DOI: https://doi.org/10.17816/humeco642723

The prevalence of unhealthy habits in residential areas and personal social circles is associated with smoking and alcohol consumption among young adults

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ABSTRACT

BACKGROUND: The impact of the prevalence of unhealthy habits in a person's living environment on the individual likelihood of smoking and alcohol consumption in Russia remains understudied.

AIM: To analyze the associations of smoking and alcohol consumption with the prevalence of unhealthy habits in residential areas and personal social circles.

MATERIALS AND METHODS: A cross-sectional study was conducted in 2022–2023 in six Russian regions, involving students in secondary and higher educational institutions. The study included 2015 men and women aged 25 years and younger. All variables were obtained through a survey method. Associations were assessed using logistic and ordinal regression analysis. Odds ratios (OR) and 95% confidence intervals (CI) were calculated.

RESULTS: Living in an area with low levels of visible alcohol consumption was associated with a lower individual likelihood of smoking (OR = 0.67; 95% CI: 0.48–0.93), alcohol consumption (OR = 0.57; 95% CI: 0.43–0.76), and with lower cigarette consumption and alcohol intake volumes. An increase in the number of smokers in a person's close social circle was associated with smoking (OR = 1.74; 95% CI: 1.61–1.88), alcohol consumption (OR = 1.39; 95% CI: 1.30–1.48), higher cigarette consumption, and greater alcohol intake. A higher number of alcohol consumers in one's immediate social environment was also associated with smoking (OR = 1.13; 95% CI: 1.06–1.22), alcohol consumption (OR = 1.13; 95% CI: 1.05–1.22), and greater alcohol intake.

CONCLUSION: The frequency of unhealthy habits within close social circles and the level of visible alcohol consumption in residential areas are associated with the individual likelihood and volume of smoking and alcohol consumption among Russian students.

Keywords: smoking; alcohol; youth; students; residential area; social circle.

To cite this article:
Maksimov SA, Kotova MB, Tsagan-Mandzhieva GN, Kurakin MS, Kostina NG, Kolesnikov VN, Suvorov VV, Nesyna SV, Nikulina MA, Agayan VA, Pinchuk YuS, Drapkina OM. The prevalence of unhealthy habits in residential areas and personal social circles is associated with smoking and alcohol consumption among young adults. *Ekologiya cheloveka (Human Ecology).* 2024;31(7):542–552. DOI: https://doi.org/10.17816/humeco642723

Received: 09.12.2024 **Accepted:** 23.01.2025 **Published online:** 28.01.2025

DOI: https://doi.org/10.17816/humeco642723

Распространённость вредных привычек в районе проживания и в личном окружении ассоциируется с курением и употреблением алкоголя молодёжью

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АННОТАЦИЯ

Обоснование. Влияние распространённости вредных привычек в среде обитания человека на индивидуальную вероятность курения и употребления алкоголя в России недостаточно изучено.

Цель. Анализ ассоциаций курения и употребления алкоголя с частотой вредных привычек в районе проживания и личном окружении.

Материалы и методы. Одномоментное исследование проведено в 2022–2023 гг. в шести регионах России среди учащихся средних и высших учебных заведений. В исследование вошли 2015 мужчин и женщин до 25 лет включительно. Все исследуемые показатели получены опросным методом. Оценку ассоциаций проводили с помощью логистического и порядкового регрессионного анализа. Рассчитывали отношение шансов (ОШ) и 95% доверительный интервал (ДИ).

Результаты. Проживание в районе с низким открытым потреблением алкоголя ассоциируется со снижением индивидуальной вероятности курения (ОШ=0,67; 95% ДИ: 0,48–0,93), употребления алкоголя (ОШ=0,57; 95% ДИ: 0,43–0,76), а также количества сигарет и объёмов алкоголя. Увеличение в ближайшем круге общения количества курящих ассоциируется с курением (ОШ=1,74; 95% ДИ: 1,61–1,88), потреблением алкоголя (ОШ=1,39; 95% ДИ: 1,30–1,48), количеством сигарет и объёмом алкоголя. Увеличение в ближайшем окружении количества употребляющих алкоголь ассоциируется с курением (ОШ=1,13; 95% ДИ: 1,06–1,22), потреблением алкоголя (ОШ=1,13; 95% ДИ: 1,05–1,22), а также с объёмом алкоголя.

