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Factors Associated with Higher or Lower Odds of Alcohol, Drug, and Tobacco Consumption Among Final-Year High School Students in Split-Dalmatia County, Croatia

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Abstract

Background: Alcohol, tobacco, and drug use are common among adolescents. The aim of this study was to detect factors associated with the use of these substances among high school students in Split-Dalmatia County (SDC), Croatia. **Methods:** A questionnaire survey was conducted among 1030 final-year high school students in SDC, Croatia, from June to July and from October to December 2020. **Results:** Factors associated with higher odds of alcohol use among our respondents were having ever earned money independently (OR 3.175), conviviality (OR 1.818), self-reported depressive feelings (OR 1.488), a higher amount of pocket money (OR 1.452), and socializing with friends more frequently (OR 1.390), while practicing religion more frequently was associated with a lower risk of drinking (OR 0.870). Having ever earned money independently was also associated with a higher risk of drug use among final-year high school students in SDC (OR 2.369), as were self-reported depressive feelings (OR 1.643), male gender (OR 1.559), parents' divorce status (OR 1.377 per category), going out with friends more frequently (OR 1.351), and mothers with a higher level of education (OR 1.249). Religiosity (OR 0.388) and practicing religion more frequently (OR 0.817) were associated with lower odds of drug use. Factors associated with higher odds of tobacco use among our respondents were going out with friends more frequently (OR 1.949), self-reported depressive feelings (OR 1.767), and parents' divorce status (OR 1.341 per category), while religiosity (OR 0.425), greater success in school (OR 0.536), and higher frequency of playing sports (OR 0.816) were associated with a lower risk of smoking. **Conclusions:** We detected some factors associated with higher or lower odds of substance use among adolescents in SDC. These results could help inform the creation of better and targeted preventive measures to decrease substance use among children and adolescents.

Keywords: alcohol; drugs; tobacco consumption; high school students; higher risk; lower risk; preventive measures

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1. Introduction

Adolescence is the period of life beginning around the onset of puberty and ending with the establishment of relative independence from parents [1]; it also represents a period when alcohol, drug, and tobacco use most often begins [2]. Peer influence plays a significant role in this age group [1] and increases the risk of substance use [3]. Frequent alcohol and marijuana consumption during adolescence can cause brain damage [4], while frequent

tobacco use can cause cardiovascular or ulcer disease and cancer of the larynx, lungs, esophagus, or stomach [5].

Adolescents often consume alcohol under peer influence, to experiment [6], or to cope with depression [7], usually during weekends [7–9] or with friends [10]. Children who have consumed alcohol at an early age [11] and who do not consider drinking to be risky tend to drink during adolescence [12,13].

The importance of good family relationships and parental supervision is emphasized because children who frequently experience conflict with their parents consume alcohol more often [14–16]. Parents with less insight into their children's leisure activities contribute to increased adolescent alcohol and drug consumption [17,18], while stricter parental supervision reduces this risk [19]. Living with siblings who consume alcohol or drugs also increases the risk of substance use among adolescents [17,18,20–23].

Depression [24] and socializing with friends who consume alcohol [10,17] increase the risk of drinking among adolescents. Children who have lower school success rates [16,23,25–28] or greater unexcused school absences [16,28] consume psychoactive substances more often.

Adolescents who have better socioeconomic status [16,29–31], have more pocket money [29,32,33], or earn money independently [29] consume alcohol or marijuana more often [31].

Studies assessing the impact of mothers' or fathers' level of education [14,15,31,34–36], playing sports [15,25,28,34,37–40], place of residence [13,23,41,42], or parents' employment status [7,35,43] have not found uniform results. However, it has been shown that growing up in a violent neighborhood can lead to the development of risky behaviors [44–46] and greater exposure to substances [47,48].

Consumption of one psychoactive substance often leads to the desire to consume other substances [16] or participate in delinquent behaviors [48] and increases the risk of substance use in later life [17].

The above-mentioned studies report different conclusions and undefined factors for risky behaviors among adolescents. Thus, we conducted an extensive explorative study among final-year high school students in Split-Dalmatia County (SDC) to further assess some previously examined and unexplored factors regarding alcohol, drug, and tobacco consumption. We aimed to detect which of the following factors are associated with higher or lower odds of substance use among this study population: gender, place of residence, mothers' and fathers' level of education, parents' employment status, parents' divorce, life community (who they live with), number of children in the family, order of the children in the family, amount of pocket money, scholarship use, independent earnings, school success, playing sports, length of participation in sports, type of sport played, parents' substance use, religiosity, frequency of practicing religion, relationship status, conviviality, frequency of socializing with friends, and depression.

2. Methods

2.1. Participants

SDC is spatially the largest Croatian county, situated in the central-southern part of Croatia, with a population of 423,407 inhabitants [49] and 49 high schools. To detect factors associated with substance use among adolescents, we conducted an online questionnaire survey among final-year high school students in all 49 schools in the county. There were 4347 students in the 2020/2021 school year. Among the 49 schools in SDC, 42 of them participated in the study. The inclusion criteria were individuals an age of >16 but <20 years and residence in SDC. Those who gave invalid (e.g., attending a graveyard school, 1000 years old, etc.) and inconsistent answers (e.g., claiming not to consume alcohol in some parts of

the questionnaire and answering alcohol consumption-related questions in other parts or not filling out the entire questionnaire) were excluded from the study.

