

## Tobacco use among children in Romanian foster care homes

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**Background:** Children living in facilities under the supervision of child protection authorities are vulnerable to early smoking experimentation. This is the first study to report the prevalence and correlates of smoking behaviour among foster care home residents in Romania. **Methods:** We conducted an in-person, cross-sectional survey of 914 resident children in 148 foster care homes of four Transylvanian counties. We included children <18 and those with complete tobacco use information in the analytical sample ( $n = 791$ ). Sociodemographic, peer and foster family characteristics were evaluated for their influence on tobacco experimentation and past 30-day use. **Results:** Respondents included 50.7% girls of average age 13.6 years (range 8–17). Almost half reported ever experimenting with tobacco (44.6%) and approximately one in four reported past 30-day use (25.9%). Factors significantly associated with an increased odds of smoking experimentation and past 30-day use in the multivariable model included being 13–17 years old (vs. <12 years), having friends who are current smokers, and having a sibling who smokes. Living in a home with a foster mother or foster father who smokes was associated with increased odds of experimentation and past-30 day use, respectively. The longer time living in foster care was associated with decreased odds of experimentation and past 30-day use controlling for all covariates. **Conclusion:** Anti-tobacco programmes that incorporate the role family and peers to reduce smoking are needed to address the high rates of use among Romanian foster care children.

### Introduction

Cigarette smoking is common among youth, especially in Central and Eastern Europe.<sup>1</sup> The Global Adult Tobacco Survey in Romania reveals that the highest proportion of initiation of daily smoking among the general population occurs during adolescence, with 43% of adult smokers starting between the ages of 17–19, followed by 22% of daily smokers starting between ages 15 and 16.<sup>2</sup> The Tobacco Atlas revealed high rates of daily tobacco use in Central and Eastern Europe among boys and girls ages 13–15, respectively: Bulgaria: 24.4% and 31.6%; Ukraine: 23% and 8%; Serbia: 9.3% and 8.9%; Moldova: 18.5% and 5.6% in Moldova; and Hungary 33% and 28%.<sup>1</sup> In Romania, 47.1% of boys and 35.4% of girls have ever smoked cigarettes and 17.6% of boys and 9.5% of girls have smoked a cigarette in the past 30 days.<sup>3</sup> Smoking is more prevalent among boys in Latvia, Lithuania and Romania, with the difference of 10% or more.<sup>4</sup>

Adolescence is a period of increased risk for tobacco experimentation and children living in foster care homes are especially vulnerable to early initiation of smoking as a comorbid condition of more general emotional and behavioural problems.<sup>5</sup> A study conducted in the UK found that as many as two-thirds of children 11–17 years olds living in residential care have tried smoking,<sup>6</sup> and an estimated 9% of foster care children between 11 and 15 were regular smokers.<sup>7</sup>

Children in ‘traditional’, non-custodial families are at risk of smoking if their parents smoke and if they are exposed to second hand smoke in the home. It is estimated that annually at least 23 000 young people in England and Wales start smoking by the age of 15 as a result of exposure to second hand smoke in their home.<sup>8</sup> In addition to parental influences, real and perceived peer smoking is

consistently associated with experimentation and current smoking behaviour among adolescence across cultures.<sup>9–11</sup>

In a multigenerational study of smoking risk at youths (406 adolescents 12–17 years old), authors examined whether exposure to parental smoking and nicotine dependence predicted prospective smoking trajectories among adolescent offspring. Adolescents with parents who were nicotine-dependent smokers at baseline were more likely to be early regular smokers: odds ratio (OR) 1.18, 95% confidence interval (95% CI) 1.05–1.33 and early experimenters: OR 1.04, 95% CI 1.04–1.25 with each additional year of previous exposure to parental smoking. Parents who were non-nicotine addicted or who were former smokers were not associated with adolescent smoking trajectories.<sup>12</sup>

Very few studies have investigated the correlates of experimentation and current smoking among foster care home children,<sup>13–15</sup> and no such studies have been conducted in Romania. Therefore, it is essential to determine factors associated with smoking in this unique and vulnerable population in order to implement health education and health policies and that reinforce primary prevention.<sup>16</sup> This is the first study to report the prevalence and correlates of tobacco use among underage residents (<18 years) in foster care homes of the Child Protection Authority in Romania.

