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**ANNAMARI LASTUNEN**

**SOCIO-ECOLOGICAL VIEW OF ADOLESCENTS' SMOKING  
BEHAVIOUR IN THE CROSS-BORDER AREA OF TWO KARELIAS**



*Socio-ecological View of Adolescents'  
Smoking Behaviour in the Cross-border  
Area of Two Karelias*



ANNAMARI LASTUNEN

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## ABSTRACT

The purpose of this comparative study was to describe and compare 9<sup>th</sup> grade adolescents' smoking behaviour between and within North Karelia in Eastern Finland and the Pitkäranta district, in the Republic of Karelia, Russia, from 1995 to 2013. Furthermore, the purpose was to find socio-ecological factors affecting the adolescents' health behaviour.

The health behaviour survey among adolescents was conducted in spring 2013. In Pitkäranta, data were collected from all pupils in all eight schools having 9<sup>th</sup> graders in 2013 (n=182). The response rate was 98% (101 boys, 78 girls). In North Karelia, data were collected from all pupils in eight schools selected for this study (n=645). The response rate was 95% (300 boys, 301 girls). In addition, the study utilised data from 1995 consisting of pupils (n=385) in all 10 comprehensive schools in the Pitkäranta district and pupils (n=2098) in 24 randomly selected schools in Eastern Finland. In total, 367 students (176 boys, 191 girls) from Pitkäranta and 1911 students (951 boys, 960 girls) from Eastern Finland completed the questionnaire and the response rates were 95% and 91%, respectively.

The qualitative data (systematic literature review) were analysed with inductive analyses which were synthesized with the narrative analysis. The quantitative data consisted of four separate cross-sectional studies from the years 1995 and 2013 and was analysed with descriptive statistics and multivariate methods. The following statistical methods were used: percentages, chi-square test, general linear model, structural equation modelling and exploratory factor and logistic regression analysis.

The literature review revealed that one of the most important socio-ecological factor related to adolescents' health behaviour was family wealth, and adolescents from less wealthy families were at a higher risk for unhealthy behaviours. The results from empirical studies showed that the smoking prevalence among 9<sup>th</sup> graders did not change among either girls or boys in either country from 1995 to 2013. In North Karelia, daily smoking prevalence stayed at nearly 20% among Finnish boys and girls. In Pitkäranta, the prevalence remained at around 30% among Russian boys and at 7% among Russian girls. A best friend's smoking is still the most important predictor for the adolescent's own smoking and the non-normative attitudes and difficulties in refusing to smoke increased the risk of smoking experimentation and daily smoking.

The results highlighted the need for evaluation of health promotion activities and anti-smoking education in schools. The schools are the central places for health promotion, and there is an opportunity for close collaboration between home and school, offering a growing possibility in preventing health problems later in life. The results also highlighted the need for carefully tailored gender and country-specific programmes which take into consideration adolescents' socio-ecological circumstances as well as cultural factors.

National Library of Medicine Classification: W 85; WM 290; WS 460

Medical Subject Headings: Adolescent; Health Behavior; Smoking; Finland; Russia



Lastunen, Annamari

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## TIIVISTELMÄ

Tämän vertailevan tutkimuksen tarkoituksena oli verrata 9-luokkalaisten nuorten tupakointikäyttäytymistä ja sukupuolten välisiä eroja Pohjois-Karjalassa Itä-Suomessa ja Pitkärannan piirissä, Karjalan tasavallassa, Venäjällä vuosien 1995 ja 2013 välisenä aikana. Lisäksi tarkoituksena oli selvittää tärkeimmät nuorten terveyskäyttäytymiseen epäedullisesti vaikuttavat sosioekologiset tekijät.

Aineistonkeräys toteutettiin kyselylomaketutkimuksena keväällä 2013. Pitkärannassa tutkimus toteutettiin alueen kaikissa 8 koulussa (n = 182). Vastausprosentti oli 98 % (101 poikaa, 78 tyttöä). Pohjois-Karjalassa tutkimukseen valikoitiin 8 koulua, jotka olivat olleet mukana myös vuoden 1995 tutkimuksessa (n = 645). Vastausprosentti oli 95 % (300 poikaa, 301 tyttöä). Tutkimuksessa käytettiin myös vuoden 1995 aineistoa, joka kattoi Pitkärannan piirin kaikki 10 koulua (n=385) ja 24 randomoitua koulua Itä-Suomesta (n=2098). Pitkärannassa kyselyyn osallistui 367 oppilasta (176 poikaa, 191 tyttöä) ja 1911 oppilasta (951 poikaa, 960 tyttöä) Itä-Suomesta. Vastausprosentti oli Pitkärannan piirissä 95 % ja Itä-Suomessa 91 %.

Laadullinen aineisto (systemaattinen kirjallisuuskatsaus) analysoitiin sisällön analyysillä, jonka tulokset syntetisoitiin narratiivisella analyysillä. Määrällinen aineisto analysoitiin kuvailevin menetelmin sekä monimuuttujamalleilla. Käytetyt tilastomenetelmät olivat: khiin neliö -testi, yleinen lineaarinen malli, rakenneyhtälö mallinnus, eksploratiivinen faktorianalyysi ja logistinen regressioanalyysi.

Kirjallisuuskatsaus osoitti, että yksi tärkeimmistä sosioekologisista tekijöistä, joka liittyy nuorten terveyskäyttäytymiseen, on perheen varallisuus. Alemmista sosiaaliluokista olevilla nuorilla oli suurempi riski epäterveelliseen käyttäytymiseen. Empiiriset tulokset osoittivat, että nuorten tupakoinnin suhteellinen osuus ei ole muuttunut vuodesta 1995 vuoteen 2013. Pohjois-Karjalan pojista ja tytöistä päivittäin tupakoi edelleen lähes 20 %. Pitkärannan piirin pojista päivittäin tupakoi edelleen melkein 30 % ja tytöistä 7 %. Myös erot sukupuolten välillä pysyivät ennallaan. Parhaan ystävän tupakointi on edelleen tärkein ennustaja nuoren omalle tupakoinnille. Nuorten tupakointiin liittyvien normien vastaiset asenteet ja vaikeus tupakoinnin vastustamiseen sosiaalisissa tilanteissa näyttäisivät lisäävän päivittäistä tupakointia, tupakointikokeiluja ja parhaan ystävän tupakointia.