Заключение. Частота вредных привычек в ближайшем круге общения и уровень открытого потребления алкоголя в районе проживания ассоциируются с индивидуальной вероятностью и объёмами курения и употребления алкоголя российскими учащимися.

Ключевые слова: курение; алкоголь; молодёжь; учащиеся; район проживания; круг общения.

Как цитировать:
Максимов С.А., Котова М.Б., Цаган-Манджиева Г.Н., Куракин М.С., Костина Н.Г., Колесников В.Н., Суворов В.В., Несына С.В., Никулина М.А., Агаян В.А., Пинчук Ю.С., Драпкина О.М. Распространённость вредных привычек в районе проживания и в личном окружении ассоциируется с курением и употреблением алкоголя молодёжью // Экология человека. 2024. Т. 31, № 7. С. 542–552. DOI: https://doi.org/10.17816/humeco642723

Рукопись поступила: 09.12.2024 **Рукопись одобрена:** 23.01.2025 **Опубликована online:** 28.01.2025

DOI: https://doi.org/10.17816/humeco642723

居住地区及个人社交圈中不良习惯的流行与青少年吸烟和饮酒行为的相关性

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摘要

背景。俄罗斯居住环境中不良习惯的普及程度对个体吸烟和饮酒可能性的影响仍研究不充分。

研究目的。研究吸烟和饮酒行为与居住地区及个人社交圈内不良习惯的普及程度之间的相关性。

材料与方法。本研究为横断面研究，于 2022–2023 年在俄罗斯六个地区的中等和高等院校学生中进行。研究对象包括 2015 名年龄不超过 25 岁的男性和女性。所有研究数据均通过问卷调查收集。采用逻辑回归分析和有序回归分析评估相关性，并计算优势比（OR）及 95% 置信区间（CI）。

结果。居住在低公开饮酒率地区的个体，其吸烟（OR=0.67，95% CI: 0.48–0.93）和饮酒（OR=0.57，95% CI: 0.43–0.76）的可能性较低，同时该因素还与吸烟数量和饮酒量的减少相关。在个人社交圈中，吸烟者数量的增加与个体吸烟（OR=1.74，95% CI: 1.61–1.88）、饮酒（OR=1.39，95% CI: 1.30–1.48）、吸烟数量和饮酒量的增加相关。此外，个人社交圈中饮酒者数量的增加与个体吸烟（OR=1.13，95% CI: 1.06–1.22）、饮酒（OR=1.13，95% CI: 1.05–1.22）及其饮酒量的增加存在统计学显著相关性。

结论。个人社交圈内不良习惯的普及程度以及居住地区的公开饮酒水平，与俄罗斯在校学生吸烟和饮酒的个人可能性及消费量相关。

关键词：吸烟；饮酒；青少年；学生；居住地区；社交圈。

引用本文:
Maksimov SA, Kotova MB, Tsagan-Mandzhieva GN, Kurakin MS, Kostina NG, Kolesnikov VN, Suvorov VV, Nesyna SV, Nikulina MA, Agayan VA, Pinchuk YuS, Drapkina OM. 居住地区及个人社交圈中不良习惯的流行与青少年吸烟和饮酒行为的相关性. *Ekologiya cheloveka (Human Ecology).* 2024;31(7):542–552. DOI: https://doi.org/10.17816/humeco642723

收到: 09.12.2024 **接受:** 23.01.2025 **发布日期:** 28.01.2025

BACKGROUND

Unhealthy habits are a crucial risk factor for the onset, progression, and outcomes of several noncommunicable diseases, which pose a substantial public health concern. As of 2021, smoking and alcohol abuse were among the top ten contributors to the global burden of disease (expressed as disability-adjusted life years) [1]. Notably, between 2000 and 2021, smoking and alcohol abuse moved up from rank 5 to rank 3 and from rank 12 to rank 10, respectively, with the greatest impact in developed economies. Globally, smoking has decreased, whereas alcohol consumption has increased in recent decades, with considerable differences across regions and countries [2, 3]. According to epidemiological data in Russia, the prevalence of both smoking and alcohol abuse in adults has decreased over the last 15 years [4, 5]. However, unhealthy behaviors cause significant health damage, necessitating preventive approaches to further reduce their prevalence. Health behavior is predominantly formed at a young age, making the search for predictors and prevention strategies in this cohort especially relevant.

