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FACTORS INFLUENCING ADOLESCENT ALCOHOL CONSUMPTION: PARENTS AND DEPRESSION

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Alcohol use is a common form of risky consumption among adolescents. Little research has been carried out on the influence of such factors as parental control, relationships with parents, and teenage feelings of depression on the frequency of alcohol consumption among adolescents in Russia. In this paper, structural models were developed to describe the influence of these factors on adolescent alcohol consumption and the relationship between the factors. Alcohol consumption in adolescents is represented in the work in two ways: casual alcohol use and binge drinking (the consumption of four or more servings of alcohol at a time). The respondents were students at vocational schools who participated in a longitudinal project to study the risky behavior of adolescents in St. Petersburg. Four waves of the survey were used: 1, 5, 6 & 7. According to the results, the strongest direct negative effect on alcohol consumption is caused by parental monitoring. However, the direct influence of monitoring on adolescent alcohol consumption was significant in Wave 1. But in Wave 6, this influence was insignificant, which can partially be explained by the age of the respondents, most of whom were already adults at the moment of completing the questionnaire in Wave 6. Regarding the relationship with parents, no direct influence on alcohol consumption was detected—only an indirect effect mediated by parental monitoring. The positive correlation between the relationship with parents and the level of monitoring was significant in Waves 1 and 7. The level of depression in adolescents was a significant predictor of drinking behavior only in the model describing alcohol consumption as the frequency of casual drinking. In the models describing binge drinking, this relationship was insignificant. In all models, there was a stable negative relationship between the relationship with parents and depression in adolescents[5].

Keywords: alcohol consumption, adolescents, vocational school, parental control, parental monitoring, depression, structural equation modeling (SEM), longitudinal study.

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Introduction

Alcohol use is one of the most common forms of risky behavior among adolescents. Alcohol use can lead to a range of adverse consequences for adolescents, such as poor academic performance [Koch &McGeary, 2005], risky sexual behavior and early sexual debut [Coleman & Cater, 2005], injury, or even death [Gore et al., 2011]. There is evidence on how various factors in adolescents' social environment and their personal characteristics (such as psychological state or predisposition to certain behaviors) lead to a decrease (or increase) in adolescent alcohol use. The literature focuses on the adolescent's immediate social environment, including their parents, siblings, and peers. In the context of influencing adolescent drinking behavior and motivations or motives for alcohol consumption, various personal characteristics (e.g., extraversion or agreeableness), and even genetic predisposition are also highlighted [Li et al., 2017; Gallego et al., 2018].

A number of theories have been formulated to explain the influence of factors on alcohol consumption among adolescents. Some of the most popular are social control, learning theories, and socialization theory [Nye, 1958; Hirschi, 1969; Foxcroft& Lowe, 1991]. Some of these theories explain the negative influence of factors on drinking behavior, while others, such as the Social Bond Theory [Hirschi, 1969], explain how different factors can lead to lower alcohol use among adolescents. More complex patterns of drinking behavior can be found in the sociological literature, which describes the influence of several factors simultaneously and show how different factors of drinking behavior can be linked and have direct and indirect effects on adolescent alcohol consumption. If we consider research devoted to the study of alcohol consumption among adolescents in Russia, it is also possible to identify a number of studies devoted to the influence of specific factors in the adolescent environment on alcohol consumption practices [Lushin et al., 2017]. However, there are few such papers where both the influence of factors on alcoholic consumption and the influence of factors on each other are considered at the same time. In addition, the longitudinal nature of the influence of various environmental factors on adolescent alcohol consumption in Russia is also understudied.

The present study examines the influence of relationships with parents, parental control, and feelings of depression on the frequency of alcohol consumption among adolescents in Russia. Structural models are used to examine the influence of these factors on alcohol consumption, which allows us to simultaneously consider the direct influence of the factors and the relationship between the factors themselves. The data of students from 13 vocational

schools in St. Petersburg, obtained during the longitudinal project “Health and Risky Behavior of Adolescents”, conducted by the Laboratory of Education and Science of HSE University in St. Petersburg, were used in the study. A total of seven waves of the survey were conducted, which included different theoretical constructs at different stages of the project. This study used data from four waves, in which questions were introduced regarding those factors that were of concern to this paper, namely questions related to adolescents' relationships with their parents, parental control, and feelings of depression.

The educational environment in general, in which adolescents spend most of their time, is of particular importance with regard to adolescent alcohol consumption. The educational environment in vocational schools is quite specific in the sense that the students at such schools tend to come from families with low socio-economic status. In addition, the educational process at these institutions itself involves a greater degree of freedom than in high school, and studies have shown that students at these institutions who have chosen working-class educational trajectories tend to show greater involvement in risky practices and alcohol use than their peers [Lushin et al., 2017].

Literature review

Parental influence

Of all the factors that influence adolescents' alcohol consumption, most attention is paid to their closest social environment, namely their parents and friends [Wells & Rankin, 1988; Dishion & Loeber, 1985; Lopez-Vergara et al., 2017]. Researchers generally view parents as those who prevent adolescents from engaging in risky practices and alcohol use in particular [Akers, 2013; Wells & Rankin, 1988]. The possible preventive influence from parents is attributed to the close relationship between the child and their parents as well as parental control. Being unambiguously defined by most control theories, such as, for example, Social Control Theory, parental control keeps the child from engaging in risky practices. Control itself, can conceptually be divided into direct control and indirect control [Nye, 1958]. The practices of direct parental control include normative regulation, monitoring, and punishment. Normative regulation is the regulation of an adolescent's actions by establishing rules, limits, and criteria for behavior that are acceptable to parents. Parental monitoring is the parents' awareness of where their child is and what they are doing, as well as monitoring whether the rules and restrictions set in the family are being followed. Lack or complete absence of parental monitoring can result in a child not learning to be responsible for their behavior and thus being

more prone to risky behavior [Wells & Rankin, 1988]. Many studies have shown that adolescents exposed to poor parental monitoring are more likely to exhibit antisocial and delinquent behaviors [Cernkovich & Giordano, 1987], engage in risky sexual behaviors, and use alcohol and drugs [Metzler et al., 1994; Brooks-Russell et al., 2015; Flannery et al., 1994]. Discipline and punishment are the third element of direct control, involving parents designating a series of consequences or sanctions imposed on the child in the case of violations of established family rules [Wells & Rankin, 1988].

