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ORIGINAL ARTICLE

Electronic Cigarette Use Among Adolescents in the Russian Federation

Grace Kong^a, Bulat Idrisov^{b,c}, Artur Galimov^c, Radik Masagutov^d, and Steve Sussman^{e,f,g}

^aDepartment of Psychiatry, Yale School of Medicine, New Haven, Connecticut, USA; ^bSection of General Internal Medicine, Boston Medical Center, Boston University, Boston, Massachusetts, USA; ^cDepartment of Preventive Medicine, Bashkir State Medical University, Ufa, Russian Federation; ^dDepartment of Psychiatry and Narcology, Bashkir State Medical University, Ufa, Russian Federation; ^eDepartment of Preventive Medicine, University of Southern California, Los Angeles, California, USA; ^fDepartment of Psychology, University of Southern California, Los Angeles, California, USA; ^gSchool of Social Work, University of Southern California, Los Angeles, California, USA

ABSTRACT

Background: Information on e-cigarettes among youth in the Russian Federation is lacking. **Objective:** We examined prevalence of and factors associated with youth e-cigarette use in the Russian Federation. **Methods:** A cross-sectional, anonymous survey, conducted among 716 (females 51.5%) high school students in three cities (i.e., Ufa, Sterlitamak, Karagaev) within the Republic of Bashkortostan, Russian Federation in 2015, assessed e-cigarette use and its correlates (i.e., sex, age, ethnicity, family structure, parents' highest degrees, antisocial behaviors, stress coping strategies, lifetime cigarette, hookah, alcohol, and marijuana use). **Results:** Lifetime use of e-cigarettes was 28.6% and past-30-day use was 2.2%. Multilevel modeling showed that belonging to Tatar/Bashkir ethnicity relative to Russian ethnicity (OR = 1.60) and lifetime use of cigarettes (OR = 21.64), hookah (OR = 4.21), and alcohol (OR = 1.90) was associated with greater odds of lifetime use of e-cigarettes. Furthermore, use of social support coping strategies (i.e., utilizing parents for support) were associated with lower odds of lifetime use of e-cigarettes (OR = 0.94). **Conclusions:** Despite high lifetime e-cigarette use, past-30-day use was low. Greater knowledge of the reasons for e-cigarette discontinuation through continued surveillance is needed in the Russian Federation. Social coping strategies involving parents may inform e-cigarette use prevention.

KEYWORDS

Adolescent; electronic cigarettes; Russian Federation; stress coping; youth

Electronic cigarettes (e-cigarettes) are electronic nicotine delivery system devices that have an atomizer with a heating element and a cartridge that contains a liquid solution, which may contain propylene glycol and/or vegetable glycerol, nicotine, flavors, and additives. While some researchers and practitioners have speculated that e-cigarettes may be used as a harm-reduction strategy to decrease combustible (conventional) cigarette use (e.g., Wagener, Siegel, & Borrelli, 2012), the growing body of literature suggests that there are constituents in e-cigarette vapor that may place users at risk for cancers, cardiovascular diseases, and lung diseases, and that adolescents who use e-cigarettes are more likely to initiate conventional cigarette smoking and be chronically addicted to nicotine (e.g., Barrington-Trimis et al., 2016; Grana, Benowitz, & Glantz, 2014; Leventhal et al., 2015).

Since the introduction to the global market around 2007, e-cigarettes quickly have become popular among youth in the United States. Early data from high schools (HSs) in New York (NY) and Connecticut (CT) showed that past-30-day e-cigarette use increased from 0.9% to 2.3% from 2010 to 2011 (Camenga et al., 2014). A 2013

survey in CT observed that 3.5% of middle school (MS) and 25.2% of HS students reported ever use of e-cigarettes (Krishnan-Sarin, Morean, Camenga, Cavallo, & Kong, 2015), consistent with ever use rates observed among HS students in Hawaii around the same time (29%; Wills, Knight, Williams, Pagano, & Sargent, 2014). Furthermore, among those who had never tried e-cigarettes, 26.4% of CT MS and 31.7% of CT HS students reported being susceptible to future use (Krishnan-Sarin et al., 2015). Recent US national data showed that for the first time in the history, past-30-day use of e-cigarettes (13.4%) among adolescents has surpassed cigarette smoking (9.2%; Arrazola et al., 2015), becoming the most commonly used tobacco product among youth (Arrazola et al., 2015; Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2015).