2.2. Methods

We constructed our own questionnaire survey in Google Forms. Due to the COVID-19 lockdown period, the study was conducted online. The questionnaire contained 74 questions; the first part explored the participants' sociodemographic variables, the second focused on prevalence and habits of risky behaviors, and the third part focused on alcohol consumption during the COVID-19 lockdown [50]. An example of the questionnaire is provided in Supplementary Material S1.

Before the research was conducted, we sent a letter to school principals and/or psychologists/pedagogues in all 49 high schools in SDC to inform them about the study methods and goals. We also sent them an example of the questionnaire survey. After all school principals provided written consent to conduct the study, we sent them an online link to the survey, which they forwarded to final-year high school students. The questionnaire survey contained a detailed informative letter at the top describing the aim, methods, and goals of the study. Completion of the survey was voluntary, and participants did not reveal their identity in any part of the questionnaire. At the beginning of the survey, after the introductory informative paragraph, it was emphasized that completion of the survey would be considered the respondent's informed consent for study participation. The students could only complete the survey once.

Data collection was performed from 6 June to 20 July 2020 (the end of the final year of high school) and from 12 October to 28 December 2020 (the beginning of the final year of high school). A total of 1263 students completed the questionnaire survey, and 233 were excluded for providing invalid or inconsistent answers, as explained previously. There were only 221 respondents in the first period of data collection because school ended in May or June for most final-year high school students, while there were 809 respondents from 12 October to 28 December (due to the significantly longer period).

2.3. Statistical Analyses

We used SPSS 25 (IBM, Armonk, New York, NY, USA; 2017). The association between examined factors and consumption of alcohol, drugs, and tobacco was determined using logistic regression with a gradual introduction of predictors (forward stepwise, with the criterion for introduction of $p < 0.05$, according to a score test). The linearity assumption for ordinal predictors was assessed using the likelihood-ratio test, while the effect of nominal variables was examined by introducing sets of dummy variables into the final models. Multicollinearity was checked using variance inflation factors (VIF). Since students were grouped within schools, the final models were further estimated using cluster-robust standard errors (with school as the cluster). Model fit was evaluated using the omnibus test, Nagelkerke R^2, the Hosmer–Lemeshow test, and the area under the ROC curve. There was no missing data for the variables included in the analysis. Results were presented as regression coefficients (B), standard errors, odds ratios (OR) with 95% confidence intervals, and p values, with $p < 0.05$ considered statistically significant.

Drug consumption was defined as lifetime drug use, assessed with a question ("Have you ever consumed drugs?"), with respondents answering "Yes" or "No". Tobacco consumers were evaluated with the question "Do you smoke?" and respondents answered "Yes" or "No". Alcohol consumption was analyzed with the question "How often do you consume alcohol?" and respondents answered "every day","3–6 times a week", "1–2 times a week","2–3 times a month"," $\leq$1 time per month","4–11 times a year","1–3 times a year", and "I do not consume alcohol". Dependent variables were dichotomous variables charac-

terized by a value of 0 or 1, where 0 refers to no consumption of the observed substance (alcohol, drugs, or tobacco) and 1 refers to experience with consumption. The following parameters were used as initial independent variables in all three estimated models (the first model used alcohol consumption as the dependent variable, the second drug use, and the third smoking); these parameters were ranked and coded during the statistical analysis as follows: gender (0—female; 1—male); participation in sports (0—no; 1—yes); frequency of playing sports (ranging from 0 (do not play) to 5–6 times a week); duration of sports participation (range of 0, meaning do not participate, to 3 meaning > 8 years, based on the provided response categories); type of sport practiced (ranging from 0 (do not practice) to 1 (practice), specific to each sport: football, gym practice, bicycling, practicing at home or outside, gymnastics or dancing, volleyball, basketball, handball, water polo, tennis, martial arts, other, more than one sport); place of residence (0—village/municipality; 1—city); living arrangement (0—alone, 1—without either parent, 2—with one parent (response combinations), 3—with both parents); number of children in the family (ranging from 1 (only child) to 3 (having 2 or more siblings)); birth order (ranging from 1 (only child) to 4 (youngest child)); mother's level of education (ranging from 1 (lower level of education, namely, primary school education) to 4 (higher education with a completed master's or doctoral degree)); father's level of education (ranging from 1 (lower level of education, namely, primary school education) to 4 (higher education with a completed master's or doctoral degree)); parental employment status (ranging from 0 (neither parent employed) to 2 (both parents employed)); parents' marital status (0—not divorced; 2—divorced); parental/other family member alcohol consumption (0—no; 1—yes); amount of pocket money (ranging from 0 (I do not receive an allowance) to 3 (>1000 HRK)); receipt of a scholarship (0—no; 1—yes); independent earnings (evaluated with the question "Have you ever earned money on your own?") (0—no; 1—yes); religiosity (evaluated with the question "Are you religious?") (0—no; 1—yes); frequency of religious practice (ranging from 0 (not religious) to 5 (practice religion $\geq$ 1–2 times a week)); relationship status (having a boyfriend or girlfriend) (0—no; 1—yes); conviviality (self-evaluated with the question "Do you consider yourself a sociable person?") (ranging from 0 (no) to 2 (yes, I like to spend time with a big group of friends)); school success (ranging from 1 (repeating the year) to 5 (excellent)); frequency of going out with friends (ranging from 0 (I do not go out) to 7 (every day)); self-reported depression (evaluated with the question "Have you ever been depressed for any reason?") (ranging from 0 (never) to 2 (yes, often)).