In addition to direct control, there is also indirect control over an adolescents' behavior, which manifests itself in the adolescent's attachment to a social group. In this case, it is their family who warns them against exposure to the risky practices which may be disapproved of by members of this group [Hirschi, 2017]. Based on Social Bond Theory, we identify four main components of indirect control: Attachment, Involvement, Belief, and Commitment. The most significant are Attachment and Involvement [Wells & Rankin, 1988]. Involvement is a situation where parents include their child in a variety of activities (e.g., sport, art) which simply do not leave time for delinquent activities [Hagan, 1989]. In this case, an adolescent's attachment to their parents does not simply mean a warm, close relationship between the adolescent and their parents, but rather what Hirschi [2017] called the "psychological presence of parents". When thinking about committing an antisocial action, an adolescent may first imagine the possible negative reaction of their parents to this action and, as a result, refuse to do it. According to this logic, if there is no emotional attachment between an adolescent and their parents, they may have little concern about what their parents think and thus be freer to take some risky actions [Akers, 2013; Wells & Rankin, 1988]. Evidence for the importance of emotional attachment in preventing adolescent drinking behavior can be found in Hahm et al. [2003], where the authors show how migrant adolescents' level of acculturation will affect alcohol consumption in students with high and low parental attachment rates. The study found that the effect of acculturation on youth drinking behavior was only present in those who demonstrated very low levels of parental attachment (drinking rates were 11 times higher in the highly acculturated group than in the least acculturated group), and when the level of attachment becomes moderate or high, drinking rates no longer vary between acculturated groups. Thus, researchers concluded that acculturation *per se* was not a risk factor in predicting alcohol consumption until it was accompanied by low levels of parental attachment [Hahm et al., 2003]. Although most scientific papers on adolescent risk behavior often focus on either direct parental control or indirect parental control, it should be recognized that parental control is only effective when forms of both direct and indirect control are present.

Depression and alcohol

Many sociological studies investigating the relationship between depression and alcohol consumption have described the linear nature of the relationship between depression and alcohol. One of the most common theoretical frameworks is Strain theory [Agnew, 1992], which focuses on how different forms of psychosocial strain lead to subsequent emotional and behavioral coping responses. According to this theory, tension can arise when a person fails to achieve personal and socially important goals, when ways to achieve these goals are blocked, or when a person loses positive stimuli or encounters new negative stimuli.

Tension or distress manifests itself in various forms, the most studied of which is depression. In addition to depression, distress in adolescents can manifest in forms such as hopelessness, loneliness, anxiety, subjective worrying, and a lack of connection with friends or social acceptance [Prinstein, Boergers, & Spirito, 2001].

Based mostly on Strain theory, self-medication and stress-coping models have been constructed to explain the connection between psychological stress and the use of alcohol or other substances. Both models are very similar and posit that people use substances as a means of coping, alleviating, or regulating negative emotions [Arendt et al., 2007]. Wills and Filer [1985] describe and derive the basic principles of the stress-coping model in detail.

Strain theory identifies two main ways of coping with stress. Problem-oriented coping is defined as a set of efforts to interact with the external environment to eliminate the source of the problem. It is assumed that this type of coping includes obtaining information, considering alternative courses of action, deciding on a plan of action, and taking direct action to solve the problem. The second type of coping is emotion-oriented, which involves efforts to work with the person's internal environment to cope with and reduce the psychological stress associated with the problem. This type of coping is thought to involve processes such as cognitively rethinking the problem situation in a more positive way, minimizing the threat associated with the problem, focusing on the positive aspects of the situation, and considering how it could have been worse. The basic position of Strain theory is that problem-focused coping should be used in situations in which the problem can be changed, whereas emotion-focused coping should be used in situations in which the problem cannot be changed. In addition to the adaptive coping strategies mentioned above, researchers also distinguish a number of maladaptive coping strategies. These maladaptive approaches include withdrawal, wishing the problem

would just go away, denial, distraction, emotional venting, and helplessness. Combining the main features of adaptive and maladaptive coping strategies, all coping strategies are divided according to whether the person tries to deal with the problem ("approach coping" or "engagement") or whether the person refuses to make any effort to solve the problem ("avoidant coping" or "disengagement"). The stress-coping model of substance use utilizes these theoretical constructs, adding that, as mentioned earlier, life stress is a risk factor for substance use. There is a lot of evidence in the literature showing how indicators of negative life events and perceived stress correlate with smoking and alcohol use among adolescents and adults [Wills & Filer, 1985]. In addition, studies of adolescents have shown that life stress is associated with increased substance use over time [Newcomb & Harlow, 1986], indicating that severe stress is not simply a consequence of prior substance use. The persistence of stress effects at different stages of substance use has led many scientists to assume that life stress may act as a common (or even general) predisposing factor for substance use.

The second important aspect of the stress-coping theoretical model is the assumption that substances themselves have functions and effects that help us to overcome stress. People believe that using tobacco or alcohol helps them calm down when they are tense or anxious and helps them feel better when they are depressed [Wills & Shiffman, 1985]. Evidence on the specific functions of alcohol also suggests that people believe that drinking alcohol (or using other intoxicants) can help relieve boredom, perform better in certain situations, or distract them from unpleasant self-consciousness [Steele & Joseph, 1990]. Studies on smoking cessation have shown that relapses occur in stressful situations because negative emotions trigger memories of previous stress coping functions through smoking [Perkins & Grobe, 1992]. A similar mechanism for relapse can be expected with the use of alcohol to cope with stress. Because substance use for coping is empirically correlated with avoidant-type measures of coping, it is often classified as an avoidant coping mechanism.