Although much of the youth e-cigarette surveillance has been conducted in the US, data from the international community also show that e-cigarettes are popular among youth globally. Data from South Korean youth show similar trends of increase in e-cigarette use as the US youth data. In 2008, 1 year after e-cigarettes were introduced in South Korea, 10.2% MS and HS students reported

being aware of e-cigarettes and 0.5% had reported ever trying them (Cho, Shin, & Moon, 2011). Then in 2011, e-cigarette ever use rates among South Korean youth increased 20-fold (0.5%–9.4%) (Lee, Grana, & Glantz, 2014). Furthermore, 10th graders reported the highest e-cigarette use, whereas 12th graders reported the highest conventional cigarettes use, suggesting that younger adolescents are initiating tobacco products with an e-cigarette (Lee et al., 2014).

Data from Europe also show that e-cigarette use rates among adolescents are on the rise. Examination of e-cigarette use in Poland using a nationally representative sample of HS-aged adolescents showed that ever use of e-cigarette was 23.5% and past-30-day use was 8.2% in 2011 (Goniewicz & Zielinska-Danch, 2012). A follow-up study in 2013 observed a fivefold increase in the past-30-day use of e-cigarettes and a sixfold increase in dual use of cigarettes and e-cigarettes (Goniewicz, Gawron, Nadolska, Balwicki, & Sobczak, 2014). In New Zealand, ever use of e-cigarette among 14- to 15-year olds tripled between 2012 and 2014 (7% vs. 20.0%), whereas conventional cigarette smoking remained stable during this time period (White, Li, Newcombe, & Walton, 2015).

Despite the amounting evidence of adolescent e-cigarette rates around the world, to the best of our knowledge, no studies have yet examined e-cigarette use among youth in the Eastern Europe and Russian Federation specifically. In this study, we examined the prevalence and correlates of e-cigarette use among HS adolescents in the Russian Federation. Similar to the introduction of e-cigarettes in the market around the globe, e-cigarettes were introduced to the Russian market around 2007. It is possible that e-cigarette use rates among Russian adolescents are equivalent to the trending rates observed around the globe. However, there is a lack of knowledge on e-cigarette use rates among Russian adolescents, despite the fact that Russia is the largest country geographically with high tobacco use rates (Bobak, Gilmore, McKee, Rose, & Marmot, 2006; Gunning, Sussman, Rohrbach, Kniazev, & Masagutov, 2009). Current conventional cigarette smoking among Russian young adult males ages 18–24 is 63% and among females this age group is 28%, and lifetime cigarette smoking among HS students is 55% and current smoking is 25.4% (Global Youth Tobacco Survey [GYTS], 2004). Given the changing landscape of tobacco use patterns among youth detected around the globe, it is important to examine e-cigarette use rates among HS students in the Russian Federation.

We also examined factors associated with e-cigarette use within the heuristic framework of the theory of triadic influence (TTI; Flay & Petraitis, 1994; Flay, Petraitis, & Hu, 1999; Flay, Snyder, & Petraitis, 2009) to guide the global research questions for the present line of inquiry. The TTI incorporates elements of many

existing theories on health behavior and organizes the influences on behaviors into three substantive domains of influence (interpersonal, intrapersonal, and cultural [i.e., community stress]), while discussing the extent to which different factors influence the target behavior. The TTI is flexible in that it expects influences from multiple streams of influence to interact and have a combined effect on behavior. This, in combination with the exhaustive list of causal factors and applicability to continued behaviors, makes it desirable as a theory to explain substance use behaviors.