In the 1970s, Bronfenbrenner [6] proposed the ecological systems theory, suggesting that an individual's development is driven by the environment, with a lifelong progressive adaptation to a changing environment. This theory holds that human development is influenced by several ecological systems, including the microsystem (family), the mesosystem (school, neighborhood), the exosystem (local external influences), and the macrosystem (social, economic, and political conditions). In the context of noncommunicable disease epidemiology, this theory lays the foundation for an ecosocial model of health, which takes into consideration both the biological component and the social production of disease. For example, the Prospective Urban Rural Epidemiology (PURE) study, one of the largest modern epidemiological studies, suggests that lifestyle behaviors, the onset and progression of noncommunicable diseases, and overall health are influenced at various levels, including the country, community (school, neighborhood), family, and individual [7].

Numerous studies confirm a significant role of the personal network and social environment in the formation of unhealthy habits in adolescents and young adults, in addition to personal characteristics [8–10]. In terms of behavioral psychology, this impact can be explained by the theory of planned behavior proposed by Ajzen [11]. According to this theory, an individual's behavioral intentions are shaped by their attitude, subjective norms, and perceived behavioral control. The subjective norm is an individual's perception about the particular behavior, which is influenced by the judgment of significant others (e.g., family or friends). The theory of planned behavior was later expanded to include descriptive norms, i.e., dependence on other people's behavior and adjusting behavioral intentions in order to comply with perceived norms. In other words, "If the others do it, I probably have to do it too." A meta-analysis of studies using the theory of planned behavior revealed that this model can explain, on average, 50% of the variance in intentions and up to 38% of the variance in behavior [12].

In Russia, numerous studies have assessed individual predictors of unhealthy behaviors in youths, including research on the impact of the family and personal network [13–15]. However, no research on the influence of the prevalence of smoking and alcohol consumption in the mesosystem (neighborhood) have been conducted in Russia.

This work aimed to assess the relationships between smoking and alcohol consumption and the prevalence of unhealthy behaviors in the neighborhood and personal network.

METHODS

General Sample Characteristics

The analysis was based on a cross-sectional study conducted in six regions of Russia between 2022 and 2023. The study included vocational school and college students of various specialties (humanities, law, engineering, etc.). A non-random sample was used. The study was conducted in accordance with Good Clinical Practice and the Declaration of Helsinki. Informed consent was obtained prior to the study. The study protocol has been published earlier [16]. The researchers conducted a short survey among students who regularly attended classroom studies. The study included students who agreed to take a survey using a special modular questionnaire. The study included 2,015 intramural and extramural students of both sexes aged 15–25 years who lived in Kaliningrad (n = 217), Kemerovo (n = 802), Rostov (n = 274), and Saratov (n = 247) regions, Republic of Karelia (Petrozavodsk, n = 227), and Yamalo-Nenets Autonomous District (Salekhard, n = 248). Regions were selected based on their representation of the federal district and the availability of study sites.

Individual Smoking and Alcohol Consumption Habits

All variables were obtained through a survey method. In terms of smoking status, participants were classified as smokers (at least one cigarette per day) or non-smokers. Weekly tobacco use (cigarettes, e-cigarettes, etc.) was totaled across all types of tobacco products and grouped into quartiles: <21 (1st quartile), 22–50 (2nd quartile), 51–104 (3rd quartile), and ≥105 (4th quartile).