Depression and parent-child relationships

A number of researchers have concluded that parent-adolescent attachment relationships can serve an adaptive function and assist the adolescent in adjusting to new environments [Papini & Roggman, 1992; Hill, 1980]. This is because an adolescent's attachment to and love from their parents can provide an emotional foundation from which the adolescent learns to cope

with the challenges of growing up [Ainsworth et al., 2015]. Attachment theory [Bowlby, 1982] explains that the strong early attachment of an adolescent to their parents will promote feelings of "self-worth, self-competence, and emotional well-being." In other words, the quality of the attachment relationship between an adolescent and their parents can have a particularly strong effect during periods when the adolescent is experiencing anxiety and stress from the pervasive social changes associated with growing up. Attachment theory also concludes that anxiety and depression may result from some loss of attachment relationships. In combining the main points of the Attachment theory, Armsden and Greenberg [1987] formulated the *buffering hypothesis*, stating that the quality of an adolescent's emotional attachment to their parents may reduce their feelings of stress and depression associated with the many difficulties and transitions typical of adolescence. Based on this hypothesis, a number of quantitative studies showed that attachment to parents was significantly and negatively related to adolescent feelings of depression and anxiety and positively related to feelings of self-perceived competence [Rosenberg, 2015; Papini & Roggman, 1992].

Methods

Data and sample

The data were obtained during the longitudinal project "Health and Risky Behavior of Adolescents". A school-based, self-reported survey of vocational students in St. Petersburg was conducted. A total of 13 colleges and vocational schools participated in the survey, and 1299 students were selected to participate in the survey. The questionnaires were completed under the supervision of the laboratory assistant who conducted the survey. All respondents, their parents, and the college administration signed a written agreement to participate in the survey. The research project was approved by the Institutional Review Board of the HSE University.

A total of seven waves of surveys were conducted in the study, with a six-month break between waves. This research uses data from Waves 1, 5, 6, and 7 when students were in their first year of study (Wave 1), the beginning (Wave 5) and end (Wave 6) of their third (final) year, and six months after graduation (Wave 7). Data from these waves were included in the analysis because questions about students' relationships with parents, parental monitoring, and

student depression were only included in these four waves of questionnaires. The initial sample included 513 females and 786 males, with an average age of 16.

Measures

Alcohol consumption

The main focus of this study is on adolescent drinking behavior, which is expressed by two variables. They were asked, “How often have you had a drink in the PAST SIX MONTHS?” and “How often in the PAST SIX MONTHS have you had FOUR OR MORE alcoholic beverages at one time?” In the first case, the variable simply shows how often the respondent has used alcohol—**alcohol use**. In the second case, the variable shows how often the teenager consumed a large amount of alcohol at one time—**binge drinking**. The questions contained seven items (never or almost never; 1-2 times in six months; 1 time per month or less; 2-3 times per month; 1-2 times per week; 3-5 times per week; every day or almost every day).

Monitoring

The Monitoring variable (Tab. 1) is represented by three questions from the survey, showing how a teenager perceives his parents' (mothers’) level of awareness of “how they spend their free time”, “how they spend their pocket money,” and “how they spend time at parties and at friends' houses.” Questions have a Likert scale with 4 points: “doesn't know at all”, “knows a bit”, “knows quite well” and “knows everything in detail”. The Monitoring scale was included on the questionnaires in Wave 1 (Cronbach's alpha = 0.792) and Wave 6 (Cronbach's alpha = 0.817) of the survey. Confirmatory factor analysis (CFA) showed that all three items loaded onto the scale, with factor loadings all above 0.71 in Wave 1 and above 0.74 in Wave 6.

Table 1. Scale reliability (Monitoring)

Variables	*N (%)*	*Mean*	*SD*	*Min*	*Max*	α
Monitoring scale (w1):	1080					0.792
How much do your parents know about how you spend your free time?		2.62	0.74	1	4	
How much do your parents know about how you spend your pocket money?		2.53	0.92	1	4	
How much do your parents know about how you spend time at parties or visiting friends?		2.4	0.94	1	4	
Monitoring scale (w6):	641	2.61	0.82	1	4	0.817
How much do your parents know about how you spend your free time?		2.83	0.92	1	4	
How much do your parents know about how you spend your pocket money?		2.55	0.91	1	4	
How much do your parents know about how you spend time at parties or visiting friends?						

Note. α = Cronbach's alpha

Attachment

The Attachment variable (Tab. 2) reflects how emotionally attached the adolescent is to their parents. Students were asked to indicate their level of agreement on the following statements on the questionnaire: "I love my parents", "I respect my parents", "I care about my parents", and "I have a very close relationship with my parents." Using the 4-point Likert scale, they answered that they "agree," "mostly agree," "mostly disagree," and "disagree" with these statements. The responses to all four statements were then combined to form the Attachment scale, which was entered into the study in the same way as the Monitoring scale in Wave 1 (Cronbach's alpha = 0.78) and Wave 6 (Cronbach's alpha = 0.814) of the survey. CFA showed that all four items were loaded onto the scale, with factor loadings all above 0.65 for Wave 1 and all above 0.71 for Wave 6.

Table 2. Scale reliability (Attachment)

Variables	*N (%)*	*Mean*	*SD*	*Min*	*Max*	α
Attachment scale (w1):	1080					0.774
I really love my parents.		4.73	0.59	1	5	
I respect my parents.		4.63	0.62	1	5	
I take care of my parents.		4.69	0.8	1	5	
I have a very close relationship with my parents.		4.12	0.44	1	5	
			0.68			
Attachment scale (w6):	641					0.814
I really love my parents.		4.65		1	5	
I respect my parents.		4.72	0.66	1	5	
I take care of my parents.		4.56	0.7	1	5	
I have a very close relationship with my parents.		4.29	0.64	1	5	

Note. α = Cronbach'salpha

Depression

The Depression scale (Tab. 3) reflects an adolescent's level of depression and consists of four items: "Nothing good awaits me in the future", "I am constantly in a bad mood", "I am not happy about anything", and "I feel like I am good for nothing". Response options also ranged on a 4-point Likert scale from "agree" to "disagree". Questions on this scale were administered in Wave 5 (Cronbach's alpha = 0.764) and Wave 7 (Cronbach's alpha = 0.876) of the project at the time students began their third (final) year and six months after graduation. The Depression scale shows acceptable factor loadings, above 0.71 in Wave 5 and above 0.64 in Wave 7.