2.4. Ethical Approval

The study was approved by the Ethical Committee of the University of Split (Class: 003-08/20-03/0005; Ed. No.: 2181-198-03-04-20-0069) on 5 June 2020. Procedures were conducted in accordance with the Helsinki Declaration.

3. Results

There were 1263 final-year high school students who completed the questionnaire survey. Among them, 1030 respondents met the inclusion criteria, comprising 433 (42.04%) boys and 597 (57.96%) girls. The mean age was 18 years (IQR 17.00–18.00).

3.1. Characteristics of Respondents (Table 1)

Most students lived in town (69.03%) with both parents (82.91%), had one brother or sister (45.34%), and were the oldest child in the family (37.09%). Students most commonly completed their final year with *very good* success (45.92%).

Table 1. Personal, family and socioeconomic characteristics of the final-year high school students (N = 1030) in Split-Dalmatia County (SDC).

Parameter		N (%)
Gender	Male	433 (42.04)
	Female	597 (57.96)
Place of residence	Village	176 (17.09)
	Municipality	143 (13.88)
	City	711 (69.03)
Mothers' level of education	Primary school education	36 (3.50)
	High school education	639 (62.04)
	College education	258 (25.05)
	College education with master's degree or doctorate	97 (9.41)
Fathers' level of education	Primary school education	64 (6.21)
	High school education	645 (62.62)
	College education	238 (23.11)
	College education with master's degree or doctorate	83 (8.06)
Parents' employment status	Neither parent is employed	31 (3.01)
	One parent is retired and other isn't working	25 (2.42)
	Both parents are retired	7 (0.68)
	One parent is retired and other is working	100 (9.71)
	One parent is working	235 (22.82)
	Both parents are employed	632 (61.36)
Parents' divorce status	No	892 (86.60)
	No, but they live separately	28 (2.72)
	Yes	110 (10.68)
Living community	Alone	5 (0.49)
	With friend or sibling	18 (1.75)
	In students' home	24 (2.32)
	With close family without parents	5 (0.49)
	With one parent	121 (11.75)
	With close family and one parent	2 (0.19)
	With both parents	854 (82.91)
	Other	1 (0.10)
Number of children in the family	The only child	98 (9.51)
	I have one brother or sister	467 (45.34)
	I have ≥2 brothers or sisters	465 (45.15)
Order of the child in the family	The only child	98 (9.51)
	The oldest child	382 (37.09)
	Middle child	201 (19.51)
	The youngest child	349 (33.89)
The amount of pocket money	I don't get pocket money	271 (26.31)
	<500 HRK (66 €)	439 (42.62)
	500–1000 HRK (66–133 €)	262 (25.44)
	>1000 HRK (133 €)	58 (5.63)
Scholarship use	No	885 (85.92)
	Yes	145 (14.08)
Ever earned money independently	No	252 (24.47)
	Yes	778 (75.53)

Table 1. *Cont.*

Parameter		N (%)
School success	Repeating class	2 (0.19)
	Sufficient	17 (1.66)
	Good	208 (20.19)
	Very good	473 (45.92)
	Excellent	330 (32.04)
Playing sports	No	386 (37.48)
	Yes	644 (62.52)
Frequency of playing sports	Does not play sports	386 (37.48)
	1–2 times a week	181 (17.57)
	3–4 times a week	289 (28.06)
	5–6 times a week	174 (16.89)
Length of playing sports	I don't play sports	386 (37.48)
	≤1 year	110 (10.68)
	2–4 years	160 (15.53)
	5–8 years	107 (10.38)
	>8 years	267 (25.93)
Type of sport	Football	103 (15.99)
	Gym practice	227 (35.25)
	Athletics	24 (3.73)
	Bicycling	16 (2.48)
	Exercise at home or outside	49 (7.61)
	Gymnastics or dancing	67 (10.40)
	Volleyball	21 (3.26)
	Basketball	33 (5.12)
	Handball	19 (2.95)
	Water polo	11 (1.71)
	Tennis	5 (0.79)
	Martial arts	38 (5.90)
	Other	23 (3.57)
	More than one sport	8 (1.24)
Alcohol or drug use among parents or family members	No	933 (90.58)
	Yes	97 (9.42)
Religiosity	No	204 (19.81)
	Yes	826 (80.19)
Frequency of practicing religion	I am not religious and I don't go to church	143 (13.88)
	I am religious but I don't go to church	119 (11.55)
	I go to church only for religious holidays	147 (14.27)
	Few times a year	132 (12.82)
	1–2 times a month	144 (13.98)
	≥1–2 times a week	345 (33.50)
Relationship status (having boyfriend or girlfriend)	No	686 (66.60)
	Yes	344 (33.40)
Conviviality (consider yourself sociable)	No	36 (3.50)
	Yes, I have few friends I hang out with	557 (54.07)
	Yes, I like to spend time in big group of friends	437 (42.43)

Table 1. *Cont.*

Parameter		N (%)
Frequency of going out with friends	Never	18 (1.74)
	4–11 times a year	12 (1.17)
	1–3 times a year	8 (0.78)
	2–3 times a month	82 (7.96)
	≤once a month	23 (2.23)
	1–2 times a week	264 (25.63)
	3–6 times a week	279 (27.09)
	Every day	344 (33.40)
Self-reported depressive feelings	Never	385 (37.38)
	Yes, sometimes	500 (48.54)
	Yes, often	145 (14.08)
Suicidal thoughts	Never	773 (75.05)
	Yes, sometimes	196 (19.03)
	Yes, often	61 (5.92)

More than half of the students (62.52%) played sports, and most often exercised in the gym (35.25%) and played football (15.99%), 3–4 times a week. Students were most likely (25.93%) to have trained for more than 8 years.