In terms of alcohol consumption, participants were classified as those who drank or did not drink alcohol in the last year. Respondents who drank alcohol were asked to specify the type, frequency, and volume of consumed alcoholic beverages, and the average individual consumption was calculated. Because different alcoholic beverages vary in their alcohol content, the volume of consumed alcohol in

milliliters was converted to grams of pure alcohol. Based on Russian epidemiological studies [5], the following alcohol content estimates were used: 0.0400 for beer, 0.0927 for dry and sparkling wine, 0.1227 for fortified wine, and 0.3227 for vodka, brandy, and other hard liquor. The alcohol content in grams for different alcoholic beverages was then totaled, converted to daily average consumption, and grouped into tertiles: <1.25 g/day, 1.251–6.0 g/day, and ⩾6.01 g/day.

Other Personal Characteristics

Sociodemographic covariates included sex, age, citizenship (Russia/other), educational institution (vocational school/college), and study year (1/2–5). Low, medium, and high income groups were formed based on responses that best described the family's financial capability.

Smoking and Alcohol Consumption in the Neighborhood and Personal Network

The neighborhood's smoking and alcohol consumption rates were assessed using the following questions: "How often do you see people smoking cigarettes (including e-cigarettes) in your neighborhood?" and "How often do you see people drinking alcohol in your neighborhood?". The questions included the following categories: "walking down the street," "near house or office entrances," "at playgrounds," "at bus stops," "in coffee shops, restaurants, and bars," "smoking women," and "smoking teenagers." Four response categories were used: frequently (1 point), occasionally (2 points), seldom (3 points), and never (4 points). The scores were then summed (7–28 points) and grouped into tertiles: high, moderate, and low smoking and alcohol consumption rates in the neighborhood.

The prevalence of smoking and alcohol consumption in respondents' personal networks was assessed using the following questions: "Please recall five friends, acquaintances, or relatives you most frequently associate with. How many of them regularly smoke/drink alcohol?". A quantitative variable ranging from 0 to 5 was used.

Statistical Analysis

Qualitative variables are presented as percentages, whereas quantitative variables are presented as means and standard deviations. Differences in qualitative parameters were assessed using the Pearson's chi-squared test. Differences in quantitative parameters for two groups and three or more groups were assessed using the Mann—Whitney test and the Kruskal—Wallis test, respectively. The Bonferroni correction was used for multiple comparisons. Spearman correlation analysis was used to assess the relationships between two quantitative parameters.

Logistic regression analysis was used for multifactorial assessment of associations with smoking and alcohol consumption. Ordinal regression was used to analyze associations with the number of tobacco products used and alcohol content. Associations are presented as odds ratios (OR) and 95% confidence intervals (CI). To adjust for possible modifications, all sociodemographic characteristics, dummy variables for regions, and a dummy variable for the study year (2022 and 2023) were used as covariates in regression models. All predictors and covariates were added to regression models simultaneously. The Wald test was calculated to assess the role of predictors in the probability of smoking and drinking alcohol. The significance level was at $p = 0.05$. SPSS Statistics was used for statistical analysis.

RESULTS

The sample had the following sociodemographic characteristics: 63.7% females, 92.7% Russian citizens, 69.2% college students, 40.8% first-year students, 86.8% intramural students, 13.3% with low family income, and 34.5% with medium family income. Overall, 25.4% (511 participants) smoked and 54.3% (1,095 participants) drank alcohol in the last year.

Lower smoking and alcohol consumption rates in the neighborhood were associated with lower individual smoking and alcohol consumption rates reported by participants (Table 1). For example, respondents living in neighborhoods with low smoking rates smoke and drink alcohol significantly less frequently (16.6% and 43.6%, respectively) than those living in neighborhoods with moderate (28.2% and 59.2%) and high (30.8% and 58.2%) smoking rates. A decrease in smoking rates in the neighborhood significantly increases the proportion of participants with low alcohol consumption rates (1st tertile), while decreasing the proportion of participants with high alcohol consumption rates (3rd tertile). There were no significant differences in the number of cigarettes depending on the neighborhood.

A decrease in alcohol consumption rates in the neighborhood is associated with a significant linear decrease in the proportion of participants who smoke (from 34.1% to 25.9% and 16.6%) and drink alcohol (from 65.0% to 56.2% and 42.6%). A decrease in alcohol consumption rates in the neighborhood increases the proportion of participants with low smoking/alcohol consumption rates, while decreasing the proportion of participants with high smoking/alcohol consumption rates.