Table 3. Scale reliability (Depression)

Variables	*N (%)*	*Mean*	*SD*	*Min*	*Max*	α
Depression scale (w5):	641					0.764
Nothing good awaits me in the future.		1.21	0.48	1	4	
I am constantly in a bad mood.						
I am not happy about anything.		1.44	0.68	1	4	
I feel like I am good for nothing.		1.69	0.49	1	4	
		1.68	0.4	1	4	
Depression scale (w7):						
Nothing good awaits me in the future.	241					0.876
I am constantly in a bad mood.		1.32	0.6	1	4	
I am not happy about anything.						
I feel like I am good for nothing.		1.62	0.74	1	4	
		1.61	0.8	1	4	
		1.82	0.63	1	4	

Note. α = Cronbach's alpha

Analysis

Measurement invariance testing

Before building a longitudinal structural model, it is necessary to have a complete understanding of all the measurement properties of the latent variables used in the analysis. For this purpose, it is necessary to find out how stable over time all measurement properties are, which is called measurement invariance (MI), in order not to assume changes in measurement properties as hypothesized changes in the level of construct [Newsom, 2015]. In other words, MI analysis must be performed to ensure that the interpretation of the latent variables is valid across multiple time points.

To test MI, it is necessary to estimate increasingly constrained CFA models, namely the configural invariance model, the metric invariance model, the scalar invariance model, and the strict invariance model. The configural model is a CFA model fitted without any equality constraints. The metric model is a constrained version of the configural model, where the factor loadings are assumed equal across different time points, but the intercepts are allowed to vary between different time points. The scalar model is a constrained version of the metric model, where both the factor loadings and intercepts are assumed to be equal across different time points. Finally, the strict invariance model is a constrained version of the scalar model where the factor loadings, intercepts, and residual variances are fixed across different time points. Strict invariance is often very difficult to establish in practice.

Models for invariance measurement were established for three latent constructs: Monitoring, Attachment for Waves 1 and 6, and Depression for Waves 5 and 7. Fit indices for all models are presented in Table 4.

Table 4. Measurement invariance analysis

Model	*df*	CFI	TLI	RMSEA	SRMR
Configural (monitoring)	8	0.993	0.986	0.038	.019
Metric (monitoring)	10	0.983	0.975	0.051	0.028
Scalar full (monitoring)	12	0.983	0.979	0.047	0.029
Partial scalar invariance (monitoring)	11	0.995	0.994	0.025	0.02
Configural (attachment)	19	0.959	0.924	0.036	0.025
Metric (attachment)	22	0.955	0.932	0.034	0.036
Scalar full (attachment)	25	0.794	0.743	0.066	0.045
Partial scalar invariance (attachment)	24	0.943	0.922	0.037	0.037
Configural (depression)	19	0.972	0.958	0.043	0.035
Metric (depression)	22	0.993	0.991	0.02	0.036
Scalar full (depression)	25	0.989	0.987	0.024	0.038

df Degrees of freedom, *CFI* Comparative Fit Index, *TLI* Tucker Lewis Index
RMSEA Root-mean-square error of approximation
SRMR Standardized square root mean residual

Measurement invariance was tested using the R software and package “lavaan”. Latent construct fit indices indicated a good model fit for the configural model (CFI = 0.993; TLI = 0.986; RMSEA = 0.038). The factor loadings were set to be equal across different time points, and the metric invariance model was tested. Although fit indices show quite good fit (CFI = 0.983; TLI = 0.975; RMSEA = 0.051), the chi-square difference test between two models was significant ($p < 0.01$), which means that after making factor loadings equal across time points, model fit changed substantially and therefore the metric invariance could not be confirmed. The next step was to try to establish partial MI. For that, we identify which fixed parameters should be released to improve the fit of the metric model. Further steps showed that

there are two potentially influential parameters that should be released: factor loadings for item 3 in Wave 1 and item 3 in Wave 6. After releasing these parameters, the chi-square difference test became insignificant ($p = 0.7$), and therefore the partial metric MI was established. The scalar invariance model, where factor loadings and intercepts were set to be equal across time points, was then tested. Despite good fit (CFI = 0.983; TLI = 0.979; RMSEA = 0.047), the chi-square difference test again was significant ($p < 0.01$), and further analysis showed that factor loadings for item 3 in Wave 1 and item 3 in Wave 6 are the influential parameters that should be released. After releasing them, the new partial scalar invariance model was tested. Along with the good model fit (CFI = 0.995; TLI = 0.994; RMSEA = 0.025), the chi-square test became insignificant ($p = 0.48$). Thus, the partial scalar MI for the monitoring scale was confirmed.

Similar procedures were performed to test MI for latent construct attachment. Firstly, the configural model was tested, demonstrating quite good model fit (CFI = 0.909; TLI = 0.865; RMSEA = 0.048). After that, all factor loadings were set to be equal across different time points, and the metric model was tested. The metric model demonstrated good fit (CFI = 0.945; TLI = 0.931; RMSEA = 0.034), and the chi-square test was insignificant ($p = 0.33$). This means that the metric model fits the data as well as the configural one, and thus the metric MI was established. Intercepts were added to the list of parameters constrained to be equal between time points, and the scalar invariance model was tested. The model fit for the scalar model was not good (CFI = 0.874; TLI = 0.859; RMSEA = 0.049), and the chi-square difference test was significant ($p < 0.001$), signifying that the scalar MI could not be established. Further analysis revealed that there are four influential parameters: fixed intercepts for item 1 in Wave 1 and Wave 6, and item 3 in Wave 1 and Wave 6. Initially, it was decided to handle the most influential parameters (item 1 in Wave 1 and Wave 6). After releasing these parameters, the new scalar model demonstrated good fit (CFI = 0.941; TLI = 0.931; RMSEA = 0.034), and the chi-square test became insignificant ($p = 0.24$). It means that there is partial scalar MI.