Within the interpersonal domain, we examined family structure (e.g., living with mother, father or both). Within the cultural domain, we examined parents' level of education as a proxy for socioeconomic status (SES) (Hiscock, Bauld, Amos, Fidler, & Munafò, 2012; Soteriades & DiFranza, 2003). Data from US youth showed that adolescents with higher parental education were less likely to be aware of e-cigarettes (Pepper et al., 2013). Similarly, there is a possibility that Russian adolescents with higher parental education may also be less likely to use e-cigarettes. Also, we examined antisocial behaviors, such as a history of family or self-arrest and being suspended from school/work, as being indicative of community stress. Furthermore, although studies have identified that e-cigarette use is associated with dual/poly use with other tobacco products (Camenga et al., 2014; Krishnan-Sarin et al., 2015), as well as other substances such as alcohol and marijuana (Miech, O'Malley, Johnston, & Patrick, 2016; Morean, Kong, Camenga, Cavallo, & Krishnan-Sarin, 2015), the examination of the role of antisocial behaviors on e-cigarette use is lacking.

Within the intrapersonal domain, we considered sex, ethnicity, ever use of commonly used substances among adolescents (i.e., cigarettes, hookah, alcohol, and marijuana), and coping strategies (decision making, avoidance coping, anger coping, seeking social support). Sex differences in e-cigarette use have been identified in adolescents, with males being more likely to using e-cigarettes than females (Babineau, Taylor, & Clancy, 2015; Cho et al., 2011; Cooper, Case, & Loukas, 2015; Kinnunen et al., 2015; Suris, Berchtold, & Akre, 2015). Given that Russian male cigarette smoking rate is higher than female smoking rates during adolescence (Global Youth Tobacco Survey [GYTS], 2004), we hypothesized that male e-cigarette use would also be higher.

Previous studies have identified that negative coping strategies (e.g., "avoidance coping," "anger coping") are associated with youth substance use, including cigarette smoking, whereas positive, behavioral coping strategies (e.g., "decision-making coping," "social-support coping") are inversely associated with substance use (McConnell, Memetovic, & Richardson, 2014; Wills, Sandy, Yaeger, Cleary, & Sinar, 2001). However, the association between

Table 1. Participant characteristics for the total sample and separated by lifetime and past-30-day e-cigarette use.

Study variables	Total sample (<i>n</i> = 716)	Ever e-cigarette users (<i>n</i> = 205)	Past-30-day e-cigarette users (<i>n</i> = 16)
Sex (%)			
Male	48.5	50.7	81.3
Female	51.5	49.3	18.8
Age (%)			
15 years old	26.4	18.5	31.3
16 years old	35.8	42.0	43.8
17 years old	22.3	18.5	6.3
18 years or older	15.5	21.0	18.8
Ethnicity (%)			
Russian	29.1	25.4	37.5
Tatar/Bashkir	50.6	55.6	37.5
Other	20.4	19.0	25.0
Family structure (%)			
Both parents	75.8	80.0	75.0
Mother/stepmother	19.4	16.1	25.0
Other person(s)	4.7	3.9	0
Mother's highest degree (%)			
Secondary school	5.3	4.4	12.5
Vocational training	55.2	51.7	50.0
University degree	39.0	42.9	31.3
Father's highest degree (%)			
Secondary school	8.1	6.3	12.5
Vocational training	50.4	44.4	75.0
University degree	40.5	48.8	6.3
Lifetime use (%)			
Cigarettes	38.7	88.8	81.3
Hookah	34.9	69.8	75.0
Alcohol	40.9	68.8	87.5
Marijuana	4.6	10.7	25.0
Antisocial behaviors (%)			
School/work trouble	6.8	9.8	12.5
Trouble with the law	4.7	8.3	12.5
Stress-coping scale (<i>M</i> , <i>SD</i>)			
Decision-making coping	10.56, 2.43	9.71, 1.82	10.38, 2.99
Anger coping	6.58, 2.27	7.51, 1.82	6.50, 2.28
Social-support coping	10.90, 2.43	9.65, 2.55	9.88, 3.56

coping strategies and e-cigarette use has not yet been examined.

Methods

Participants

Participants were 716 (females 51.5%) HS students. See Table 1 for demographic variables for the total sample and separated by e-cigarette use status.