Most mothers (62.04%) and fathers (62.62%) had completed high school education. In most cases, both parents were employed (61.36%), 10.68% of parents were divorced, and 9.42% of students reported alcohol or drug abuse among their parents or other family members.

Students usually received <500 HRK (63 €) monthly pocket money, while 58 (5.63%) of them received >1000 HRK (133 €) a month. Most students (75.53%) had earned money on their own at least once, and 14.08% of students had received a scholarship.

Most students (80.19%) were religious, and 33.50% of them practiced religion ≥ 1–2 times a week. A total of 33.40% of students had a boyfriend or a girlfriend. Most students considered themselves sociable but had few friends that they hung out with (54.07%). Students were most likely to socialize with their friends every day (33.40%).

More than half of our respondents (62.62%) reported having ever felt depressed, with 14.08% of them reporting feeling depressed often. A great number of them (24.95%) had suicidal thoughts, with 5.92% of them reporting experiencing these thoughts often.

3.2. Factors Associated with Higher or Lower Risk of Substance Use Among Final-Year High School Students in SDC

3.2.1. Alcohol Consumption

Among our respondents, 84.66% of them consumed alcohol. There was no significant difference according to gender ($\chi 2 = 0.955$, $p = 0.328$).

Having ever earned money independently was associated with higher odds of alcohol consumption by 3.175 times, conviviality by 1.818 times, self-reported depressive feelings by 1.488 times, a higher amount of pocket money by 1.452 times, and higher frequency of going out by 1.390 times. On the other hand, practicing religion more frequently was associated with lower odds of alcohol consumption (OR 0.870) (Table 2). With cluster-robust standard errors, all associations remained significant except frequency of practicing religion, which became borderline ($p = 0.051$).

Table 2. Logistic regression model of impact of risk factors for alcohol consumption among final-year high school students in Split-Dalmatia County (N = 1030).

Predictor	*B*	SE	OR	95% CI	*p*	95% CI [a]	*p* [a]
Amount of pocket money	0.373	0.128	1.452	1.130–1.866	0.004	1.041–2.026	0.028
Ever earned money independently	1.155	0.196	3.175	2.163–4.661	<0.001	2.020–4.986	<0.001
Frequency of practicing religion	−0.139	0.055	0.870	0.782–0.969	0.011	0.757–1.001	0.051
Conviviality	0.598	0.191	1.818	1.250–2.644	0.002	1.040–3.180	0.036
Frequency of going out with friends	0.329	0.065	1.390	1.229–1.586	<0.001	1.206–1.602	<0.001
Self-reported depressive feelings	0.397	0.146	1.488	1.118–1.981	0.006	1.125–1.967	0.005
Constant	−1.833	0.414	0.160	0.071–0.360	<0.001	0.070–0.365	<0.001

B—regression coefficient; SE—standard error of *B*. Forward stepwise logistic regression. N = 1030 (alcohol consumers (vs. students who do not consume alcohol): N = 872); no missing data. Model fit: omnibus $\chi^2(6) = 141.2$, $p < 0.001$; Nagelkerke $R^2 = 0.223$; Hosmer–Lemeshow $\chi^2(8) = 10.22$, $p = 0.250$; AUC = 0.761; correctly classified 86.0%. [a] Cluster-robust 95% CI and *p* (sandwich variance estimator, students clustered within 42 schools), calculated around the coefficients shown. *B*, SE, 95% CI and *p* in the remaining columns are model-based (SPSS). Only predictors selected in the final forward stepwise model are shown; predictors not selected are given in Supplementary Table S1. Coding of all predictors and reference categories: Supplementary Table S2; VIF: Supplementary Table S3.

3.2.2. Drug Consumption

In total, 24.27% of our respondents consumed drugs, with boys reporting consumption more often than girls ($\chi2 = 6.193$; $p = 0.013$). Marijuana was the most used drug (92.40%), with other reported drugs being cocaine (2.00%), speed (2.00%), ecstasy (0.40%), dimethyltryptamine (0.80%), other (0.80%), more than one type (1.20%), and all the above (0.40%).

Having ever earned money independently was associated with higher odds of drug consumption (OR 2.369), as were self-reported depressive feelings (OR 1.643), male gender (1.559), parents' divorce status (OR 1.377 per category), going out with friends more frequently (OR 1.351), and mothers with a higher level of education (OR 1.249). Religiosity (OR 0.388) and practicing religion more frequently (OR 0.817) were associated with lower odds of drug consumption (Table 3). With cluster-robust standard errors, mothers' level of education was not statistically significant ($p = 0.133$), while the other associations remained significant. When divorce status was entered as two indicators, both students whose parents lived separately (OR 2.888; 95% CI 1.252–6.662) and students with divorced parents (OR 1.737; 95% CI 1.097–2.750) had higher odds of drug use than students whose parents were not divorced.

