2016). When collecting an objective history, the number of substance users would likely increase. In our opinion, the number of “false” answers among adolescents with special needs is minimal due to the peculiarities of the mental domain (insufficient formation of abstract logical thinking and ability to predict consequences, infantilism, a low level of claims, a narrow focus of interest and possibilities of self-assertiveness, including communicative ones).

Because the data on adolescents from secondary schools were obtained solely from self-reports, we therefore assumed that the actual substance use by adolescents from comprehensive school would be slightly higher. Reluctance to reveal the facts of their substance use can be explained by the psychological characteristics of puberty (secrecy, protest reactions, negativism), the influence of social and cultural environmental conditions (this is especially true for rural girls), and their attitude to the study. For instance, according to the results of socio-psychological testing of rural secondary school students in the Tomsk District conducted in 2016, only 2.2% of students reported substance use. According to our study conducted in the same year, 7.1% reported smoking (5.3% in rural schools), and 8% reported drinking alcohol (Tyulyupo & Dashieva, 2019). The differences in the indices can be explained by the participation in the intra-departmental testing of teachers directly working with students, which could be regarded by teenagers as unsafe and lead to them concealing signs of addictive behaviour.

The data we obtained are consistent with current trends in substance use by adolescents that has been identified in Russia and other countries. This includes an increase in early systemic alcohol use of female adolescents, the erasing of gender differences in adolescents involved in drug and alcohol use, and more rapid development of clinical

symptoms (Smirnov, 2010; Cheng & Anthony, 2018). These trends are associated with changing cultural ideas about gender, social roles, increasing availability of alcohol, and marketing strategies aimed at young women (Egorov, 2004).

The emotional and behavioural problems identified in girls are dynamically interrelated. This can lead to deterioration of the emotional state of the adolescent and/or occurrence of problematic forms of behaviour including suicidal tendencies and addictive substance use.

Academic problems can present an occasion for adults (parents and teachers) to take educational or pedagogical measures that are often ineffective in such situations, and this can contribute to deterioration in the emotional state of a teenager and/or the appearance of problematic behaviour, including addictive substance use. We can therefore assume that the emerging affective pathology in girls with the prerequisites of addictive behaviour is often manifested by irritability, opposition, and a demonstrative desire to violate social norms.

These conditions can be considered an unfavorable variant for the development of such relationships and the formation of comorbid affective and addictive disorders. This conclusion is supported by the analysis of students with high risk levels of depression. The data obtained on substance use by adolescent girls allows us to supplement the idea of the causes of alcohol use as a possible way to relieve negative mood, which is usually considered to be more characteristic of older people.

The difference in assessing one's mood and evaluating one's state or one's actions as allowing one to experience pleasure is likely due to the cognitive characteristics of students with sensory impairments, which is relevant because 7 out of 10 students with a sensory defect had a diagnosis of developmental disorder (F83). It is worth considering that both the defect itself limiting the perception of external stimuli, as well as the comorbid mental disorders that affects the analytic capabilities of the adolescent; determine the specifics of the emotional response and cognitive processing.

Thus, the emerging addictive behaviour of adolescent girls can be considered as a coping mechanism for the struggles that come with adapting to adolescence, interpersonal interaction with peers, and ongoing social changes. This problem requires further study, including longitudinal studies, to assess the dynamics of clinical symptoms and monitor socio-psychological conditions long-term. With further understanding of the problem, scientifically based strategies can be developed for the prevention of chemical addictions in adolescents.

Limitations

In a further analysis of the results, one should consider the following limitations of our study. Data on adolescents from secondary schools were obtained solely from self-reports, while data collection in the

group of adolescents with disabilities was supplemented by objective information regarding addictive behaviour, which allowed us to obtain indices hewing closer to reality.

Another limitation was the small sample size and isolated cases of high risk of depression in boys ($n = 7$), which did not allow for a complete analysis of this group or a robust comparison between girls and boys.

Conclusions

According to self-reports, 26.4% of students smoked, 15.2% used alcohol, 2.9% used drugs, and indices of the substance use did not significantly differ between boys and girls.

Students in special education schools reported that they smoked significantly more often than students in comprehensive schools, for both boys and girls.

According to the CDI, 8% of students had a high level of risk of developing depressive symptoms, with a significant predominance of girls (15.4% of girls and 2.8% of boys).

Girls with a high risk of developing depression were significantly more likely to drink alcohol compared to other girls, regardless of their level of health and type of educational institution.

Comparison of the indices of individual subscales of the CDI in the group of girls with a high level of risk of depression revealed significant differences between girls from comprehensive and special education schools.

Problems in the emotional sphere, combined with emerging addictive behaviour in adolescent girls should be considered for future prevention of both affective and addictive disorders.

Ethics statement

Ethical approval for the study was received from the research team's university's ethics committee, and complied with the Declaration of Helsinki (Approval number 77/6.2015 of 23.03.2015).

Conflict of Interest

There is no conflict of interest.

Availability of data and materials

Data will be made available upon reasonable request.

Funding source

None.

Authors' contributions

All authors significantly contributed to the preparation of this manuscript.

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