Procedures

We conducted an anonymous survey in 2015 (with a response rate of 92.1%) to assess demographic characteristics and risky behaviors, including tobacco and alcohol use in nine HSs in three cities in the Bashkortostan

Republic, Russian Federation: Ufa, Sterlitamak, and Karagaev. Bashkortostan is a republic within the Russian Federation that spans 143,600 km² with a population of 4.1 million, and represents numerous ethnicities. Ufa is the capital city of Bashkortostan and has a population over 1 million. It is the 11th highest populated city in the Russian Federation. Sterlitamak is the second largest city of Bashkortostan and has the population of 274,000. Finally, Karagaev is the village of Bashkortostan, which is 143 km from Ufa and has a population of 330.

The schools were selected as a convenience sample by city officials and researchers to represent a cross-section of their cities: six schools in Sterlitamak, two schools in Ufa, and one school in Karagaev. The classes that participated in the survey were randomly selected. The questionnaire was developed in English, translated into Russian and backtranslated into English by two bilingual speakers. Similar method has been used in prior school surveys conducted in the Russian Federation (Sussman et al., 2009). All study procedures were approved by the Bashkir State Medical University Institutional Review Board. We obtained verbal assent (for students under age 18)/consent (for students 18 years and older) prior to conducting surveys.

Measures

Intrapersonal domain

We assessed demographic information such as age, biological sex, and ethnicity. The ethnicity was comprised of: Russian, 29.1%; Tatar, 18.0%; Bashkir, 16.5%; Tatar/Bashkir, 16.1%; Russian/Tatar, 5.6%; Russian/Bashkir, 7.3%; and other, 7.5%. Ethnic groups were collapsed to Russian, Tatar or Bashkir, and other to better represent the ethnicity categories in terms of similar cultural and religious backgrounds (see Table 1 for percentages).

We asked participants how many times in their lifetime they tried each product (i.e., cigarettes, e-cigarettes, hookah, alcohol, marijuana) with a question stem: "In your *lifetime*, how many times have you tried each of the drugs below? The response options ranged from 0 times to over 100 times. A response other than "0 times" was coded as ever use of each respective product. Past-30-day use of cigarettes and e-cigarettes were assessed by asking participants to select how many times they have tried each product in the past 30 days, using the question stem: "How many times have you used each of these drugs in the *last month* (last 30 days)?" The responses also ranged from 0 times to over 100 times. A response of other than "0 times" in the past 30 days of each product was coded as past-30-day use of that product.

Coping strategies were assessed by asking the students what they would do when they have a problem at school or

at home using 12 statements. Responses were assessed with a five-point scale ranging from “never” to “always.” This scale assessed four coping strategies: decision-making coping (e.g., “I think about the choices before I do anything”), social-support coping (e.g., “I get emotional support from my mother/father”), avoidance coping (e.g., “I daydream about other things”), and anger coping (e.g., “I take it out on someone else”). These subscales are adapted from Wills (1986) and assessed positive (decision-making and social-support coping) and negative (avoidance and anger coping) coping strategies.

However, in our sample, the avoidance coping subscale demonstrated poor reliability (Cronbach’s $\alpha = 0.51$), so we conducted principal components analysis (PCA) with varimax rotation on all items. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.77, above the commonly recommended value of 0.6, and Bartlett’s test of sphericity was significant ($\chi^2 [66] = 3274.5$, $p < .001$). The PCA identified four components based on eigenvalues >1 , which were consistent with the original scale: decision-making coping, social-support coping, avoidance coping, and anger coping. These four factors explained 32%, 16%, 12%, and 9% of the variance, respectively. The factor loadings of the items of the social-support coping ranged from 0.79 to 0.91, decision-making coping 0.78–0.87, anger coping 0.74–0.75, and avoidance coping was all 0.83. Interestingly, one item of the original avoidance coping subscale (“I tell people to leave me alone”) loaded on anger coping (factor loading = 0.64). Adding this item to the anger coping scale improved the reliability from 0.69 to 0.77. However, the reliability of the avoidance coping subscale with the two remaining items was still low (0.59), so we decided to remove this subscale from our analyses. We conducted sensitivity analyses and conducted the multilevel models with and without the avoidance subscale and the results were comparable. The reliability of the remaining three scales was high: Cronbach’s α for decision-making coping = 0.83, social-support coping 0.88, and anger coping = 0.77.