The latent constructs of Monitoring and Attachment are valid to be used for longitudinal analysis because partial scalar measurement invariance was confirmed for these scales.

Finally, the Depression scale was tested for MI. Unlike the Monitoring and Attachment scales, the Depression scale was only included in the survey in Waves 5 and 7 of the study. As previously, a configural model was constructed first, where all parameters were released and no equality constraints were applied. The configural model demonstrated a good fit

(CFI = 0.972; TLI = 0.958; RMSEA = 0.043). Next, a metric model was constructed where all factor loadings are fixed. The model fit for the metric model was also good (CFI = 0.993; TLI = 0.991; RMSEA = 0.02), and the chi-square test was insignificant (p = 0.9). It means that the metric model fits the data as well as the configural one, and thus the metric MI can be established for this scale. Further, the intercepts were fixed across time points, and the scalar model was tested. As with configural and metric models, the model fit for this model was also good (CFI = 0.989; TLI = 0.987; RMSEA = 0.024). The chi-square difference test was insignificant (p = 0.17), meaning the scalar measurement was invariant. The results of the MI tests suggest that the most robust of the three latent constructs is Depression, as its overall fit across all models was good and, more importantly, only for this scale was scalar measurement invariance confirmed, while for Monitoring and Attachment only partial scalar measurement invariance could be established. This is most likely due to the fact that the time interval between measurements of the scales is different and while two and a half years passed between the monitoring and attachment scales (Waves 1 and 6), only a year passed between Waves 5 and 7, in which depression was measured.

Structural equation modeling

After testing the scales for MI, we tested the effects of Monitoring, Attachment, and Depression on adolescent alcohol consumption using SEM. Models describing the frequency of **alcohol use** are shown in Figures 1 and 2, and models describing the frequency of **binge drinking** are shown in Figures 3 and 4. The hypothesized structural models are based on theory and the literature [Akers & Jennings, 2015; Andrade et al., 2019; Hirschi, 2017; Kytle & Bandura, 1978] and cover three and a half years—the entire educational period of students in vocational schools. SEM was performed in the R program using the "lavaan" package to evaluate how the models fit the data and also to check the direct and indirect effects of the variables on alcohol consumption. SEM was based on Kline's [Kline, 2016] techniques describing the construction of models with latent constructs, a categorical dependent variable, and also on Newsom's [Newsom, 2015] techniques describing longitudinal structural modeling with fixed effects. The overall model fit was tested with multiple goodness-of-fit indices: CFI, TLI, and RMSEA. The chi-square divided by the degrees of freedom (CMIN/DF) was also used as a measure of model fit. An adjusted r-square was calculated, showing the proportion of dispersion of the dependent variable that was explained using the proposed model. The data used in this study are clustered because the data on students comes from 13 vocational schools. In order to take this into

account, fixed effects were added to the model, but this did not change the results. The gender and age of respondents were also included in the model as control variables.

Results

Descriptive statistics

Descriptive statistics are presented in Table 5. The initial sample consisted of 1,299 students, but after removing all missing and incorrect answers, the total number of responses used in the analysis was 641 for models 1 and 2 and 241 for models 3 and 4. Among these, 282 (44%) were female and 359 (56%) were male in models 1 and 2 (without Wave 7), and 89 (37%) females and 152 (63%) males in models 3 and 4, where the data from all four waves is used. The distribution of alcohol consumption differs markedly between different waves. The distribution of answers for Wave 1 indicates that the majority of students (45%) report having never, or almost never, tasted alcohol in the last six months. The distribution of answers then begins to decrease significantly; 23 people (5%) consumed "1-2 times a week", 6 people (1.3%) consumed "3-5 times a week", and only 4 people (1%) consumed "every day or almost every day". Regarding the frequency of drinking, the distribution in Wave 1 was not significantly different from the distribution of binge drinking: (52%) reported "having never, or almost never, had four or more alcoholic beverages at one time in the last six months," 12 people (3.5%) consumed "1-2 times a week", 4 people (1%) consumed "3-5 times a week", and there were no students who drank four or more beverages "every day or almost every day". This distribution of responses could be partially related to the fact that the project from which the data were taken had a longitudinal design, and thus the survey was not anonymous. Since underage alcohol consumption is illegal in Russia, some students may have chosen not to report the actual frequency of alcohol consumption because of concerns about possible consequences.

Table 5. Descriptive statistics

Variables	*N (%)*	*Mean*	*SD*	*Min*	*Max*
Age	359	16.2	0.91	15	28
	282	16.2	0.77	15	22
Gender					
Males	359 (56%)				
Females	282 (44%)				
Alcohol consumption (w1)	1080	1.17	1.37	1	7
Alcohol consumption (w5)	771	1.8	1.57	1	7
Alcohol consumption (w6)	641	1.91	2.2	1	7
Alcohol consumption (w7)	241	1.66	1.14	1	7
Alcohol consumption – drinking (w1)	1080	1.13	1.25	1	7
Alcohol consumption – drinking (w5)	771	1.4	1.3	1	7
Alcohol consumption – drinking (w6)	641	1.72	1.6	1	7
Alcohol consumption – drinking (w7)	241	1.45	1.22	1	7

Note. α = Cronbach's alpha

Models predicting adolescent alcohol consumption

A total of four main structural models were constructed predicting the alcohol consumption of adolescents who are students at St. Petersburg vocational schools. The main predictors in the model Attachment, Monitoring, and Depression. Respondents' gender and age were added to the analysis as control variables. Figures 1 and 2 show the models that use data from Waves 1, 5, and 6. As an outcome for the alcohol consumption in the first model, it is the alcohol use, and in the second model, it is binge drinking. The first model shows good fit (CMIN/DF = 3.625; CFI = 0.984; TLI = 0.98; RMSEA = 0.017; and SRMR = 0.043) and explains approximately 6 % of the variance of alcohol use in Wave 1, about 19 % in Wave 5, and 45 % in Wave 6. Monitoring in Wave 1 had a significantly negative (-0.37) effect on alcohol use in Wave 1 but had insignificant coefficients on alcohol use in Waves 5 and 6. The coefficient on the effect of monitoring in Wave 6 on alcohol use was also insignificant. Attachment significantly increased (0.53) the level of monitoring, and this positive relationship (0.6) was also observed between Attachments in Wave 6 and Monitoring in Wave 6. For Wave 5, Depression significantly increases (0.26) adolescent alcohol use. In addition, Attachment in Wave 1 is significantly negatively related (-0.35) to Depression in Wave 5. The first model is presented in Figure 1.