### Methods

#### Sample

Children who are temporarily or permanently deprived of parental care and exposed to a high-risk social environment are admitted in custodial care by the Child Protection Authority in Romania. Foster care homes operate on the family house model for maximum of 12 children served by foster mother and father supported by

educational instructors. They are responsible for the children's care and direct and indirect education. As a general rule, siblings under child protection are not separated by the authorities and live in the same foster care home. Our sampling frame was a census of the entire residential population of 1003 persons in 148 foster care homes in four counties (Mures=42, Alba=43, Harghita=38, Covasna=25). Among them, 818 were <18 year old and 791 children completed the anonymous questionnaire and had complete tobacco use data. The county distribution of participants was Mures=206 (25.3%), Alba=290 (35.6%), Harghita=213 (26.2%), Covasna=105 (12.9%)

### Human subjects

This study was approved by the Institutional Review Board of the University of Medicine and Pharmacy Targu Mures, Romania 2012 (ref. Nr.: 19/29 05.2012) as part of a larger study to build capacity for tobacco research and control in Romania (R01 TW009280-01). Ethical review board approval was also received from the Children's Protection Authority in Romania. All children consented to participate in the study, and all children had a right to refuse participation. Data were recorded without any personal identifying information.

### Data collection

Trained data collectors conducted in-person surveys with all children January–March 2014 in Mures county and November 2014–February 2015 in Alba, Covasna and Harghita counties after explaining the purpose of the study and receiving assent from the children.

### Measurement

Sociodemographic questions included age (dichotomized into 8–12 and 13–17 years), sex (male, female) and time spent in the foster care home (<1, 1–5, ≥5 years). Peer smoking was measured by asking 'How many of your five most important friends have ever tried cigarettes?' and 'How many of your five most important friends smoke at least one cigarette a week?' Response options included: (1) None, (2) At least one, (3) Two, (4) Three, (5) Four, (6) All. Responses were dichotomized for both questions as having at least one friend who had tried or who smokes at least one cigarette per week. Smoking habits and perceptions of foster families included whether their foster mother (yes, no) and foster father are current smokers (yes, no). Natural sibling smoking status was coded 'yes' if at least one sibling was reported to be a smoker. Children without natural siblings in the foster care home were coded as 'no'.

Parental reaction to respondent smoking was determined by the following: 'How would your foster parents react if they caught you smoking?' Respondents who reported that their parents would be 'angry' or 'very angry' were coded as '1' vs. '0' for moderately angry or not angry. Parental reaction was coded separately for mothers and fathers. Tobacco use behaviour among respondents was measured by several questions. The main outcomes included having ever experimented with tobacco, even a single puff (yes, no), and current use, defined as having smoked a whole cigarette in the past 30 days (yes, no). Other smoking behaviours are included for descriptive purposes, and included: age at initiation, which defined as having smoked an entire cigarette before age 10, between ages 11 and 14, and between ages 15 and 17 (all respondents were below age of 18); as well as whether the respondent had smoked <5 packs vs. 5 or more packs in his or her lifetime.

### Analysis

The analytical sample included 791 respondents <18 years of age living in Romanian foster care homes who had complete data on tobacco use behaviour (which excluded 19 respondents who had

incomplete tobacco use information). Descriptive statistics on all categorical variables were computed and are reported as raw numbers and frequencies in table 1. To assess the association among sociodemographic, peer, and familial factors and tobacco use behaviours among foster care children, we regressed all covariates on having ever experimented with smoking (yes, no) and current tobacco use (yes, no) using binary logistic regression analyses. We report unadjusted and adjusted ORs and 95% CIs for ever having experimented (table 2) and current tobacco use (table 3). We also conducted multivariable logistic regression, which simultaneously adjusted for all covariates in the analytical model. All analyses were conducted using Stata/IC version 14.0.