Interpersonal domain

We assessed the family structure by asking, “who do you live with?” and coded the responses to “both parents (or step parents),” “only with my mother (or stepmother),” “other.”

Cultural domain

We examined parents’ level of education as a proxy for SES by asking these questions separately for mothers and fathers (i.e., “What is the highest degree completed by your mother/father?”). The response options for both questions included: “secondary school,” “vocational training,” “university degree,” and “other.” We excluded the other category because no one endorsed this category for

father’s education. Only 0.4% ($n = 3$) endorsed “other” for mom’s education, so these participants were coded as missing.

Students were asked to respond “yes” or “no” to the statements assessing antisocial behaviors: “During the past 2 years, I got disciplined or suspended from school or work” and “During the past 2 years, someone in my family or I was arrested.”

Data analyses

The descriptive statistics, chi-square, and PCAs (described in the Measures) were conducted using IBM SPSS Statistics (version 21). Chi-square tests examined the association between study variables and ever use of e-cigarettes. We did not examine the association between study variables and past-30-day use of e-cigarettes because of low number of past-30-day users ($n = 16$). Using Mplus (version 6), we examined the association between lifetime e-cigarette use (i.e., dependent variables) and the intrapersonal domain (i.e., sex, age, lifetime use of cigarettes, hookah, alcohol, and marijuana and coping strategies), the interpersonal domain (i.e., family structure), and the cultural domain (i.e., parents’ level of education, antisocial behaviors as a proxy), while accounting for nesting of subjects within schools as cluster in a multilevel model. We chose to use multilevel modeling based on the intraclass correlation of 0.18 and the average cluster size, which suggests that clustering in the data needs to be taken into account during estimation. We did not conduct the multilevel model with past-30-day use as the dependent variable because of small number of participants who endorsed past-30-day use.

Results

Of the total sample ($n = 716$), 28.6% reported e-cigarette ever use and 2.2% reported past-30-day use. The majority of lifetime e-cigarette users (90.1%) have used an e-cigarette 1–10 times in their lifetime (Figure 1).

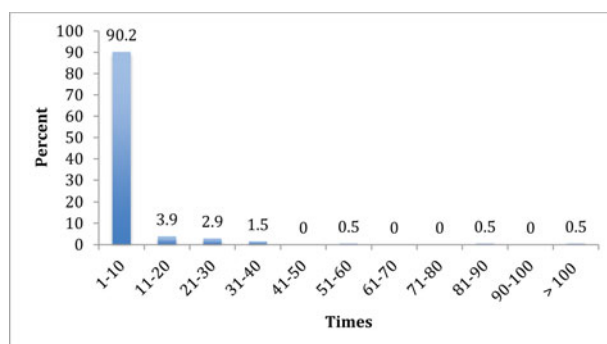


Figure 1. Number of times e-cigarette was used in the lifetime among lifetime e-cigarette users.

Chi-square statistics showed that relative to never e-cigarette users, lifetime e-cigarette users were older ($\chi^2 [3, 716] = 17.22, p = 0.001$); reported higher father's education ($\chi^2 [2, 716] = 8.00, p = 0.018$); reported lifetime use of cigarettes ($\chi^2 [1, 716] = 303.87, p \leq .001$), hookah ($\chi^2 [1, 716] = 153.443, p \leq 0.001$), alcohol ($\chi^2 [1, 716] = 92.21, p \leq 0.001$), and marijuana ($\chi^2 [1, 716] = 24.49, p \leq .001$); reported getting disciplined/suspended from school ($\chi^2 [1, 716] = 3.82, p = 0.051$); and being arrested or having family member arrested ($\chi^2 [1, 716] = 3.71, p = 0.054$). On coping measures, anger coping ($t [716] = -5.62, p \leq .001$) was higher, and social-support coping ($t [716] = 5.72, p \leq .001$) and decision-making coping ($t [716] = 5.14, p \leq .001$) were lower among lifetime e-cigarette users than never users (Table 1).