Smoking and alcohol consumption rates, as well as the number of cigarettes and alcohol content, are associated with a similar prevalence of unhealthy behaviors in respondents' personal networks (Table 2). For example, respondents who smoke more frequently have people who smoke (3.7 ± 1.5 and 1.9 ± 1.7, respectively; $p < 0.001$) and drink alcohol (2.0 ± 1.8 and 0.9 ± 1.4, respectively; $p < 0.001$) in their personal networks, compared to respondents who do not smoke. Similarly, respondents who drink alcohol more frequently have people who smoke (2.9 ± 1.7 and 1.7 ± 1.7, respectively; $p < 0.001$) and drink alcohol (1.6 ± 1.7 and 0.8 ± 1.3, respectively; $p < 0.001$) in their personal networks, compared to respondents who do not drink alcohol. Moreover,

Table 1. Prevalence and characteristics of smoking and alcohol consumption in students depending on the neighborhood

Individual smoking/alcohol consumption habits		Smoking rate in the neighborhood, % (*n*)				Alcohol consumption rate in the neighborhood, % (*n*)			
		High	Moderate	Low	*p*	High	Moderate	Low	*p*
Smoking (*n* = 2.015)		30.8 (180)	28.2 (233)	16.6 (98)	<0.001	34.1 (238)	25.9 (152)	16.6 (121)	<0.001
Number of cigarettes (*n* = 511)	1–21	24.4 (44)	24.9 (58)	31.7 (31)	0.100	24.8 (59)	25.0 (38)	29.8 (36)	0.005
	22–50	20.6 (37)	28.3 (66)	24.5 (24)		20.6 (49)	27.6 (42)	29.8 (36)	
	51–104	22.8 (41)	23.6 (55)	26.5 (26)		26.9 (64)	16.4 (25)	27.3 (33)	
	⩾105	32.2 (58)	23.2 (54)	17.3 (17)		27.7 (66)	30.9 (47)	13.2 (16)	
Alcohol consumption (*n* = 2.015)		58.3 (350)	59.2 (488)	43.6 (257)	<0.001	65.0 (454)	56.2 (330)	42.6 (311)	<0.001
Alcohol content, g (*n* = 1.095)	<1.25	26.9 (94)	34.0 (166)	40.9 (105)	0.003	26.0 (118)	32.7 (108)	44.7 (139)	<0.001
	1.25–6.0	34.0 (119)	34.6 (169)	31.5 (81)		31.5 (143)	40.6 (134)	29.6 (92)	
	>6.0	39.1 (137)	31.4 (153)	27.6 (71)		42.5 (193)	26.7 (88)	25.7 (80)	

an increase in the number of cigarettes and alcohol content reported by respondents is associated with an increase in the number of people who smoke and drink alcohol in their personal networks (the difference is not significant for the number of cigarettes).

A regression analysis, taking into account respondents' sociodemographic characteristics, showed similar patterns for alcohol consumption in the neighborhood, as well as smoking and alcohol consumption in the personal network (Table 3). For example, living in a neighborhood with low alcohol consumption rates is associated with lower individual rates of smoking (OR 0.67; 95% CI: 0.48–0.93) and alcohol consumption (OR 0.57; 95% CI: 0.43–0.76). Furthermore, respondents who live in a neighborhood with moderate alcohol consumption rates are less likely to consume alcohol (OR 0.74; 95% CI: 0.56–0.97). Living in neighborhoods with low and moderate alcohol consumption rates is associated with fewer cigarettes (only in low-rate neighborhoods) and lower alcohol content reported by respondents.

As the number of people who smoke and drink alcohol in the personal network increases, so do individual smoking and alcohol consumption rates, as well as the number of cigarettes and alcohol content reported by respondents. One exception is that there is no significant association between the number of people who drink alcohol in one's personal network and the number of cigarettes reported by a respondent.

Notably, unlike a univariate analysis, regression models showed no significant associations between smoking rates in the neighborhood and individual likelihood of smoking and alcohol consumption.