## Results

### Description of the sample

The respondents were 50.7% girls and an average of 13.6 years (range 8–17, SD ±2.18). Thirty percent of respondents spent five or more years in the foster care home. Almost half of the respondents reported ever trying smoking (44.6%) and 25.9% are current smokers. Almost 1 in 10 children reported smoking a whole cigarette prior to age 10. Among current smokers, 21.5% reported daily smoking in the past month.

The majority of children reported that at least one of his or her most important friends had experimented with smoking or had smoked at least one cigarette in the past week (69.3% and 60.2%, respectively). About one-third of respondents reported that their foster mother and foster father are current smokers (31.3% and 29.6%, respectively). In addition, children perceived that foster mothers and fathers would be angry or very angry if they believed the respondent was smoking (80.5% and 80.6%, respectively).

### Factors associated with experimentation with smoking in logistic regression models

Factors associated with increased odds of smoking experimentation in the unadjusted bivariate model and adjusted multivariable model were similar. Being 13–17 years old (vs. ≤12 years) was associated with a >3-fold increased odds of experimentation, while having friends who are current smokers was associated with a 6-fold increase in having ever tried smoking (AOR=6.35, 95% CI 4.12–9.78). Familial influence was also important in both unadjusted and adjusted models. In the multivariable model, foster father smoking was associated with a 2-fold increase in experimentation, while having siblings who smoke increased the odds 3-fold. Parental influence was not related to tobacco experimentation in the multivariable model.

### Factors associated with current smoking in logistic regression models

Older children (13–17 years) were more likely than younger children (≤12 years) to be current smokers. Yet, as time in foster care increased, the odds of current smoking decreased. Children in the homes 1–5 years were about half as likely to report current smoking (AOR=0.52, 95% CI 0.28–0.96), whereas having been in the home for more than 5 years was associated with an even lower odds (AOR=0.35, 95% CI 0.18–0.70) of regular smoking, controlling for age of the child. Having friends who smoke was associated with 4-fold increased odds of smoking among the respondents. Having a foster mother or a sibling who smokes increased the odds of current smoking more than 2-fold.

## Discussion

The Global Youth Tobacco Survey (GYTS) data on the prevalence of cigarette consumption among students aged 13–15 years in 25

**Table 1** Description of children (<18 years old) living in Romanian foster care homes (*n* Description of children (<18 years old))

	<i>n</i> (%)
Sex	
Male	390 (49.3)
Female	401 (50.7)
Age of respondent	
8–12 years old	265 (33.5)
13–17 years old	526 (66.5)
Time living in foster care home (year)	
<1	85 (10.7)
1–5	472 (59.7)
5+	234 (29.6)
Self-reported smoking behaviour	
Ever tried smoking, even one puff	353 (44.6)
Smoked at least one cigarette in the past 30 days	205 (25.9)
Age when first smoked an entire cigarette ( <i>n</i> = 385)	
Never smoked a whole cigarette ( <i>n</i> = 373)	509 (64.4)
<10 years old	101 (12.8)
11–14 years old	137 (17.3)
15+ years old	44 (5.6)
Lifetime use	
< 5 packs	183 (23.1)
≥5 packs	109 (13.8)
n/a	499 (63.1)
Self-reported smoking behaviour among friends	
At least one of my five most important friends has ever experimented with smoking	548 (69.3)
At least one of my five most important friends has smoked at least one cigarette in the past week	476 (60.2)
Self-reported smoking behaviour and perceptions of smoking among foster family	
Foster mother smokes	225 (31.3)
Foster father smokes	211 (29.6)
At least one sibling smokes <sup>a</sup>	203 (27.9)
Perceives mother would be angry if caught smoking	577 (80.5)
Perceives father would be angry if caught smoking	570 (80.6)

a: Children without biological siblings coded as '0'. Biological children in Romanian foster care homes remain together, whenever possible.