The results of the multilevel model (Table 2) showed that belonging to Tatar/Bashkir ethnicity relative to Russian ethnicity (odds ratio [OR] = 1.60) and lifetime use of cigarettes (OR = 21.64), hookah (OR = 4.21), and alcohol (OR = 1.90) were associated with greater odds of lifetime use of e-cigarette. Greater social-support coping strategies was associated with lower odds of lifetime use of e-cigarettes (OR = 0.94).

Table 2. Multilevel model examining the association between study variables and lifetime e-cigarette use with school as cluster ($n = 706$).

Independent variables	OR	95% CI
Sex	0.51	0.25, 1.05
Age	0.77	0.56, 1.07
Ethnicity		
Russian (ref)		
Tatar/Bashkir	1.60	1.16, 2.16
Other	1.11	0.51, 2.47
Family structure		
Both parents (ref)		
Mother/stepmother	0.72	0.34, 1.39
Other person(s)	1.55	0.46, 5.36
Mother's highest degree		
Secondary school (ref)		
Vocational training	0.73	0.28, 1.96
University degree	0.63	0.29, 1.40
Father's highest degree		
University degree (ref)		
Secondary school	1.58	0.64, 3.83
Vocational training	1.15	0.55, 2.35
Lifetime use (never use = ref)		
Cigarettes	21.64	7.34, 64.58
Hookah	4.21	2.46, 7.36
Alcohol	1.99	1.06, 3.72
Marijuana	0.98	0.20, 3.26
Antisocial behaviors (no = ref)		
School/work trouble	0.75	0.28, 2.45
Trouble with the law	1.03	0.34, 3.56
Stress-coping scale		
Decision-making coping	0.99	0.90, 1.09
Anger coping	0.96	0.90, 1.03
Social-support coping	0.94	0.90, 0.99

Note: Boldface indicates statistically significant difference at $p \leq .05$. OR = odds ratio, 95% CI = confidence interval.

Discussion

The findings of this study contribute to the growing literature documenting high e-cigarette experimentation among youth around the globe (e.g., Babineau et al., 2015; Cooper et al., 2015; Krishnan-Sarin et al., 2015; Suris et al., 2015). This study also fills an important gap in the literature by conducting the first examination of e-cigarette use and its correlates among youth in the Russian Federation. Using data from a large sample of HS students, we found that 28% had ever tried an e-cigarette and 2.2% have used it in the past 30 days.

The ever use rates of e-cigarettes are consistent with those detected around the globe (e.g., Goniewicz et al., 2014; Krishnan-Sarin et al., 2015; Wills et al., 2014). However, past-30-day use of e-cigarettes is very low. Perhaps restrictive policy measures that prevent youth from accessing e-cigarettes and high cost of the product make access to e-cigarettes difficult among youth in the Russian Federation. The sale and use of e-cigarettes or any nicotine-containing product that resembles cigarettes to and among individuals younger than 18 years old is prohibited in the Russian Federation (Russian Federation Federal Law of 23.02.2013). E-cigarettes are also quite expensive in the Russian Federation, which may make purchasing e-cigarettes among underage adolescents difficult. This is further supported by our findings that e-cigarette use is associated with higher father's education, a proxy for SES. The cost of e-cigarettes ranges from 800 to 4,000 RUB (approximately 10–51 USD [based on November 1, 2015 exchange rate]), which is significantly greater than the cost of one pack of cigarettes (9 USD).

Despite the role of restrictive policies on youth e-cigarette access and use, little is known about the enforcement of the policies and how Russian youth are obtaining e-cigarettes. They may purchase e-cigarettes/e-liquids from visits abroad, online sales, or obtain them from older friends and/or family members. Another possibility is that adolescents are merely experimenting with e-cigarettes and they are not developing pattern of regular use of e-cigarette. Indeed, the past-30-day e-cigarette use rate in our sample was low (2.2%). Our preliminary findings suggest the importance of monitoring prevalence of e-cigarette use among Russian youth over time. We also did not observe sex differences as we hypothesized, so future studies should also continue to examine potential sex differences as they were observed for cigarette smoking (Global Youth Tobacco Survey [GYTS], 2004) and monitor how youth are accessing e-cigarettes.