Table 2. Average number of people who smoke/drink alcohol in students' personal networks, depending on their unhealthy habits

Individual smoking/alcohol consumption habits		Of the five people in the personal network			
		Smoke		Drink alcohol	
		M ± SD	*p*	M ± SD	*p*
Smoking	No (*n* = 1,504)	1.9 ± 1.7	<0.001	0.9 ± 1.4	<0.001
	Yes (*n* = 511)	3.7 ± 1.5		2.0 ± 1.8	
Number of cigarettes	1–21 (*n* = 133)	3.2 ± 1.5	<0.001[1]	1.9 ± 1.8	0.19
	22–50 (*n* = 127)	3.5 ± 1.5		1.8 ± 1.8	
	51–104 (*n* = 122)	3.8 ± 1.4		2.3 ± 1.9	
	⩾105 (*n* = 129)	4.0 ± 1.3		2.1 ± 1.8	
Alcohol consumption Alcohol consumption	No (*n* = 920)	1.7 ± 1.7	<0.001	0.8 ± 1.3	<0.001
	Yes (*n* = 1,095)	2.9 ± 1.7		1.6 ± 1.7	
Alcohol volume, g Alcohol volume (g)	<1.25 (*n* = 365)	2.3 ± 1.8	<0.001[2]	1.0 ± 1.3	<0.001[2]
	1.25–6.0 (*n* = 369)	2.9 ± 1.6		1.5 ± 1.7	
	>6.0 (*n* = 361)	3.4 ± 1.6		2.3 ± 1.9	

Note: M ± SD, mean ± standard deviation; [1] 1 vs 2, $p = 0.32$; 2 vs 3, $p = 0.32$; 3 vs 4, $p = 0.82$; other $p < 0.05$; [2] all $p < 0.05$.

Table 3. Associations between individual smoking/alcohol consumption habits and the prevalence of unhealthy behaviors in the neighborhood and personal network

Predictor		Individual smoking/alcohol consumption habits							
		Smoking (*n* = 2.015)		Smoking, number (*n* = 511)		Alcohol consumption (*n* = 2.015)		Alcohol, volume (*n* = 1.095)	
		OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*
Smoking rate in the neighborhood (reference: high)	Moderate Medium	0.89 (0.62–1.27)	0.520	0.80 (0.54–1.17)	0.470	1.23 (0.95–1.59)	0.12	0.85 (0.65–1.13)	0.260
	Low Few	1.09 (0.82–1.45)	0.530	0.83 (0.50–1.38)	0.470	0.99 (0.73–1.34)	0.96	0.84 (0.59–1.19)	0.330
Alcohol consumption rate in the neighborhood (reference: high)	Moderate Medium	0.83 (0.62–1.12)	0.220	1.09 (0.73–1.64)	0.670	0.74 (0.56–0.97)	0.028	0.74 (0.56–0.99)	0.042
	Low Few	0.67 (0.48–0.93)	0.016	0.62 (0.40–0.96)	0.032	0.57 (0.43–0.76)	<0.001	0.65 (0.48–0.90)	0.009
Smoke (of five people)		1,74 (1.61–1.88)	<0.001	1.23 (1.09–1.38)	0.001	1.39 (1.30–1.48)	<0.001	1.21 (1.12–1.30)	<0.001
Drink alcohol (of five people)		1,13 (1.06–1.22)	0.001	1.02 (0.92–1.12)	0.740	1.13 (1.05–1.22)	0.001	1.29 (1.20–1.39)	<0.001

Note: OR, odds ratio; CI, confidence interval. All regression models are adjusted for sociodemographic characteristics. Smoking and alcohol consumption rates were assessed using logistic regression; the number of cigarettes and alcohol content were assessed using ordinal regression.