**Table 2** Factors associated with having ever experimented with cigarette smoking among children living in Romanian foster care homes (*n* = 791)

	Unadjusted ORs (95% CI)	Adjusted ORs (95% CI)
Sociodemographics		
Male	1.18 (0.89–1.56)	1.08 (0.74–1.57)
13–17 years old (vs. 8–12)	4.42 (3.16–6.20)	3.27 (2.10–5.13)
Time in the foster care home (vs. <1 year)		
1–5 Years	0.57 (0.35–0.90)	0.72 (0.40–1.32)
5+ Years	0.45 (0.27–0.75)	0.35 (0.18–0.70)
Peers		
At least one of my five most important friends has smoke at least 1 cigarette per week (vs. none)	7.22 (5.14–10.14)	6.35 (4.12–9.78)
Foster family		
Foster mother smokes	2.36 (1.71–3.26)	1.23 (0.77–1.97)
Foster father smokes	3.00 (2.15–4.19)	2.02 (1.25–3.26)
At least one sibling smokes	3.52 (2.51–4.95)	3.01 (1.96–4.64)
Perceive mother would be angry (vs. not) if she knew you smoked	0.31 (0.21–0.46)	0.54 (0.27–1.08)
Perceive father would be angry (vs. not) if they knew you smoke	0.35 (0.24–0.52)	1.15 (0.57–2.38)

European countries (2002–05) showed that 22% of boys and 18% of girls were current smokers.<sup>17</sup> In addition, data from the 2013 National Youth Tobacco Survey (NYTS) reveal that 46% of US high school students have ever tried tobacco and 23% reported current use of any tobacco product. However, only 2.9% of middle school children represented in the NYTS data report smokers.<sup>16</sup>

The 2004 and 2009 Romanian GYTS suggests a declining (non-significant) trend in ever smoking cigarettes (49.9–41.2%) and current cigarette smoking (29.9–13.5%) among a nationally representative sample of Romanian adolescents in grades 6–8.<sup>18</sup> Although foster care children in this study have similar rates of ever smoking compared with the general population of adolescents in Romania

(45% vs. 41%, respectively), their current smoking is twice as high as the prevalence reported in the GYTS (26% vs. 13.5%, respectively). Although the ages of the two samples are not directly comparable (GYTS: 13–15; Our Sample: 8–17), the inclusion of younger children in our sample should mitigate at least some of the difference attributable to our inclusion of older children. More than one in 10 children in Romanian foster care homes reported smoking an entire cigarette at age 10 or younger, and another 17% report having smoked the first cigarette between ages 11 and 14. In other words, almost one in three children under the age of 15 reports having smoked an entire cigarette. When compared with the general population, however, these data are promising. According to the GYTS, 38.3% of ever smokers initiated smoking prior to the

**Table 3** Factors associated with smoking at least one cigarette in the past 30 days among children living in Romanian foster care homes ( $n = 791$ )

	Unadjusted ORs (95% CI)	Adjusted ORs (95% CI)
<b>Sociodemographics</b>		
Male	1.57 (1.14–2.16)	0.75 (0.50–1.41)
13–17 years old (vs. 8–12)	5.90 (3.68–9.45)	4.07 (2.27–7.29)
Time in the foster care home (vs. <1 year)		
1–5 Years	0.47 (0.29–0.77)	0.51 (0.28–0.95)
5+ Years	0.49 (0.29–0.84)	0.34 (0.17–0.66)
<b>Peers</b>		
At least one of my five most important friends has smoke at least one cigarette per week (vs. none)	6.70 (4.31–10.42)	4.39 (2.53–7.61)
<b>Foster family</b>		
Foster mother smokes	2.79 (1.97–3.96)	2.25 (1.38–3.69)
Foster father smokes	2.47 (1.73–3.51)	1.17 (0.71–1.94)
At least one sibling smokes	3.80 (2.66–5.42)	2.72 (1.75–4.21)
Perceive mother would be angry (vs. not) if she knew you smoked	0.23 (0.16–0.34)	0.65 (0.32–1.29)
Perceive father would be angry (vs. not) if they knew you smoke	0.20 (0.14–0.30)	0.48 (0.24–0.96)

age of 10 years old. We observed an interesting phenomenon among children living in Romanian foster care home: despite having higher rates of current tobacco use compared with the general population of Romanian adolescents, we find that the longer time spent in foster care, the decreased likelihood of tobacco experimentation and current smoking, controlling for age of the child. Therefore, we may hypothesize that the foster care system is likely doing a good job of deterring tobacco use among children who enter the system at an early age, a hypothesis that should be tested in longitudinal analyses.