Tulosten perusteella näyttäisi, että tupakoinnin vastaista työtä on edelleen tärkeää jatkaa ja ottaa huomioon terveyskäyttäytymiseen liittyvät sosioekologiset tekijät. Koulut ovat keskeisiä paikkoja terveysopetukselle ja terveyden edistämiseksi yhteistyössä perheiden kanssa. Terveystoimia ja -interventioita tulee kehittää edelleen, ja huomioida sekä sukupuolten ja maiden väliset erot, että sosioekologiset ja kulttuuriset vaikutukset terveyskäyttäytymiseen.

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Kuopio, July 2016

*Annamari Lastunen*

# List of original publications

This dissertation is based on the following original publications:

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- III Lastunen (Aura) A, Laatikainen T, Isoaho H, Lazutkina G and Tossavainen K. Family members' and best friend's smoking influence on pupil smoking differs between Eastern Finland and Russian Karelia. Submitted.
- IV Aura (Lastunen) A, Laatikainen T, Isoaho H, Lazutkina G and Tossavainen K. Adolescents' attitudes on smoking are related to experimentation with smoking, daily smoking and best friends' smoking in two Karelias in Finland and in Russia. *International Journal of Behavioural Medicine*, 1-7, 2016. doi:10.1007/s12529-016-9566-7.

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# Contents

<b>1 INTRODUCTION</b>	<b>1</b>
<b>2 SOCIO-ECOLOGICAL FACTORS RELATED TO ADOLESCENTS' HEALTH BEHAVIOUR IN CROSS-BORDER AREA</b>	<b>4</b>
2.1 Adolescents' health behaviour – The relation of socio-ecological context with underlying social determinants.....	4
2.2 Socio-ecological influence on adolescents' smoking.....	5
2.3 Socio-ecological smoking environment on the Finnish side of the cross-border area .....	5
2.4 Socio-ecological smoking environment on the Russian side of the cross-border area .....	7
2.5 The stages of the tobacco epidemic model in Finland and in Russia .....	8
2.6 Summary .....	10
<b>3 SOCIO-ECOLOGICAL MODELS AND SOCIAL THEORIES AS A PERSPECTIVE TO EXPLAIN HEALTH BEHAVIOUR AND SMOKING AMONG ADOLESCENTS</b>	<b>11</b>
3.1 Socio-ecological models.....	11
3.1.1 The Socio-ecological Model.....	11
3.1.2 The Behavioural Ecological Model .....	13
3.2 Theories of social influence.....	14
3.2.1 Social learning theory .....	14
3.2.2 Social identity theory .....	15
3.2.3 Primary socialising theory.....	15
3.2.4 Social network theory .....	16
3.3 Summary .....	16
<b>4 AIMS OF THE STUDY</b>	<b>19</b>
<b>5 MATERIAL AND METHODS</b>	<b>20</b>
5.1 Study area and population .....	20
5.2 Study subjects and questionnaire .....	20
5.2.1 Study subjects.....	20
5.2.2 Questionnaire .....	22
5.3 Data gathering .....	25
5.3.1 Qualitative data gathering .....	25
5.3.2 Quantitative data gathering.....	25
5.4 Data analysis .....	26
5.4.1 Qualitative data analysis .....	26
5.4.1 Quantitative data analysis.....	28
5.5 Ethical considerations.....	30

<b>6 RESULTS</b>	<b>31</b>
6.1 Socio-ecological inequalities in health behaviour among adolescents .....	31
6.2 Current smoking behaviour among adolescents in the two Karelias and changes from 1995 to 2013 .....	33
6.3 The relationship of family members' and best friend's smoking to adolescents' smoking – the differences between the Karelias .....	36
6.4 Tobacco-related attitudes associated with smoking experimentation, daily smoking and best friend's smoking.....	41
6.5 Summary .....	42
<b>7 DISCUSSION</b>	<b>43</b>
7.1 Evaluation of the study findings.....	43
7.1.1 Relations of the socio-ecological factors with adolescents' health behaviour .....	43
7.1.2 The current smoking behaviour among adolescents in the cross-border area.....	44
7.1.3 Socio-ecological factors related to adolescents' daily smoking in the cross-border area.....	45
7.1.4 Attitudes related to smoking among adolescents in the cross-border area.....	46
7.2 Research strengths and limitations.....	48
7.3 Conclusions and recommendations .....	50
7.4 Suggestions for future research.....	51
<b>REFERENCES</b>	<b>53</b>
<b>APPENDICES</b>	

# Abbreviations

AHIC	Karelia ENPI CBC project “Addressing challenging health inequalities of children and youth between two Karelias” in 2013-2014.	GLM	General linear model
BEM	Behavioural Ecological Model	LRA	Logistic regression analysis
CESCR	The Committee on Economic, Social and Cultural Rights	ML	Maximum likelihood
CI	Confidence Interval	NCSS	Number Cruncher Statistical System
CMIN/DF	Minimum discrepancy/ degrees of freedom	NFI	Normed Fit Index
EFA	Exploratory Factor Analysis	P	Power
ENPI CBC	European Neighbourhood and Partnership Instrument, cross border cooperation	Res_Bfs	Residual for best friend’s smoking
Error_Bs	Structural error term for brother's smoking	Res_Ds	Residual for daily smoking
Error_Ss	Structural error term for sister's smoking	RMSEA	Root Mean Square Error of Approximation
ESPAD	The European School Survey Project on Alcohol and other Drugs	OR	Odss Ratio
EST	Ecological Systems Theory	RR	Relative risk
IBM	International Business Machines	SCT	Social cognitive theory
FCTC	Framework Convention on Tobacco Control	SDH	Social determinant of health
FNBE	Finnish National Board of Education	SEM	Structural equation modelling
		SES	Socio-economic status
		SMC	Squared Multiple Correlations
		SPSS	Statistical Package for the Social Sciences
		SRW	Standardised regression weight
		TTCs	Transnational Tobacco Companies
		UN	United Nations
		WHO	World Health Organisation



# 1 Introduction

A fundamental assumption is that childhood and adolescence lay a critical foundation for health behaviour in adulthood. The major development with biological, social and behavioural changes will occur during adolescence. These changes are inter-related with socio-ecological determinants, and this relation has been shown to be complex (Bronfenbrenner 1979; Bronfenbrenner & Evans 2000.). While adolescence is basically a period of health, there may be serious problems in health-related behaviour that may have severe consequences for later life. The four leading behavioural risk factors — smoking, alcohol use, physical inactivity and unhealthy diet — are health threats, being leading causes of non-communicable diseases and premature death. In fact, tobacco use is the leading cause of preventable death globally, and if current smoking patterns continue, it has been estimated that deaths because of tobacco-related diseases will rise to over 8 million in 2030 (WHO 2009). Moreover, these above-mentioned unhealthy behaviours cause deepening inequalities between and within populations. Therefore, healthful behaviour is one of the most important tools to reduce non-communicable diseases and mortality and, moreover, to decrease health inequalities.