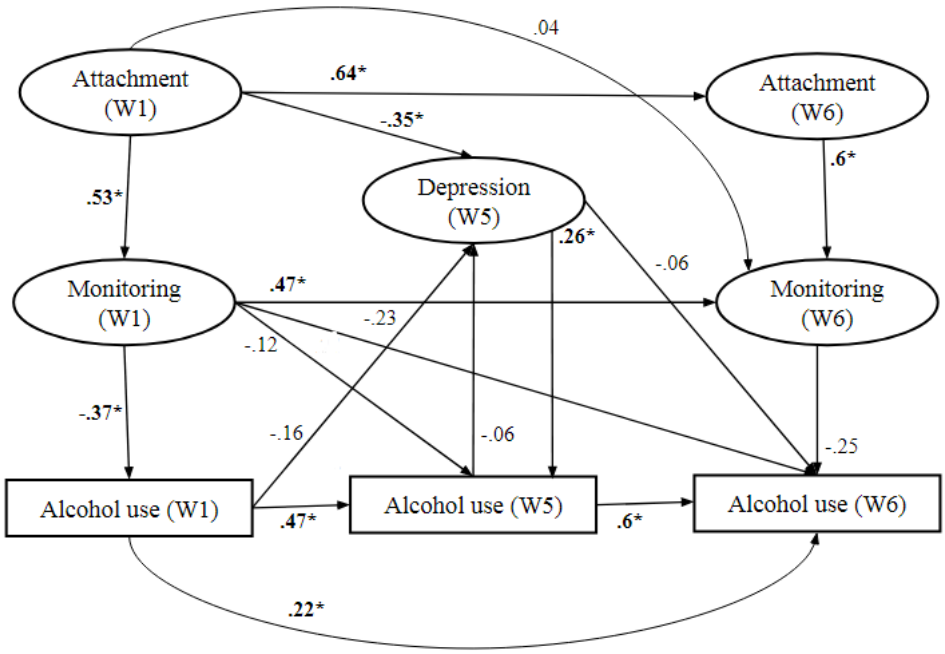

Figure 1. Alcohol use (without Wave 7)

The second model, predicting the frequency of binge drinking in adolescents, shows similar results to the first model, with one exception: in this model, the relationship between Depression and binge drinking was found to be insignificant. For the other coefficients, as in the first model, Monitoring in Wave 1 is significantly and negatively (-0.31) related to drinking in Wave 1, in Wave 6 this relationship is no longer significant. Attachment is significantly and positively related to the level of Monitoring in Waves 1 and 6. The model predicting the frequency of adolescent binge drinking also shows good fit (CMIN/DF = 3.312; CFI = 0.98; TLI = 0.975; RMSEA = 0.019; and SRMR = 0.043) and explains 5 % of binge drinking in Wave 1, 15 % in Wave 5, and about 40 % in Wave 6. The second model is presented in Figure 2.

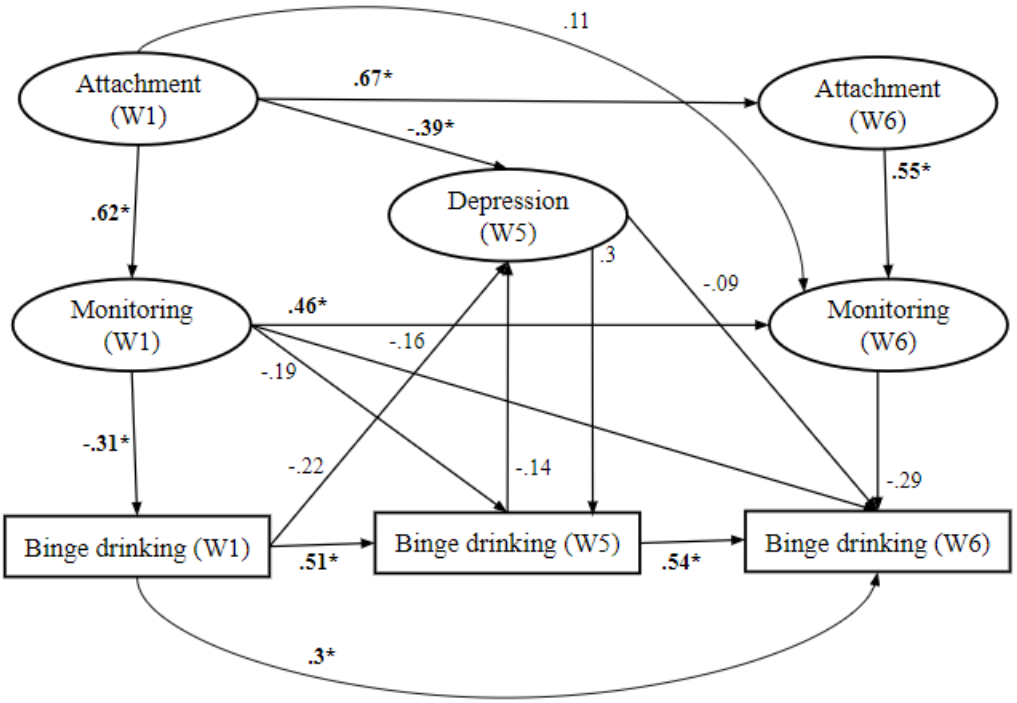

Figure 2. Binge drinking (without Wave 7)