Table 3. Logistic regression model of impact of risk factors for drug consumption among final-year high school students in Split-Dalmatia County (N = 1030).

Predictor	*B*	SE	OR	95% CI	*p*	95% CI [a]	*p* [a]
Male gender (ref. female)	0.444	0.165	1.559	1.117–2.136	0.008	1.111–2.187	0.010
Mothers' level of education	0.222	0.111	1.249	1.002–1.532	0.046	0.935–1.667	0.133
Parents' divorce status	0.320	0.115	1.377	1.094–1.715	0.006	1.084–1.749	0.009
Ever earned money independently	0.862	0.224	2.369	1.522–3.662	<0.001	1.509–3.717	<0.001
Religiosity	−0.947	0.230	0.388	0.248–0.610	<0.001	0.231–0.650	<0.001
Frequency of practicing religion	−0.202	0.056	0.817	0.730–0.908	<0.001	0.725–0.921	<0.001

Table 3. *Cont.*

Predictor	*B*	SE	OR	95% CI	*p*	95% CI [a]	*p* [a]
Frequency of going out with friends	0.301	0.071	1.351	1.177–1.552	<0.001	1.081–1.689	0.008
Self-reported depressive feelings	0.497	0.123	1.643	1.279–2.069	<0.001	1.267–2.133	<0.001
Constant	−3.540	0.505	0.029	0.011–0.078	<0.001	0.007–0.117	<0.001

B—regression coefficient; SE—standard error of *B*. Forward stepwise logistic regression. N = 1030 (students who had ever used drugs: N = 250); no missing data. Model fit: omnibus $\chi^2(8) = 171.1$, $p < 0.001$; Nagelkerke $R^2 = 0.229$; Hosmer–Lemeshow $\chi^2(8) = 11.61$, $p = 0.170$; AUC = 0.756; correctly classified 78.1%. [a] Cluster-robust 95% CI and *p* (sandwich variance estimator, students clustered within 42 schools), calculated around the coefficients shown. *B*, SE, 95% CI and *p* in the remaining columns are model-based (SPSS). Only predictors selected in the final forward stepwise model are shown; predictors not selected are given in Supplementary Table S1. Coding of all predictors and reference categories: Supplementary Table S2; VIF: Supplementary Table S3.

3.2.3. Tobacco Consumption

In total, 37.28% of our respondents were smokers, with no significant difference between girls and boys ($p = 0.85$).

Going out with friends more frequently was associated with higher odds of tobacco consumption among final-year high school students in SDC (OR 1.949 per category), as were self-reported depressive feelings (OR 1.767) and parents' divorce status (OR 1.341 per category). Religiosity (OR 0.425), greater school success (OR 0.536), and a higher frequency of playing sports (OR 0.816 per category) were associated with lower odds of tobacco consumption (Table 4). However, the linear specification was not adequate for going out and for sports frequency (likelihood-ratio $\chi^2(5) = 50.5$, $p < 0.001$). In the categorical model (Table 5), the odds of smoking were higher only among students going out 3–6 times a week (OR 3.236; 95% CI 1.483–7.061) or every day (OR 9.603; 95% CI 4.410–20.913) than among those going out once a month or less, and lower only among students training 5–6 times a week (OR 0.283; 95% CI 0.172–0.466) than among those not playing sports; training 1–2 or 3–4 times a week was not associated with smoking. Divorced parents (vs. not divorced) were associated with higher odds of smoking (OR 1.718; 95% CI 1.099–2.685), whereas parents living separately were not (OR 2.132; 95% CI 0.883–5.145); the per-category OR of 1.341 corresponds to an OR of about 1.80 for the comparison of divorced with non-divorced parents.

Table 4. Logistic regression model of impact of risk factors for tobacco consumption among final-year high school students in Split-Dalmatia County (N = 1030).

Predictor	*B*	SE	OR	95% CI	*p*	95% CI [a]	*p* [a]
Parents' divorce status	0.293	0.112	1.341	1.077–1.671	0.009	1.082–1.660	0.007
School success	−0.624	0.097	0.536	0.443–0.648	<0.001	0.444–0.647	<0.001
Frequency of playing sports	−0.203	0.066	0.816	0.716–0.929	0.002	0.710–0.939	0.004
Religiosity	−0.856	0.185	0.425	0.296–0.611	<0.001	0.310–0.582	<0.001
Frequency of going out with friends	0.667	0.073	1.949	1.690–2.247	<0.001	1.574–2.412	<0.001
Self-reported depressive feelings	0.569	0.111	1.767	1.420–2.198	<0.001	1.405–2.221	<0.001
Constant	−1.509	0.630	0.221	0.064–0.760	0.017	0.050–0.983	0.047

B—regression coefficient; SE—standard error of *B*. Forward stepwise logistic regression. N = 1030 (smokers: N = 384); no missing data. Model fit: omnibus $\chi^2(6) = 236.7$, $p < 0.001$; Nagelkerke $R^2 = 0.280$; Hosmer–Lemeshow $\chi^2(8) = 13.81$, $p = 0.087$; AUC = 0.780; correctly classified 72.8%. [a] Cluster-robust 95% CI and *p* (sandwich variance estimator, students clustered within 42 schools), calculated around the coefficients shown. *B*, SE, 95% CI and *p* in the remaining columns are model-based (SPSS). Only predictors selected in the final forward stepwise model are shown; predictors not selected are given in Supplementary Table S1. Coding of all predictors and reference categories: Supplementary Table S2; VIF: Supplementary Table S3.