Smoking starts primarily during adolescence (Chassin et al. 1996; Lamkin & Houston 1998). Half of the smokers who start smoking during adolescence will die of a tobacco-related disease (Hu et al. 2006). Typically, smoking initiation occurs at between thirteen to fifteen years (Raisamo et al. 2011) and ages between 14 and 18 are crucial for several socio-ecological influences (Steinberg & Monahan 2007). It has also been shown that the earlier the stage of adolescence the smoking starts, the bigger is the risk for daily smoking throughout the lifespan (Chassin et al. 1996).

Finland and Russia are geographically close with a long, shared border, while being otherwise economically and politically very different areas. The long history of different health policies, smoking legislation and overall smoking atmosphere has created enormous differences in smoking prevalence. In Russia, smoking legislation has traditionally been ineffective and the smoking atmosphere is very liberal (Gilmore & McGee 2004a, 2004b). After the collapse of the Soviet Union, enormous marketing areas were opened for transnational tobacco companies, and already high smoking rates among men continued to rise. Since then, the smoking rates among women have doubled (Gilmore & McGee 2004a). In Finland, tobacco legislation has been very tight and controlled since the first Tobacco Act in the early 1970s (Finlex 2014a). Since then, the legislation has been tightened several times.

North Karelia, Eastern Finland and the Republic of Karelia, an autonomous part of Russia (formerly part of the Soviet Union) share a long, common border. The two sides of this border differ vastly in terms of living standards, health conditions and health-related behaviour due to historical and current differences between the Finnish and Russian environment and economy. The Pitkäranta district, which is part of the Republic of Karelia is located approximately 150 kilometres from the Finnish-Russian border to the east near Lake Lagoda. In this study, the concept “*cross-border area*” has been used. The concept covered the area from where the data of this study were collected: North Karelia, Eastern Finland and the Pitkäranta district, Republic of Karelia, Russia. It has also been used in the context of describing differences in health-related behaviour, particularly smoking, in this area.

The following key concepts have used in this study:

*Adolescence*, defined by WHO (2001) as the period between ages 11 and 19 years, is a phase of development with biological, social and behavioural changes and is strongly affected by socio-ecological context with underlying social determinants (Bronfenbrenner 1979; Bronfenbrenner & Evans 2000). The United Nations (UN 2012) has defined adolescence as a

period between the ages of 12 and 17 and young people as a period between 12 and 24. The duration of the periods may vary across time, cultures and socioeconomic situations. Global networking, urbanisation, earlier onset of puberty, changed health behaviour and sexual attitudes has affected the definition of adolescence (WHO 2001).

*Health behaviour* is behaviours that positively or negatively affect health. It is any activities that either prevent negative health consequences or promote health and well-being. Health behaviour is usually divided into health impairing behaviour (e.g., smoking and alcohol use) and health enhancing behaviour (e.g., physical exercise and healthy dieting) (Conner & Norman 2005.). In 1986, the Ottawa Charter for Health Promotion declared that healthy behaviours are maximized when individuals are educated and motivated to make healthy choices and when policies are supportive towards these choices (WHO 1986).

*Social determinants of health* (SDH) are related to health behaviour and have been shown to be unquestionably important factors predicting unequal health outcomes (The World Health Organisation's Commission on the Social Determinants of Health 2008). The WHO report of Social Determinants of Health (2010) has defined SDH as the conditions where people are born, grow, live, work and age. However, in the same report it is written that our children have dramatically different life changes depending on where they were born. Differences in health follow the socioeconomic position; the lower the socioeconomic position, the worse is the health. It has been proposed that income inequality associates with low birth weight, child mortality, lower life expectancy, poor self-reported health, depression, mental illnesses and obesity (Pickett & Wilkinson 2009; Wilkinson & Pickett 2009). Even though a consensus has been reached that there is a relation between SDH and health, the relation is complex. Mackenbach (2012) has discussed the paradox of health and shown that health is not invariably better in countries with better social, material and economic welfare.

The *socio-ecological* perspective means understanding the relation between the adolescent's health behaviour and the influence of the environment. The basis of this view is Urie Bronfenbrenner's theory of The Ecology of Human Development, which was published in 1979. The philosophy of ecological perspective is based on the socialising and social learning between individual and environment (Bandura 1977, 2001; McLaren & Hawe 2005; Härkönen 2007). The term ecology originates in the biological sciences and has focused on the relation between organisms and environment. In the context of health, development and education it has evolved in the fields of sociology, psychology, education and health and has focused on the interrelationships between individual and environment (Bronfenbrenner 1979).

*Social influence* is the effect others have on individual and group behaviour and attitudes (Berkman et al. 2000). The conceptualization suggests that social influences have an effect through context, networks and peer group membership and are influenced by social norms and behaviours (Kameda et al. 2005). The most important socializer between individuals and social structures are family, school, peers and community. However, with respect to adolescents' smoking, social influences from peers are the most consistent (Kobus 2003; Kirke 2004; Steinberg & Monahan 2007).

*Inequality* in health is a difference in health status or health determinants between social groups or individuals (Whitehead 1990, 1992). It is often synonymous for inequity (Whitehead & Dahlgren 2006) or disparity (Woodward & Kawachi 2000; Braveman & Gruskin 2003). Inequalities in health are often measured by differences in socioeconomic status or sociodemographic differences (Braveman 2006). Braveman and Gruskin (2003) defined the health inequalities as follows: "Potentially avoidable differences in health between groups or people who are more or less advantaged socially". Whitehead (1992) has written that differences in health "are not only unnecessary and avoidable but, in addition, are considered unfair and unjust". In addition, health inequalities are systematic, socially, economically and environmentally produced and are unfair with no existence of nature

which influenced lifestyle and health behaviour (Whitehead & Dahlgren 2006). The social inequality in health within and between countries has risen from unfair social policies and economic circumstances and limits the individuals' access to health care, school or education (WHO 2010). Furthermore, individuals also have a right to health-related education and information (CESCR 2000).

The view about inequalities often discusses equity in health. *Equity* is an ethical concept implying the idea of fairness or social justice. Health equity is defined as "the absence of unfair and avoidable or remediable differences in health among population or groups" (Whitehead 1990, 1992; Whitehead & Dahlgren 2006).