Models 3 and 4 (see Figs. 3 and 4) add data from Wave 7, so the total number of observations in these waves is much smaller than in Models 1 and 2, with only 241 respondents. Wave 7 includes data on students' levels of Depression and their drinking behavior. Model 3, which describes the relationship between Monitoring and Depression to adolescent alcohol consumption, shows a good fit (CMIN/DF = 2.914; CFI = 0.997; TLI = 0.997; RMSEA = 0.005; and SRMR = 0.055). Among the variables added to this model for Depression and

alcohol consumption in Wave 7, only the positive relationship (0.6) between Depression in Wave 5 and Depression in Wave 7 and between alcohol use in Wave 7 and alcohol use in the other waves was significant. The model explains about 4 % of the variance in alcohol use in Wave 1, about 20 % of alcohol consumption in Wave 5, 55 % in Wave 6, and about 40 % in Wave 7. Similar results are observed in Model 4, which describes the frequency of binge drinking. This model also shows good fit (CMIN/DF = 2.899; CFI = 0.969; TLI = 0.963; RMSEA = 0.018; and SRMR = 0.057) and explains about 3 % of students' binge drinking in Wave 1, about 19 % of drinking consumption in Wave 5, about 40 % in Wave 6, and 35 % in Wave 7.

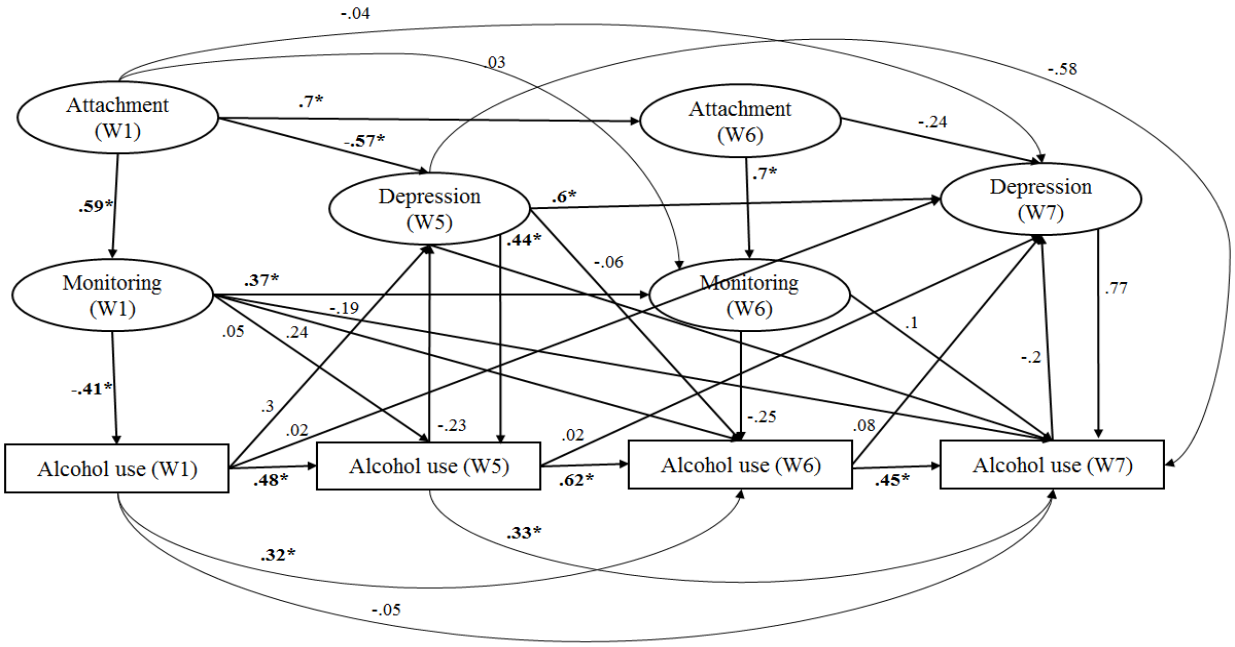

Figure 3. Alcohol use (all waves)

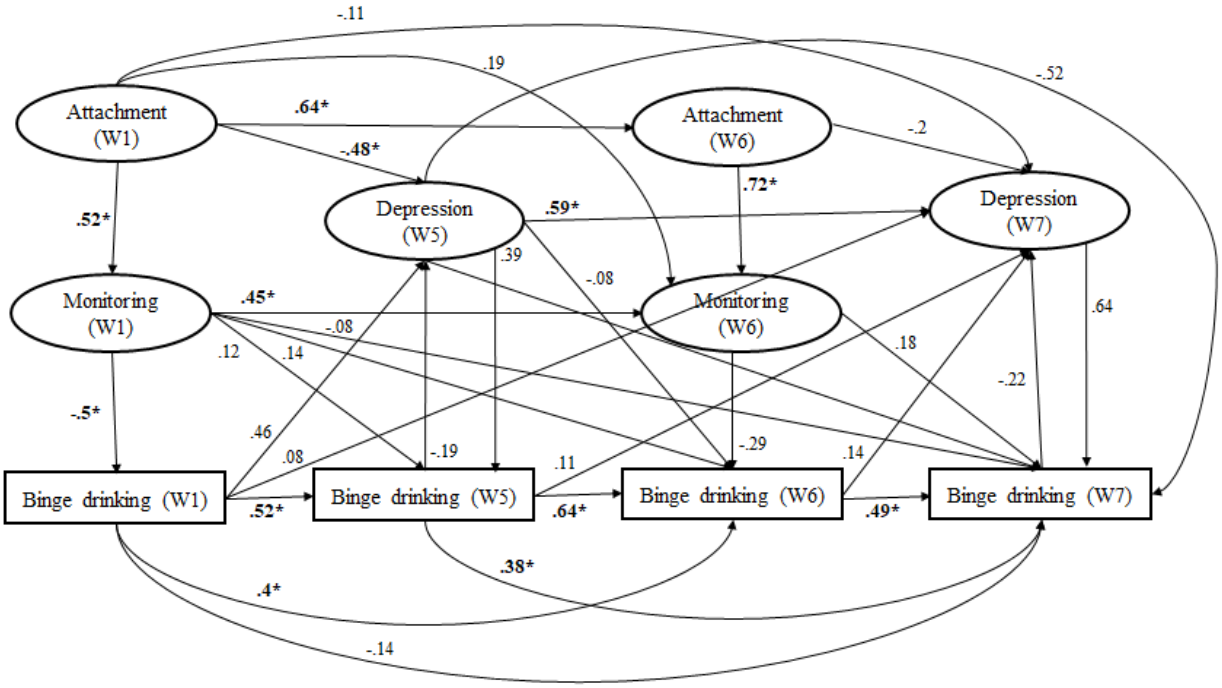

Figure 4. Binge drinking (all waves)