Compared to conventional individual predictors of unhealthy behaviors (sex, age, socioeconomic characteristics), alcohol consumption rates in the neighborhood, as well as unhealthy behavior rates in the personal network, play a significant role. The following factors were ranked 1–3 in terms of their contribution to unhealthy behaviors: smoking in the personal network (199.5), educational institution type (15.4), and alcohol consumption in the personal network (11.7) for the likelihood of smoking; smoking in the personal network (11.0), alcohol consumption in the neighborhood (6.9), and family income (4.9) for the number of cigarettes; smoking in the personal network (101.4), age (17.6), and alcohol consumption in the neighborhood (15.0) for the likelihood of alcohol consumption; and alcohol consumption in the personal network (46.1), smoking in the personal network (25.5), and sex (13.3) for alcohol content.

DISCUSSION

According to the study, the prevalence of unhealthy behaviors in the personal network and alcohol consumption rates in the neighborhood are associated with the individual likelihood and rates of smoking and alcohol consumption among Russian students. The prevalence of unhealthy behaviors in the personal network plays a more significant role than alcohol consumption rates in the neighborhood. A decrease in smoking rates in the neighborhood was associated with lower smoking rates in the univariate analysis; however, the difference was not significant after adjusting for covariates.

Several other studies have confirmed the association between unhealthy behaviors in youths and the prevalence of these unhealthy behaviors in their personal networks. For example, a meta-analysis of 75 studies in 16 countries revealed that smokers in the personal network increase the likelihood of starting (OR 1.96; 95% CI: 1.76–2.19) and continuing (OR 1.78; 95% CI: 1.55–2.05) smoking in adolescents [10]. A meta-analysis of 17 studies revealed that the following factors increase the risk of starting smoking: smoking in parents (OR 1.88; 95% CI: 1.56–2.28), close friends (OR 2.53; 95% CI: 1.99–3.23), siblings (OR 2.44; 95% CI: 1.93–3.08), family/household (OR 1.55; 95% CI: 1.36–1.76), and adults (OR 1.34; 95% CI: 1.02–1.75) [17]. According to an analysis of 11 systematic reviews on smoking in youths, the most valuable predictors for smoking abstinence/cessation were smoking in the family/household, smoking among peers, and social acceptability of smoking [8]. Notably, the perceived prevalence of smoking was considered a predictor of insufficient/inconsistent significance. This indirectly supports our findings, given that smoking rates in the neighborhood determine the perceived prevalence of smoking to some extent. Similar to smoking, several systematic reviews have confirmed the impact of alcohol consumption by parents, peers, and friends [9, 18].

We found no studies assessing the influence of the prevalence of unhealthy behaviors in the neighborhood on individual smoking and alcohol consumption habits. Some studies, however, assess these relationships in larger areas (regions). For example, two reviews use the population-wide prevalence of smoking and alcohol consumption in the region as a predictor of individual smoking and alcohol consumption rates. The population-wide prevalence of alcohol consumption and abuse shows consistent associations with individual alcohol consumption rates. Three studies found that the

prevalence of alcohol consumption and abuse in adults was associated with the likelihood of alcohol consumption and abuse in children and youths.

Another review of seven studies that assessed individual risks of smoking based on regional characteristics revealed an association between the population-wide prevalence of smoking in the region and individual smoking habits [20]. Nine of 14 associations analyzed in these studies were significant; an increase in the population-wide prevalence of smoking increased individual risks of smoking, including in four studies in children and young adults.

Also of interest is a large Russian study in adolescents aged 15–17 years from rural areas of 17 regions. The study revealed that in regions with smoking rates above the Russian average, adolescents more frequently had smoking friends and started smoking earlier [21].

When interpreting the findings, it is important to consider that alcohol consumption rates in the neighborhood and personal network are associated with both individual alcohol consumption and individual smoking habits. Similarly, the prevalence of smoking in the personal network correlates with both individual smoking and individual alcohol consumption habits. Thus, the prevalence of unhealthy behaviors influences both smoking and alcohol consumption. We believe this is due to two factors. First, smoking and alcohol consumption are two types of addictive behavior that are synergistically linked in the general population. Smokers consume alcohol more frequently and in larger amounts than non-smokers, whereas those who drink alcohol smoke more frequently and actively [22, 23]. For example, data from China's National Health Commission for more than 0.5 million individuals indicate that smoking in adolescents is closely associated with alcohol consumption (OR 7.5; 95% CI: 6.9–8.1) [24]. Therefore, the neighborhood and personal network have a synergistic effect on smoking and alcohol consumption.