This study was part of the larger Finnish-Russian collaboration and research project "Addressing challenging health inequalities of children and youth between two Karelias, AHIC (2013-2014)". AHIC was conducted by the University of Eastern Finland, Department of Nursing Science and carried out in cooperation with Finnish and Russian partners. The Finnish research consortium consists of the National Institute for Health and Welfare, and the North Karelia Public Health Association. In Russian Karelia, the partner was the 'State Budgetary Health Care Institution of the Republic of Karelia "Pitkäranta Central District Hospital"'.

AHIC was funded from the Karelia ENPI CBC programme (Social wellbeing) by the European Union, the Russian Federation, and the Republic of Finland. Karelia ENPI CBC is a cross-border cooperation programme between Finland and Russia. The key objective of the programme is to increase wellbeing in the region it covers. The costs of this study were paid in the above-mentioned project budget.

AHIC was a continuation of long-standing Finnish-Russian collaboration and research work of cardiovascular risks and school health promotion in the cross-border area (Tossavainen et al. 2014) in Eastern Finland and in Pitkäranta district, formerly part of the Soviet Union. The interregional and long-running collaboration of adolescents' cardiovascular health has existed in the areas since 1980's. Through the decades, sharp health differences and changes have been studied in many surveys and intervention studies back in Pitkäranta Youth Study in 1995. The long history of research collaboration between the areas allowed this study to conduct feasible data collection in local schools.

This study was carried out in the cross-border area of neighbouring countries, North Karelia in Eastern Finland and in the Pitkäranta district, Republic of Karelia, Russia. The purpose was finding out and comparing the smoking behaviour among 9<sup>th</sup> grade adolescents between the study areas from 1995 to 2013. Furthermore, the overall aim was to find out the most important socio-ecological factors what are related to adolescents' health behaviour.

## *2 Socio-Ecological Factors Related to Adolescents' Health Behaviour in Cross-border Area*

### **2.1 ADOLESCENTS' HEALTH BEHAVIOUR – THE RELATION OF SOCIO-ECOLOGICAL CONTEXT WITH UNDERLYING SOCIAL DETERMINANTS**

According to the UN (2012) there were approximately 721 million adolescents (aged from 12 to 17) in the world in 2012 and the predicted number is 755 million in 2040. Adolescence is the healthiest period in life, but there are some serious life-threatening risks related to health behaviour. Adolescents' risky behaviours include several types of behavioural problems. However, in this study the health behaviour considered is particularly smoking but also alcohol use, physical activity and diet.

Social and environmental factors are related to health behaviour, and this relationship has been shown to be complex (Bronfenbrenner 1979; Hanson & Chen 2007; Härkönen 2007). Adolescence is a pathway to adulthood, and therefore it is crucially important to understand the social determinants behind health behaviour. During adolescence the future health is established, and therefore there are opportunities to affect health. However, adolescents are not necessarily capable of fully understanding the consequences of risky behaviour, and abstract decision making may be inadequate. This inability may make them particularly vulnerable to unhealthy behaviour (WHO 2001.).

It has been proposed that better material wealth may negate unhealthy behaviours which seem to be strongly related to family, peers and school (Hanson & Chen 2007; Mackenbach et al. 2008) and unfavourable choices seem to cumulate, which will deepen the inequalities (Pampel et al. 2010). It has also been argued that these influences may run in families as a heritage (Graham & Power 2004) and therefore economic, ecological, social and cultural circumstances in childhood and during adolescence may formulate the social status and health in adulthood (Starfield et al. 2002; Mackenbach et al. 2008; Due et al. 2011; Viner et al. 2012).

Hunter and colleagues (2009), based on Marmot's review (Marmot 2010), raised the issue of the causes of the causes, meaning that we should emphasise the social determinants more carefully beyond the lifestyle. Therefore, adolescents should be the central concern of global health policy (Sawyer et al. 2012) but are often neglected (Kleinert 2007; Viner et al. 2012). Health related behaviour contributes to global health concerns, particularly to the epidemic of non-communicable diseases (Beaglehole et al. 2011). Risky behaviour is usually established at an early stage in life (CSDH 2008), and smoking and alcohol use, in particular, have far-reaching consequences to later health (Starfield et al. 2002; Marmot 2005). Moreover, it has been proposed that engagement in any risky behaviour is likely to increase engagement in another one (Escobedo et al. 1997; DuRant et al. 1999). Engagement in multiple risk behaviours in adolescence increases the possibility of multiple risk behaviours also in adulthood.



## **2.2 SOCIO-ECOLOGICAL INFLUENCE ON ADOLESCENTS' SMOKING**

The influence of close social relationships has been well documented among adolescents (Hoffman et al. 2006; Hanson & Chen 2007). Close relations are the most important because they are persistent, valued and emotional. Individuals interact and spend time with these relations, which provide opportunities for influence from sharing information via interaction and observation. The more adolescents with whom smokers have close relationships, the greater is the risk of smoking (Harakeh et al. 2007; Wen et al. 2009). However, parental anti-smoking values and attitudes seem to reduce the likelihood of smoking (Simons-Morton 2004; Kristjansson et al. 2008; Evans & Kutcher 2011).

Perhaps the most important socio-ecological primary factors are parents' and peers' smoking (de Vries et al. 2003; Schepis & Rao 2005; Hoffman et al. 2006; Kemppainen et al. 2006; Hoffman et al. 2007; Kristjansson et al. 2008; Rogacheva et al. 2008; Baška et al. 2009; Gilman et al. 2009; Wen et al. 2009; Kislitsyna et al. 2010; Tjora et al. 2011; Jung & Chung 2012; Mak et al. 2012; Kristjansson et al. 2013). Peers are important determinants of smoking because when adolescents associate with smoking peers and reinforce smoking behaviour, they are likely themselves to smoke.

Socio-economic status (SES) has been shown to influence smoking. Adolescents from families with lower socioeconomic status are more likely to smoke (Rasmussen et al. 2009; Richter et al. 2009; Kislitsyna et al. 2010; Richter et al. 2012; Pitel et al. 2013; Mathur et al. 2013). On the other hand, high levels of parental education (Mistry et al. 2011; Kuntz & Lampert 2013) and living in an intact family (Griesbach et al. 2003; Johansen et al. 2006; Hemovich et al. 2011) decrease the likelihood of smoking.