Discussion

This paper explored the relationship between parental monitoring, emotional attachment to parents, the level of adolescent depression, and the alcohol consumption of vocational school students. SEM was used to analyze these constructs simultaneously. The article presents four models, two of which (Figures 1 and 2) cover the period of Waves 1, 5, and 6, while the other two (Figures 3 and 4) are supplemented with data from Wave 7. Wave 1 of the survey was when adolescents first enrolled in vocational school, at the beginning of their freshman year; Waves 5 & 6 represent the beginning and second half of students' third year (their senior year); and Wave 7 represents the six-month period after students graduate from vocational school.

Two latent constructs were analyzed regarding parental influence on adolescent alcohol consumption, representing respondents' perceptions of the level of parental monitoring and their emotional attachment to parents. Monitoring appeared to be significantly negatively related to adolescent alcohol consumption, and this relationship was observed for both outcomes: alcohol use and binge drinking. The findings are consistent with other research findings about the preventive effect of parental monitoring on adolescent alcohol consumption [Brooks-Russell et al., 2015; Ryan et al., 2010], confirming the basic assumptions of control theory—the influence of parents on adolescent risk behaviors [Nye, 1958]. Nevertheless, the

direct influence of parental monitoring on adolescent alcohol consumption was significant in Wave 1, but in Wave 6, this influence was insignificant. Perhaps this can be explained by the fact that, as a rule, most students are over 18 by their third year; when drinking alcohol becomes legal for them and they can tell their parents about it. In other words, monitoring by parents is no longer a significant preventive factor for third-year students' alcohol consumption. In our study, monitoring is not an active form of parental control but rather a general level of information that parents have regarding their child's activities. Therefore, the mere fact that parents are aware of an adolescent's alcohol consumption after age 18 is no longer a significant factor. If the paper had considered other forms of parental control involving active parental action (e.g., punishment), then the significance of parental control in preventing alcoholic consumption might have persisted even after the students turned 18.

In contrast to Monitoring, no direct connection was established between Attachment and alcohol consumption. The only thing one can observe is a mediated negative effect, appearing only in Wave 1, where parental monitoring acts as a mediator. In other words, the stronger the adolescent's attachment to parents, the more aware parents are of how their child spends their free time and about their friends, and this, in turn, has a negative effect on alcohol consumption. The finding Attachment (indirectly) reduces adolescent drinking is consistent with the basic principles of many control theories [Nye, 1958; Cernkovich & Giordano, 1987]. Nevertheless, although the effect of Monitoring in Wave 6 was found to be insignificant, the direct positive relationship between Attachment and Monitoring was significant. This robust relationship between Attachment and Monitoring can be explained by the fact that, regardless of the adolescent's age, the closer the adolescent's relationship with their parents, the more information parents have about how their child spends time with friends and spends pocket money.

Several conclusions can be drawn about the influence of depression on adolescent alcohol behavior. First, at the time Wave 5, there is a significant positive influence of Depression on the alcohol consumption of adolescents, but in models describing drinking, this relationship is already insignificant. In some part, these results support the basic premise of Stress Coping theory, which holds that adolescents use alcohol to help cope with stress and depression. The second important finding regarding depression is that emotional attachment to parents significantly reduces adolescents' depression. In other words, the more intimate an adolescent's relationship with their parents, the less their susceptibility to depressive states. These results correspond to Attachment theory which says the quality of attachment to parents

may buffer children from potential feelings of emotional stress associated with the many transitions typical of adolescence—*the buffering hypothesis* [Armsden and Greenberg, 1987; Papini & Roggman, 1992; Bowlby, 1982].

Limitations

Adolescent alcohol consumption involves a great variety of social (and other) factors that contribute to adolescent alcohol use. Although the current models fit the data well and are able to explain a large proportion of the variance in vocational students' alcohol consumption, they do not describe the influence of other significant factors regarding adolescent alcohol consumption, such as motives, personal characteristics, or genetic predisposition [Martin, Inchley & Currie, 2019; Gallego et al., 2018]. It is important to understand that the relationships among variables observed in the models are only relevant for the given set of variables and that the observed significant relationships will not necessarily remain so when other significant factors are added to the analysis to predict adolescent risk behaviors.

A second important limitation of the study is that the respondents are students of vocational and technical schools, and therefore the results obtained in the study cannot be fully transferred to adolescents who have continued their education in high school and are about to enter higher education institutions. This is because adolescents who choose working-class educational pathways exhibit different behaviors than their high school or university peers [Lushin et al., 2017; Hanke et al., 2013]. In addition to this limitation, the parental monitoring scale used in this paper actually reflects the level of monitoring by the mother, as the questions in the questionnaire asked specifically about how aware the student's mother was of the student's friends and freetime activities. This does not allow the resulting monitoring effects to be equated with the situation if both parents were considered, as there are a number of research papers that describe how the relationship with each parent can have different effects on both adolescent behaviors in general and individually for boys and girls [Luk et al., 2017].

Finally, the most notable limitation of the paper in technical terms is that the last two models use a database almost three times smaller than models 1 and 2. This is because models 3 and 4 added data from the last wave of the “Health and Risky Consumption of Adolescents” project, which was conducted six months after graduation. Unlike previous waves, this survey was no longer administered at institutions; the questionnaires were mailed to respondents. This

was most likely the reason for such a marked difference in the number of observations, even between Waves 1, 5, and 6, used in the first two models, and Wave 7.

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