Second, it is evident that there is a correlation at both the outcome level (i.e., smoking and alcohol consumption rates in respondents) and the predictor level. To interpret the findings, we additionally assessed a correlation between smoking and alcohol consumption rates in the neighborhood and found a direct moderate correlation (correlation coefficient 0.61; $p < 0.001$). There is also a correlation between the number of people who smoke and drink alcohol in the personal network (correlation coefficient 0.44; $p < 0.001$). Therefore, a high prevalence of smoking in the neighborhood/personal network is associated with a similarly high alcohol consumption rate. Generally, this indicates the influence of the environment as a whole, where unhealthy habits characterize different aspects of the same phenomenon, rather than the influence of smoking or alcohol consumption alone.

This study has several limitations, including the cross-sectional design, which prevents assessing the causal effect of the identified associations. At the neighborhood level, respondents with and without unhealthy habits may pay different attention to persons who smoke and drink alcohol, resulting in overestimation or underestimation. In turn, the prevalence of unhealthy behaviors in the personal network may be a consequence of smoking and/or alcohol consumption, rather than a cause.

Notably, the study sample consisted of vocational school and college students. Therefore, it did not include primary technical school students, high-school students, and employed young adults. This limits the extrapolation of study findings to the entire population of youths in Russia.

CONCLUSION

The prevalence of unhealthy behaviors in the personal network and alcohol consumption rates in the neighborhood are associated with the individual likelihood and rates of smoking and alcohol consumption among Russian students. Compared to personal sociodemographic characteristics (sex, age, family income, etc.), the neighborhood has a significant impact on smoking and alcohol consumption rates in youths. The personal network has even more significant influence, actually the highest among the analyzed predictors. Notably, socioeconomic, demographic, and other characteristics of regions included in the study can influence the assessed relationships, necessitating further analysis. The study findings are significant for public health in terms of identifying possible predictors of smoking and alcohol consumption in youths, which can be used for screening in high-risk populations, improving existing prevention strategies, or planning new targeted programs.

ADDITIONAL INFORMATION

Authors' contribution. S.A. Maksimov — research concept and design, writing the text, compilation of the list of literature, statistical data processing; M.B. Kotova — writing the text, editing; G.N. Tsagan-Mandzhieva — writing the text, editing; M.S. Kurakin — collection and processing of material; N.G. Kostina — collection and processing of material; V.N. Kolesnikov — collection and processing of material; V.V. Suvorov — collection and processing of material; S.V. Nesyna — collection and processing of material; M.A. Nikulina — collection and processing of material; V.A. Agayan — collection and processing of material; Y.S. Pinchuk — collection and processing of material. All authors confirm that their authorship meets the international ICMJE criteria (all authors have made a significant contribution to the development of the concept, research and preparation of the article, read and approved the final version before publication).

Funding source. This study was not supported by any external sources of funding.

Competing interests. The authors confirm the absence of obvious and potential conflicts of interest related to the publication of this article.

Patients' consent. Written consent was obtained from all the study participants before the study screening in according to the study protocol approved by the local ethic committee.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. С.А. Максимов — концепция и дизайн исследования, написание текста, составление списка литературы, статистическая обработка данных; М.Б. Котова — написание текста, редактирование; Г.Н. Цаган-Манджиева — написание текста, составление списка литературы; М.С. Куракин — сбор и обработка материала; Н.Г. Костина — сбор и обработка материала; В.Н. Колесников — сбор и обработка материала; В.В. Суворов — сбор и обработка материала; С.В. Несына — сбор и обработка материала; М.А. Никулина — сбор и обработка материала; В.А. Агаян — сбор и обработка материала; В.С. Пинчук — сбор и обработка материала. Все авторы подтверждают соответствие своего авторства международным критериям ICMJE (все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией).

Источник финансирования. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Информированное согласие на участие в исследовании. Все участники до включения в исследование добровольно подписали форму информированного согласия, утверждённую в составе протокола исследования этическим комитетом.

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