School environment as social context has been shown to be an important domain, because adolescents spend a lot of time there (WHO 1986). Smoking has been found to be less prevalent in schools with a strong sense of belonging and high school satisfaction (West et al. 2004; Morgan & Haglund 2009). Adolescents' own higher academic achievement has also been shown to be a protective factor (Maes & Lievens 2003; Johansen et al. 2006; Richter & Leppin 2007; Schnohr et al. 2009; Pennanen et al. 2011; Jung & Chung 2012; Kuntz & Lambert 2013).

One of the most important secondary factors for smoking is tobacco advertising in the media. Tobacco advertisements in the media have an important normative influence on adolescents' behaviour, increasing positive attitudes towards smoking, intention to smoke, and smoking initiation (Wakefield et al. 2003; Sargent et al. 2005; Wellman et al. 2006). Among younger adolescents, non-smoking messages through the media have also been shown to be effective in reducing smoking (Farrelly et al. 2002, 2003; Wakefield et al. 2003).

## **2.3 SOCIO-ECOLOGICAL SMOKING ENVIRONMENT ON THE FINNISH SIDE OF THE CROSS-BORDER AREA**

In Finland, among adults, smoking prevalence is moderate and similar between men and women (WHO 2013a, 2013b). Adult men's daily smoking rates was 19% and among woman it was 13% in 2013 (Helldan et al. 2013). Fourteen- to fifteen-year-old adolescents' daily smoking rates were 12% among girls and 15% among boys in 2013 (Luopa et al. 2014). However, among 15 to 16 year olds, 34% reported having smoked during the preceding 30 days (ESPAD 2011). Among adolescents, the equality of smoking behaviours by the two genders is typical for Western European countries. In Finland, no gender differences in smoking have been found since the late 1990s (Kinnunen et al. 2015). In the area of North Karelia, adolescents' smoking prevalence is similar among both genders as in other parts of

Finland. The prevalence of smoking is moderate and the age for experimenting with smoking and habitual daily smoking has moved later (Luopa et al. 2014).

Finland has implemented the tobacco policies recommended by the Framework Convention on Tobacco Control (FCTC), and a decrease in smoking prevalence has occurred (WHO 2008). The recommended policy tools have focused on increased taxation, restrictions of advertising and smoking in public places, health warnings and education. Traditionally, Finnish tobacco legislation has been very strict, starting with the first tobacco act passed in 1976. The Act has four different dimensions which were aimed at influencing smoking and which have remained: restrictions, price policy, health education and research (Heloma et al. 2012).

In 1976, restrictions came into force concerning advertising and smoking in public places (Corrao et al. 2000) including schools (Heloma et al. 2012). At the same time, warning labels on tobacco packages became obligatory (Leppo & Vertio 1986). Restrictions were rapidly widening to all advertising, smoking in transportation vehicles, and age limits to purchase tobacco products and equipment was set to 16 years. Moreover, the tobacco prices have been raised continuously from the middle of the 1970s (Finlex 2014b) because the taxes have been shown to be an effective tobacco control policy tool (Pekurinen & Valtonen 1987).

In 1995, the revision of the Tobacco Act introduced restrictions on smoking in the workplace (Heloma et al. 2012). At this time, the sale for individuals below 18 was prohibited (Finlex 2014a). The latest reform in 2010 was aimed at causing smoking to cease in Finland by the end of 2040 (Heloma et al. 2012).

The antismoking activities began in the late 1960s. Preventive programmes also became common, and the first projects for reducing smoking started in North Karelia back in 1970's and 1980's (Vartiainen et al. 1983; Tossavainen 1993). In schools, school health education has been an independent, obligatory and autonomous subject in school curriculums since 2001 (FNBE 2004). In lower grades 1-6, health education has been integrated in other subjects, and from grade 7 it is an independent subject.

Health education in schools aims to teach children and adolescents the health knowledge and skills that are needed to maintain and promote health and health behaviour (FNBE 2014). The education is based on the WHO definition of health, and it takes into account the children's and adolescents' development and the effect of the socio-ecological environment. The aim is not only providing relevant and suitable knowledge from a formal curriculum but also strengthening their skills in decision making, problem-solving, self-control and social collaboration (FNBE 2014). Smoking and other drugs will be discussed for the first time in lower grades while integrated with other subjects. In upper school, grades 7 to 9, the health education deals with particular subject matters and the key objective is related to "know-how" learning from the perspective of pupils' age and stage of development (FNBE 2014).

Despite the success in Finland in reducing the prevalence of smoking, reductions seem to have occurred more in higher socio-economic groups, while in low social classes smoking is still more common (Heloma et al. 2012). Among working-aged adults, smoking rates are higher among low educated groups compared with more educated groups. Among the lowest educated men, smoking prevalence was 35%, while among the highest educated group it was 15% in 2010. In addition, among women the rates in the highest and the lowest groups were 10% and 28%, respectively. This trend can be seen also among adolescents. Adolescents with low academic achievements, school quitters, and vocational school adolescents have a higher prevalence of smoking than adolescents with better school performance (Helakorpi et al. 2011). Inequality in smoking can be seen as a major social gradient and may be widening the health gap between social groups (Siapush et al. 2006).

## **2.4 SOCIO-ECOLOGICAL SMOKING ENVIRONMENT ON THE RUSSIAN SIDE OF THE CROSS-BORDER AREA**

The smoking prevalence in Russia is one of the highest in the world, particularly among men, and smoking among women is growing steadily (Gilmore & McKee 2004a; WHO 2008; GATS 2009). In 2013, 55% of men and 15% of women smoked daily (WHO 2013b). The prevalence of adolescents' smoking is especially high in the European Region (Warren et al. 2006; WHO 2008), particularly in Eastern Europe, (WHO 2008; Baška et al. 2009; ESPAD 2011). In Russia, among 15-year-old adolescents, the prevalence of the daily smoking of boys was 15% and of girls, 9% in 2013 (WHO 2013b).

Earlier studies indicated that adolescents' smoking correlates with adults' smoking in the Pitkäranta district. Since 1992, the prevalence of smoking among men has remained at around 65%. Among women, smoking had increased from 11% to 22% by 2004 (Rogacheva 2008). Similar gender differences existed among adolescents' smoking as those found among adults, suggesting that smoking is more common among boys than girls. In more precise terms, smoking was more common among boys and less common among girls when compared to the general smoking prevalence in the Russian Federation (ESPAD 2011; WHO 2013a). Smoking prevalence among boys remained unchanged from 1995 to 2004, at nearly 30%. By contrast, adolescent girls' smoking doubled from 7% to 15% between 1995 and 2004 (Rogacheva 2008). The Pitkäranta region represents a rural area of Russia where the smoking prevalence in general has been lower among girls and women than in bigger cities (Vlasoff 2008; GATS 2009), where the smoking prevalence among women has strongly increased after the collapse of the Soviet Union (Bobak et al. 2006; Perlman et al 2007).