Like other studies, close friendships with smoking peers was the most robust predictor of tobacco experimentation and current smoking.<sup>19–21</sup> Among Romanian adolescents ages 13–14 in the general population, peer influence was the strongest predictor onset in multivariable analyses.<sup>22</sup> In addition to the role of peer smokers influencing non-smokers to start smoking, Lakon et al. reported that there is an important role for non-smoking peers to influence adherence to non-smoking norms and encourage smokers to stop using tobacco.<sup>23</sup> The foster care setting is an optimal venue to test this hypothesis as children in these settings share both home and school environments where social norms are promulgated and reinforced.

We also observed that foster parental behaviour was associated with the respondents smoking behaviour, but in distinct ways. Foster father smoking behaviour was associated with increased odds of experimentation, but not of current use. Conversely, foster mother smoking behaviour was not associated with experimentation, but was associated with current use. Sibling smoking behaviour was also associated with respondent smoking behaviour in both experimentation and current tobacco use. These findings suggest that parental behaviour plays an independent and important role in the tobacco dependence trajectory and should be a focus of future interventions.

Placement into custodial care is often a signal of lower socioeconomic status, which has consistently been shown to predict tobacco experimentation and addiction.<sup>24–26</sup> This is the first study to evaluate the prevalence and correlates of smoking behaviour among underage children in Romania's foster care homes. While robust in sample size and likely generalizable to other foster care homes in Romanian, there are some limitations. First, this is a cross-sectional study therefore we can only estimate associations, not causation. Second, we focused only on Romania, which may limit the generalizability to Romania or other Eastern European countries. Despite these limitations, results from this study demonstrate the high prevalence of tobacco use among children living in foster care homes of the government, which is markedly absent in the scientific literature, and suggests the need for tobacco prevention and cessation programmes targeting this vulnerable population.

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*Conflicts of interest:* None declared.

## Key points

- Residents living in foster care homes of the government are a unique and vulnerable population at risk for early initiation of smoking.
- Due to the number of very high rates for current use, we confirm the importance of specifically tailored preventive programmes for this vulnerable young population.
- Primary prevention in terms of anti-tobacco education should be started as early as possible in the basic school programmes, especially given that 1 in 10 children reported experimenting with tobacco under the age of 8.

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## The contribution of smoking to mortality during working age at different levels of leisure-time physical activity

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**Background:** Smoking and physical inactivity are linked to mortality, but it is not known whether the association between smoking and mortality is affected by the amount and intensity of physical activity. We examined the joint associations of smoking and physical activity with mortality, while taking key covariates into account. **Methods:** We linked survey data, collected in 2000–2002 from among 40–60-year-old employees of the City of Helsinki, Finland, with complete register data on all-cause mortality from Statistics Finland ( $n = 6390$ , 79% women, response rate 67%). Smoking, leisure-time physical activity and covariates (sociodemographic factors, problem drinking, body mass index and self-rated health) were measured at baseline. We fitted Cox regression models (hazard ratios, HR, 95% confidence intervals, CI), and the follow-up continued until the end of 2013. No gender interactions were found. **Results:** A total of 228 deaths occurred during the follow-up. Smokers were at an increased risk of mortality after full adjustments, but the risk was higher among inactive (HR 3.27, 95% CI 2.05–5.22) and moderately active smokers (HR 2.37, 95% CI 1.49–3.79) than among vigorously active non-smokers. The excess risk for vigorously active smokers, or for inactive or moderately active non-smokers, could not be confirmed. **Conclusion:** The highest mortality risk was found among physically inactive or moderately active smokers. Prevention of smoking and engaging in vigorous physical inactivity among smokers might prevent mortality during working age.

### Introduction

Smoking is a widely examined public health concern, and physical inactivity has also emerged as a key contributor to global non-communicable diseases and excess mortality.<sup>1,2</sup> It has been estimated

that 10% of premature mortality worldwide is attributable to smoking, while the corresponding figure for physical inactivity is around 9%.<sup>3</sup> Earlier meta-analyses further highlight the importance of vigorous physical activity in the prevention of mortality, although the mortality risk among those partaking in