Table 5. Logistic regression model of factors associated with smoking with frequency of going out and frequency of playing sports entered as categories (N = 1030).

Predictor	*B*	SE	OR	95% CI	*p*	95% CI [a]	*p* [a]
Parents' divorce status	0.333	0.116	1.395	1.111–1.752	0.004	1.132–1.720	0.002
School success	−0.639	0.100	0.528	0.434–0.643	<0.001	0.439–0.635	<0.001
Religiosity	−0.907	0.189	0.404	0.279–0.585	<0.001	0.295–0.552	<0.001
Self-reported depressive feelings	0.574	0.114	1.775	1.419–2.220	<0.001	1.439–2.189	<0.001
Frequency of going out with friends (ref. ≤ once a month, N = 61)							
2–3 times a month (N = 82)	−0.275	0.514	0.759	0.277–2.080	0.592	0.210–2.752	0.675
1–2 times a week (N = 264)	0.468	0.404	1.596	0.723–3.525	0.247	0.582–4.381	0.364
3–6 times a week (N = 279)	1.174	0.398	3.236	1.483–7.061	0.003	1.136–9.216	0.028
Everyday (N= 344)	2.262	0.397	9.603	4.410–20.913	<0.001	3.430–26.892	<0.001
Frequency of playing sports (ref. does not play sports, N = 386)							
1–2 times a week (N = 181)	−0.106	0.211	0.899	0.594–1.361	0.615	0.582–1.388	0.632
3–4 times a week (N = 289)	0.205	0.182	1.228	0.860–1.753	0.259	0.850–1.772	0.274
5–6 times a week (N = 174)	−1.263	0.254	0.283	0.172–0.466	<0.001	0.168–0.476	<0.001
Constant	1.096	0.586	2.991	0.948–9.441	0.062	0.815–10.977	0.099

B—regression coefficient; SE—standard error; OR—odds ratio; CI—confidence interval; [a] cluster-robust 95% CI and *p* (42 schools). Same predictors as in Table 4, with frequency of going out and frequency of playing sports entered as categories instead of linear terms. The reference category for going out combines "never", "1–3 times a year", "4–11 times a year" and "≤once a month" because of small numbers. Categorical vs. linear specification: likelihood-ratio $\chi^2(5) = 50.5$, $p < 0.001$; joint test for going out $\chi^2(4) = 130.3$, $p < 0.001$; for playing sports $\chi^2(3) = 37.4$, $p < 0.001$. N = 1030 (smokers: N = 384). Model fit: omnibus $\chi^2(11) = 287.2$, $p < 0.001$; Nagelkerke $R^2 = 0.332$; Hosmer–Lemeshow $\chi^2(8) = 5.17$, $p = 0.739$; AUC = 0.800; correctly classified 74.4%.

Among the predictors not selected by the stepwise procedure, type of sport tested as a nominal variable (Supplementary Table S2) was associated with drug use ($\chi^2(4) = 9.91$, $p = 0.042$) and smoking ($\chi^2(4) = 20.31$, $p < 0.001$). Adding recruitment wave to the final models did not materially change the estimates (wave OR 0.797, 0.708 and 0.880 for alcohol, drugs and tobacco; all $p > 0.05$), and the joint tests of predictor × wave interactions were not significant ($p = 0.350$, 0.336 and 0.113). Of the individual interactions, only religiosity × wave in the tobacco model was significant ($p = 0.020$): religiosity was associated with lower odds of smoking in the second wave but not in the smaller first wave (Supplementary Tables S4 and S5).

4. Discussion

We found that having ever earned money independently, a higher amount of monthly pocket money, conviviality, self-reported depressive feelings, socializing with friends more frequently, male gender, parents' divorce status, and mothers with a higher level of education are associated with higher odds of substance use, while religiosity, practicing religion more frequently, greater school success, and frequent sports training (5–6 times a week) are associated with lower odds of alcohol, drug, and tobacco consumption among final-year high school students in SDC.

4.1. Socioeconomic Factors

Having ever earned money independently was associated with higher odds of alcohol (OR 3.175) and drug (OR 2.369) consumption among our respondents. In this study we did not measure current employment, working hours or working conditions, so our results cannot be interpreted as an effect of employment. It was reported that employed adolescents drink and smoke more often, with frequency of consumption depending on the type of work [51] and the highest consumption of psychoactive substances being

observed among adolescents who were working > 10 h a week [52]. Other studies found that employment increases the risk of alcohol [53] and tobacco consumption but not drug consumption [51], while our study found that having ever been employed (having ever earned money independently) increases the odds of drug use. Employed adolescents and those who occasionally earn money independently have an independent source of income and do not solely depend on money obtained from their parents. A higher income and independent control over money may increase the possibility of alcohol, drug, and tobacco use, but this should be tested in new studies. It is also possible that students who are working while attending school are under greater pressure with more obligations and therefore may resort to risky behaviors more often, but further studies should be conducted to confirm these possible explanations because they were not tested in our study. Furthermore, according to the results of our study, additional income through scholarships has no significant influence on substance use among this population. Children who receive scholarships are often those who have the greatest success in school or sports and probably have less leisure time, or they spend leisure time on school- or sports-related activities, and therefore engage in risky behaviors less often. However, this should be further explored.