Historically, Russian smoking legislation has been largely ineffective and insufficiently controlled (Gilmore & McKee 2004a, 2004b) and tobacco products are easily available with low prices (Baška et al. 2009; WHO 2010). The smoking climate and also the attitudes towards smoking have been very liberal, and therefore smoking is deeply embedded in Russian culture.

Since the transition of the Soviet Union in 1991, enormous markets opened for transnational tobacco companies (TTCs). Remarkably, smokers already existed among men because of the high smoking prevalence. The new potential smokers were found to be among women and adolescents, but particularly among young women, whose smoking rates have been traditionally very low (McKee et al. 1998.). The Western style marketing, changed attitudes towards smoking among women and specific brands for women created enormous potential for tobacco industries to influence smoking rates. The rates increased by 6% among men and more than doubled among women between 1992 and 2003 (Jha & Chaloupka 2000; Gilmore & McKee 2004a; Perlman et al. 2007; Kislitsyna et al. 2010). In fact, because of the weak and insufficiently controlled tobacco law, growing smoking rates were easy to achieve by TTCs (WHO 2013b).

Today, the Russian tobacco markets are one of the most important areas globally for the TTCs. The Russian Duma only accepted the FCTC in 2008. Prior to that, tobacco legislation and its implementation were insufficient. After the acceptance of the FCTC, new more effective and tighter tobacco legislation was urgently needed in Russia. In 2013, the new legislation came into force (Duma 2013). The law brought restrictions for sales to minors, advertising, and smoking in public places. However, before the final law was approved, the TTCs proposed that they would be allowed to charities, and this was approved (Stafford 2013). In addition, because of tobacco companies there still is not a minimum price for cigarette products (Stafford 2013) and prices have remained low because of taxation (WHO 2007; WHO 2013b).

The new tobacco legislation brings directions to schools as well. The law directs teachers to give educational information to pupils about the harmful effects of smoking and the

relation to future health (Duma 2013). In Russia, health education has been integrated into other subjects, and therefore this reform was important also from an educational aspect; it may inhibit the smoking initiation of pupils and in later life protect them from tobacco-related diseases and other consequences. In all, overall awareness of the harmful health effects of tobacco is needed, because it has been observed that smokers do not clearly know the risk of their behaviour (Siapush et al. 2006; Roberts et al. 2012).

## **2.5 THE STAGES OF THE TOBACCO EPIDEMIC MODEL IN FINLAND AND IN RUSSIA**

The model of the tobacco epidemic (Lopez et al. 1994) with four distinct phases is used to emphasise the situation of populations' smoking (Table 1). In the model, the stage of the epidemic can be characterised through three different variables: prevalence, consumption and mortality. Prevalence (the percentage of current smokers) is the most used variable, and the prevalences can also be defined in sub-groups such as age, gender, social class and profession. Consumption can be measured by cigarette consumption per time range and it is influenced by income and prices. Mortality is presented as rates. In addition, health effects can also be evaluated (e.g., through tobacco-related diseases).

*In Russia*, the smoking epidemic in general seems to be at the end of stage two. It is characterised by a high and still continuing trend of smoking among men of all ages and an increasing smoking trend among women. Smoking is similar between the social classes, and in addition, may be more common in the upper classes. It has taken two or more decades from stage one (with very low smoking trends among men and hardly any smoking among women). Still, there are no clear signs of decreasing smoking trends, which is typical for phase three (Bayard et al. 2012). In phase three, smoking starts to decline among older men (quitters), then among all men, and at last slowly among women.

*In Finland*, the smoking epidemic seems to be at stage four. In 1950, smoking was very high, nearly 70% (Rahkonen et al. 1992) and shown to be one of the most important reasons causing premature mortality in 1960 (Vartiainen et al. 1994). Since then, men's smoking rates have declined (Helldan et al. 2013) and the trend is still decreasing, but more slowly than before (Helakorpi 2011).

Among Finnish women, smoking prevalence was 13% in 1950. In the late 1970s the prevalence increased to 20% (Rahkonen et al. 1992) and stayed there since early 2000 (Helakorpi et al. 2011). Right after that, the trend started to decrease (Helldan et al. 2013). Today, the smoking trend in Finland is quite similar to that among adults in other Western countries. In summary, in both genders, smoking prevalence is still slowly decreasing. However, the differences in smoking trends between social classes are continuously widening (Helakorpi et al. 2011). Because of smoking, life expectancy differences between educational groups have strongly increased over the last 40 years. In men the difference in life expectancy between socio-economic groups has traditionally been great, but decreasing and in women, respectively, a small, but growing (Martikainen et al. 2013.).

Adolescents' smoking stayed relatively high from the late 1970s to the 2000s. After that, daily smoking has decreased among all pupils in secondary and high schools and in vocational schools but still among older adolescents, 20% are current smokers and the average consumption was 10 cigarettes per day in 2011 (Raisamo et al. 2011). However, socio-economic differences are also obvious among adolescents. Adolescents in vocational schools still have markedly higher daily smoking rates compared with the corresponding rates in secondary and high schools (School Health Promotion Study 2015.).

*Table 1.* The stages of a tobacco epidemic (Lopez et al. 1994)

<b>Description of the stages</b>	
I	<ul style="list-style-type: none"> <li>• The beginning of the tobacco epidemic in the populations.</li> <li>• Smoking prevalence is low, among men &lt;15 % and among female &lt;10%.</li> <li>• Tobacco-related diseases and mortality is not evident.</li> <li>• A time period is short (1-2 decades).</li> <li>• Cigarette consumption per capita is low (&lt;500 cigarettes/adult/year)</li> <li>• At the end of the phase, among men the prevalence of smoking starts to rise.</li> <li>• Tobacco policy is not developed.</li> </ul>
II	<ul style="list-style-type: none"> <li>• Smoking prevalence among men continues a rapid increase, reaching a level of 50-60%.</li> <li>• Women's smoking start to increase but lags behind the men.</li> <li>• Smoking behaviour is similar between social classes and it is socially acceptable.</li> <li>• A time period is two or three decades.</li> <li>• Cigarette consumption is 1000-3000 per adult in a year.</li> <li>• Mortality rates and diseases start to increase among men.</li> <li>• Tobacco policies are insufficient and lag behind the populations' smoking situation.</li> </ul>
III	<ul style="list-style-type: none"> <li>• Men's smoking starts to decline among middle-aged and elderly men.</li> <li>• The increase of women smoking stops and starts to slowly decrease among well-educated women.</li> <li>• Cigarette consumption among men varies from 3000 to 4000 and among women from 1000 to 2000 per adult in a year.</li> <li>• Male mortality for tobacco-related diseases is high, and it starts to increase among women.</li> <li>• Tobacco policies are developed and anti-tobacco education is initiated in schools.</li> <li>• Smoking starts to be socially abnormal behaviour.</li> </ul>
IV	<ul style="list-style-type: none"> <li>• Among both genders, the prevalence of smoking starts to slowly decrease.</li> <li>• The smoking prevalence between genders is similar, near 30%.</li> <li>• The mortality among both genders is expected to slowly decrease two or three decades after this stage has started.</li> <li>• Smoking is more common among low social classes.</li> <li>• Individuals are demanding smoke-free environments and policies and programmes are developed to support that.</li> </ul>