We examined e-cigarette use within the framework of the TTI (Flay & Petraitis, 1994; Flay, Petraitis, & Hu, 1999; Flay, Snyder, & Petraitis, 2009), which postulates

that three substantive domains of influence (intrapersonal, interpersonal, cultural) ranging from very proximal to distal and ultimate in each domain, influences substance use behavior.

Within the cultural domain, which is a proxy for community stress, we detected an association between e-cigarette use and antisocial behaviors in the bivariate analysis. The bivariate analysis also showed an association between e-cigarettes and intrapersonal domains, such as ethnicity, ever use of cigarettes, hookah, alcohol on e-cigarette use, and social-support coping strategies protective against e-cigarette use. However, in the multilevel model controlling for demographic factors, substance use (i.e., cigarette, hookah, alcohol, marijuana) was independently associated with e-cigarette use. This pattern of observations is similar to those observed among adolescents around the globe. E-cigarette use has been shown to be associated with use of other tobacco products like combustible cigarettes, and hookah, as well as with alcohol and marijuana (Kinnunen et al., 2015; Miech et al., 2016; Morean et al., 2015). Despite these patterns of associations, much remains unknown about the course of e-cigarettes with other substances. Future studies should examine whether adolescent e-cigarette use is part of a pattern of more extensive substance use or whether adolescents are merely experimenting. Moreover, given the high dual use rate between e-cigarettes and conventional cigarettes, it is possible that youth are using e-cigarettes to quit smoking. Future longitudinal studies are needed to examine whether e-cigarettes introduce more harm by creating new attractive methods for youth to become addicted to nicotine. We recommend continual surveillance of e-cigarette use among Russian youth using a representative sample.

Interestingly, we did not find an effect of interpersonal domain regarding family living situation and the cultural domain of parents' level of education on e-cigarette use. Although the TTI is a comprehensive framework to understanding emerging substance use behaviors such as e-cigarettes, future studies should also include more measures of both proximal and distal factors in each of the domains within TTI. As this was an exploratory study, we asked limited questions that covered these factors in the survey. For example, interpersonal domains could also include drug use role models and peer norms, or family conflict. Within the cultural domain, proximal variables could include expectancies regarding drug use benefits minus costs. Given the ethnicity differences that we observed in this study, a better understanding of ethnic differences in terms of attitudes and beliefs regarding e-cigarettes is warranted. Although all adolescents in this study were of Russian nationality, Russian and Bashkir/Tatar ethnicities share different language and

religious histories. For example, Bashkirs and Tatars are historically Muslims and Russians are Orthodox Christians. Thus, as our study findings indicate, their attitudes and beliefs regarding substance use may also differ. Future studies are needed to identify specific attitudes and perceptions regarding e-cigarettes that are ethnic specific.

Bivariate comparisons showed that e-cigarette users were more likely to report anger coping and less likely to report social-support and decision-making coping strategies; however, only social-support coping strategies were significant in the multilevel model after adjusting for the study variables. It is important to note that the social-support items were all related to parental support. This finding is consistent with the smoking literature that emphasizes the importance of the role of parents smoking-prevention efforts (Kong, Camenga, & Krishnan-Sarin, 2012; Sargent & Dalton, 2001). It appears that having parental support to cope with problems, even when it is not specific to antitobacco use, could protect youth against e-cigarette initiation. Future e-cigarette prevention efforts could involve parents to support youth.

This study has several limitations. This sample is not a nationally representative sample and the findings may not be representative of all Russian adolescents. However, this study is the first to document e-cigarette use rates in Russia. As with any self-report data, our results may be affected by reporting bias, such as underreporting of e-cigarette use behaviors. However, given that this was an anonymous data with a response rate of 92.1%, this bias is limited.

In conclusion, this study provides the first evidence of e-cigarette use among adolescents living in the Bashkortostan Republic, Russian Federation. Close monitoring of e-cigarette use among youth is important to develop appropriate policy measures to prevent youth from developing nicotine addiction. Furthermore, education campaigns to communicate accurate information of e-cigarettes and nicotine addiction should be developed.

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Declaration of interest

The authors declare that they have no conflict of interest. The authors alone are responsible for the content and writing of the article.

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