Having a higher amount of monthly pocket money was also associated with higher odds of alcohol consumption among our respondents (OR 1.452). Most of our respondents were receiving less than 500 HRK (≈66 €) a month. Some studies also found that having a higher amount of pocket money (30–50 € a week) increases the risk of binge drinking (BD) among adolescents [29,32,33], whereas an increase in weekly pocket money by 10 € increases the binge drinking risk by 20% in the following year [54].

4.2. Personal Factors

The male gender was associated with higher odds of drug consumption among final-year high school students in SDC (OR 1.559). Almost a quarter of the students in SDC have used drugs, which is more than that found in the latest ESPAD report [55]. Some studies reported that boys consume drugs [34,55–57], tobacco [34,56], and alcohol [23,58] more often than girls, while others observed higher alcohol [24,57] and tobacco [57] consumption among girls. Among our respondents, there was no significant difference in alcohol ($p = 0.328$) and tobacco use ($p = 0.85$) depending on gender compared with other studies [18,23,27,55,58].

We found that self-reported depressive feelings are associated with higher odds of consuming all three psychoactive substances: alcohol (OR 1.488), drugs (OR 1.643), and tobacco (OR 1.767). Depressive feelings were assessed with a single question ("Have you ever been depressed for any reason?"), which is not a validated or clinical measure of depression. Other studies reported that depression increases the risk for substance use, especially among girls [24]. Depression increases the risk of marijuana use among adolescents, and marijuana consumption increases the risk of suicide [59,60]. Most of our respondents (62.62%) reported being depressed, with 14.08% reporting feeling depressed often; because of the different measurement, this proportion is not directly comparable with the prevalence of depression reported in other studies [24,59]. Additionally, 24.95% of our respondents had suicidal thoughts, with 5.92% reporting them often. Such high prevalence of suicidal thoughts among young people is worrying, especially because suicide is the second most common cause of death among high school students [61]. These results can indicate that more intensified work on children and adolescents' mental health is needed.

Going out with friends more frequently is also associated with a higher risk of substance use among our respondents (drugs (OR 1.351), alcohol (OR 1.390), and tobacco (OR 1.949 per category)), while conviviality is associated with higher odds of alcohol consumption (OR 1.818). For smoking, the association was not linear: the odds were increased

only among students going out 3–6 times a week (OR 3.236) or every day (OR 9.603). Adolescents most often consume psychoactive substances with their friends [10], so more frequent socialization, especially with a larger number of peers or with those who drink, increases the risk of alcohol [12,13], drug [30], and tobacco consumption [57].

Peer influence can be positive if it is well organized and planned. Some studies found that students who were monitored by upper-year students who helped them with learning and guided them were more satisfied, had better learning outcomes, and felt like they belonged in school [62].

Religiosity was associated with a lower risk of drug (OR 0.388) and tobacco (OR 0.425) consumption among adolescents in SDC. Additionally, practicing religion more frequently was associated with a lower risk of drug (OR 0.817) and alcohol (OR 0.870) consumption. Some studies found that religiosity reduces the risk of alcohol [15,35,63] and marijuana consumption [36], while others did not find a connection between religiosity and drinking among adolescents [14]. It has also been shown that religiosity has a strong influence on alcohol use among adolescents [64]. In addition to these conclusions, our study revealed that practicing religion frequently had a significant influence not only on alcohol consumption but also on drug use among adolescents.

Greater school success is associated with a lower risk of tobacco consumption (OR 0.536) among our respondents. It is possible that children who have greater school success have more knowledge about the negative consequences of smoking on health, while those with lower school success are absent from school more often and may thus smoke more often [16]. However, these suggestions should be further explored in future studies. Some studies reported that children with lower school grades more often consume alcohol [25,28], drugs and tobacco [16], or all three substances [27,65]. Others reported more acute alcohol intoxications among children with greater school success [66]. In our study, we did not find any connection between school success and alcohol and drug consumption among high school students.

A higher frequency of playing sports was also associated with lower odds of smoking (OR 0.816 per category); however, the categorical analysis showed that this association was limited to students training 5–6 times a week (OR 0.283), whereas training 1–2 or 3–4 times a week was not associated with smoking. The model used the frequency of playing sports rather than participation in sports (yes/no). Some studies reported similar results [27,37,39], while others found that the prevalence of smoking increases with physical activity [58] and engaging in team sports [40]. Students who play sports and strive for significant sports achievement probably lead healthier lives, eat cleaner, and avoid smoking due to its negative effects on health, but this should be explored in future studies as it was not examined in this study. Some studies reported that adolescents who play sports, especially football, volleyball, and hockey [40], have a higher risk of alcohol consumption [25,28,34,37–39] and a lower risk of drug use (except marijuana) [37–39], while others found that playing sports reduces the risk of drinking [14,35]. In our study, we found no significant connection between playing sports and alcohol or drug consumption among adolescents. Length of involvement in sports was not associated with substance use, whereas type of sport, tested as a nominal variable, was associated with drug use and smoking (Supplementary Table S2); this exploratory finding should be confirmed in studies designed for this purpose.