## **2.6 SUMMARY**

The long-standing differences in smoking legislation and overall health policy have created two very different climates towards smoking in Finland and in Russia. Smoking behaviour is undoubtedly the cause of many health inequalities between individuals and populations, and therefore it is still crucial to improve understanding of the determinants behind smoking behaviour in culturally different areas, especially among adolescents. Policies in communities, schools, families and peer groups play a crucial role in adolescents' health-related behaviour and attitudes. They also influence learning and formulate the development of health-related behaviour. Health promoting policies and supportive relations are the key agencies to learn health skills and competencies through the transition from childhood to adulthood.

## *3 Socio-Ecological Models and Social Theories as a Perspective to Explain Health Behaviour and Smoking among Adolescents*

### **3.1 SOCIO-ECOLOGICAL MODELS**

Ecological models of health behaviour emphasise the contexts of environmental factors of behaviour while incorporating social and psychological influences. The paradigm is rooted in the assumption of interrelations of environmental factors and health behaviour with multiple levels of intrapersonal, interpersonal, organisational, community, physical environmental, and policy determinants (Bronfenbrenner 1979). Health behaviour has been shown to be closely linked to the adolescent's immediate surroundings (WHO 2015), and therefore socio-ecological models can be seen as a conceptual framework to effective health promotion. The models have been adopted in many health promoting studies among children's and adolescents' health behaviour (DiNapoli 2009; Lewis-Moss et al. 2009; Moore et al. 2011; Jon-Akinola & Gabhainn 2015).

#### **3.1.1 The Socio-ecological Model**

*The socio-ecological model* of health promotion was advocated in the Ottawa Charter for Health Promotion (1986). The model was based on the assumption that there are multiple levels of reciprocal causations which will shape individual behaviour, development and learning. The socio-ecological model offers a holistic explanation to health challenges and emphasises the interaction between the factors of individual and environment in all levels of health behaviour (Stokols 1996). The model contains inter- and intrapersonal, community and institutional and policy levels, and individuals' behaviour interacts across these levels (Stokols 1996; McLaren & Hawe 2005). As the health challenges are complex and multilevel, the model integrates several levels of health determinants that impact health behaviour. The model proposes that individuals are an integral part of the larger social units in which they live. The interaction contains socio-cultural, economic and political environment (Paton et al. 2005). These relations affect individuals' and populations' health. On the other hand, these relations of interaction support and promote behaviour and health outcomes, if they are well balanced (Bronfenbrenner & Evans 2000). The levels of the socio-ecological model by McLaren and Hawe (2005) are presented in Table 2.

Table 2. Socio-ecological model's levels of influence on health behaviour and health outcomes (McLaren & Hawe 2005)

Level	Description of the level
Intrapersonal	Individual and personal characteristics that influence health behaviour such as attitudes, knowledge and beliefs.
Interpersonal	Interpersonal supportive relationships with family and friends.
Organisational	Rules, policies and informal structures which may promote the health behaviour.
Community	Social networking among individuals, groups and populations.
Policy	Laws and policies which support health behaviour.

The model is based on several socio-ecological theories of social science which explain or guide the health behaviour. Bronfenbrenner's *Ecological Theory of Human Development* (1979), known also as *Ecological Systems Theory (EST)*, presented the basics of widely accepted environmental effects on the development and growth of children and adolescents. In addition, more models were created for application to health behaviours and health promotion (Stokols 1996; Cohen et al. 2000; Glanz et al. 2005; Fisher et al. 2005; Glass & McAtee 2006).

Bronfenbrenner's theory proposes that a child's development is related to multi-level factors: micro-, meso-, exo- and macrosystems. The microsystem includes family, school, neighbourhood and care. The mesosystem is the combination of the different structures of the microsystem. The exosystem is formed by indirect effects of the social interaction, such as parents' profession and the existing financial and environmental resources. An individual does not directly belong in this system, but that influences his/her microsystems. Macrosystems are related to societal laws and values. The macrosystem consists of the overarching pattern of micro-, meso-, and exosystems characteristic of a given culture or other broader social context, such as belief systems, life styles, life course options, and patterns of social interchange that are embedded in each of the other systems. In the 1980's, Bronfenbrenner added in the model chronosystem, which indicates the relationship between the time and the timing of the various internal and maturation events of life (Bronfenbrenner 1986, 1994).

The central assumption is that children and adolescents produce and are produced by the environment (Bronfenbrenner 1979; Bronfenbrenner & Evans 2000; Härkönen 2007). The theory emphasises the importance of the quality and context of the living environment. Bronfenbrenner argues that as the child develops, interaction with the environment will be more complex. Paquette and Ryan (2001) proposed that the issue of the complexity is due to the fact that the child's physical and cognitive structures grow and mature. The model of EST is presented in Figure 1.