4.3. Family Factors

Parents' divorce status was associated with higher odds of drug use (OR 1.377 per category; divorced vs. not divorced OR 1.737) and smoking (OR 1.341 per category; divorced vs. not divorced OR 1.718) among our respondents. It has been reported that growing up with one parent increases the risk of drinking among children [19,67]. In our

study, parents' divorce status was associated with drug use and smoking, but not with drinking. Greater parental supervision and insights into children's leisure time decrease the odds of practicing risky behaviors among children [19]. Children who grow up with one parent could be under milder parental supervision or might spend more time alone when the parent is at work, leaving them more leisure time for engaging in risky behaviors. They could also be more stressed or depressed about their parents' divorce, but these possibilities should be further investigated.

Children whose parents, especially fathers or siblings, use drugs or alcohol have a higher risk of substance use [17,18,21–23,33,35] and developing alcohol-related problems in later life [22]. Despite these results, we did not find a significant connection between substance use among parents or family members and adolescents in SDC.

Mothers with a higher level of education were associated with higher odds of drug use among adolescents in SDC (OR 1.249). In contrast, the father's level of education did not have a statistically significant impact on alcohol, drug, and tobacco consumption among our respondents. It has been known that the mother–child relationship is one of the earliest formed relationships, with the mother being the most important person shaping the child's behavior [63]. Therefore, the mother's absence from home due to work could result in worse relationships and lead to the child engaging in risky behaviors, but this should be further explored. Some studies reported that having a mother with a higher level of education increases the risk for consumption of alcohol [15,34] and other substances among girls [27]. Other studies found that having a father with higher education increases the risk of drinking among boys [15], while some reported that this factor decreases the risk [14].

Living with unemployed parents decreases the risk of drinking [43], while living with unemployed mothers or with a smaller number of siblings increases the risk of alcohol, drug, and tobacco consumption among adolescents [35]. In contrast, we found no connection between the use of any substance among adolescents in SDC and parents' employment status, number of family members, order of the child in family, or life community. The place of residence also had no significant influence on substance use among our respondents compared with the results of other studies [13,23,41,42].

4.4. Limitations of the Study

The study was conducted online due to the COVID-19 lockdown. It was a cross-sectional study, so causal conclusions cannot be drawn. The data were collected in two recruitment waves that comprised two different graduating cohorts surveyed at different points of the school year and in different phases of the pandemic; the waves differed in several characteristics and in the prevalence of drug use, although adjustment for wave did not materially change the main associations. Several variables were measured with single self-reported items: depressive feelings were not assessed with a validated instrument, having ever earned money does not describe current employment, and family substance use emphasized alcohol or drug abuse by any family member. A questionnaire survey was used, so we had to rely on the sincerity of the participants' answers, which could be a limitation. Participation was voluntary, so only those who chose to participate and complete the whole questionnaire were included. We excluded 233 questionnaires according to the rules described in the Methods, and participation was voluntary, so non-response bias is possible. Clustering of students within schools was taken into account with cluster-robust standard errors. Some data were published in other studies [50,68,69], but the data analyzed in this study were not published before. These studies explored alcohol consumption among final-year high school students in SDC during the COVID-19 lockdown period [50], the circumstances of their first instance of alcohol consumption [68], or the consequences of alcohol consumption [69]. This study aimed to determine factors

that could increase or decrease the risk of alcohol, drug, and tobacco consumption among this population. Overall, this was a large study with a significant number of participants (N = 1030). The study detected significant personal, family, and socioeconomic factors associated with alcohol, tobacco, and drug consumption among final-year high school students in SDC. These results could help us create targeted preventive measures for children and adolescents who have higher odds of substance use, including promoting factors found to be associated with a lower risk of substance use.

5. Conclusions

A higher amount of pocket money, having ever earned money independently, socializing with friends more frequently, self-reported depressive feelings, parents' divorce status, mothers with a higher level of education, and the male gender are associated with higher odds of alcohol, drug, and tobacco consumption among final-year high school students in SDC. Frequent sports playing, greater school success, religiosity, and practicing religion more frequently are associated with lower odds of substance use in this population. Modeling these factors (e.g., encouraging sports participation, limiting and controlling monthly pocket money, and consulting with depressed children) could possibly help us prevent and reduce the prevalence of risky behaviors among adolescents, but the impact of these suggested measures should be further investigated in new studies. Because this was a cross-sectional study, it cannot show whether changing these factors would reduce substance use; the findings mainly identify groups of students who may benefit from targeted prevention, and intervention studies are needed to test such measures.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/soc16100351/s1, Supplementary Material S1: Questionnaire survey; Supplementary Table S1: Predictors not selected by the stepwise procedure (score statistics and estimates when each predictor was added separately to the final model); Supplementary Table S2: Nominal predictors tested as sets of indicator variables; Supplementary Table S3: Variance inflation factors (VIF); Supplementary Table S4: Comparison of the two recruitment waves; Supplementary Table S5: Sensitivity of the final models to recruitment wave.

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