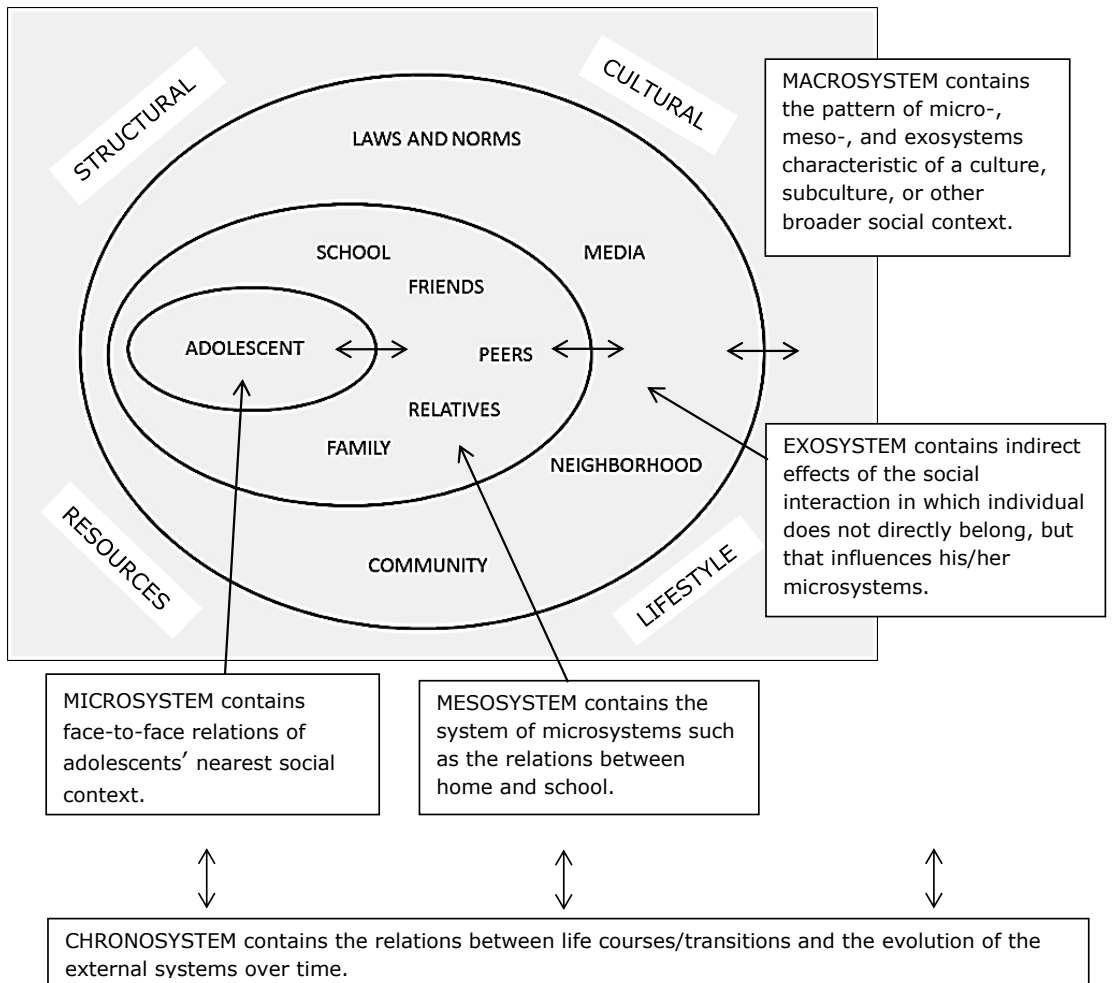


Figure 1. The Ecological Systems Theory applied by Bronfenbrenner (1976, 1986, 1994), reprinted with the permission of the copyright owner.

### 3.1.2 The Behavioural Ecological Model

The *Behavioural Ecological Model (BEM)* was developed and based on the principles of behaviour (Hovell & Hughes 2009; Hovell et al. 2009). However, the BEM extends behavioural principles to the cultural roles and expectations in a complex reciprocal system. The model integrates the individual's biology and history of health learning to the group and population practices which are influenced by the surrounding culture (Hovell & Hughes 2009). The behaviour, which is always situated within the context, is dependent on the power of the rewards of the external environment. The future behaviour is based on rewards that either increase or decrease such behaviour.

Figure 2 presents the BEM with the sources of influence on smoking behaviour. The model presumes that influences from individual genetic and biological levels (e.g., nicotine dependence) with learning history (e.g., addiction to smoking, attitudes towards smoking, skills, motivation, perceived social norms, emotions, empowerment) interact with the levels of the local nearest social environment (e.g., parents' and peers' smoking, social pressure and attitudes), built environment (e.g., access to clinical services, school

policy), upper societal community (e.g., tobacco policy and laws, media, advertising, tobacco products availability) and social/cultural levels (e.g., nationality, culture specific attitudes). All these levels interact with physical ecology.

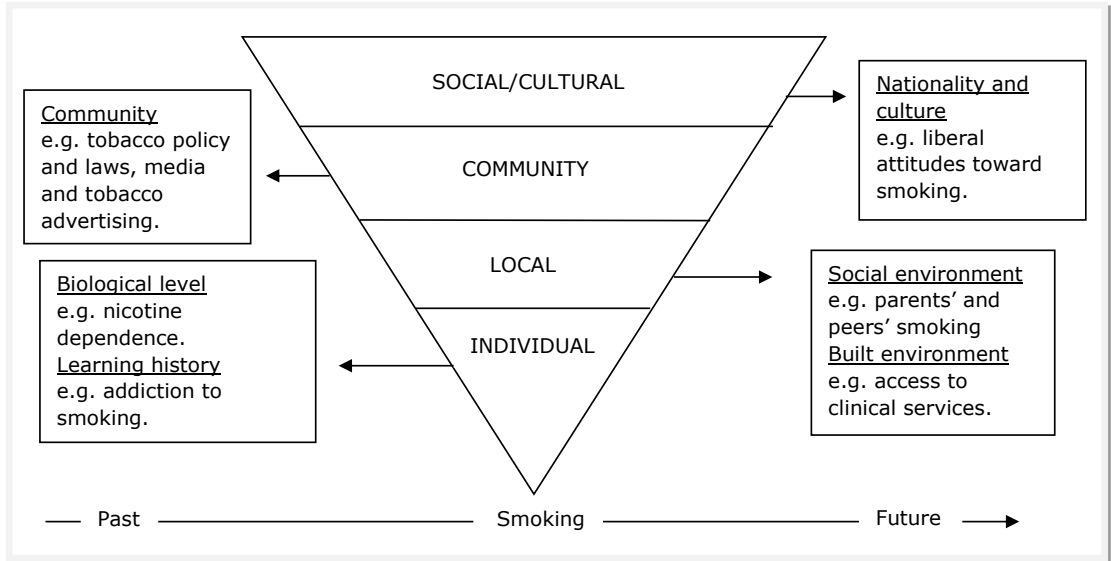


Figure 2. The Behavioural Ecological Model on the context of smoking behaviour applied by Hovell et al. (2009), reprinted with the permission of the copyright owner.

## 3.2 THEORIES OF SOCIAL INFLUENCE

The following theories, *social learning*, *primary socialisation*, *social identity* and *social network theories* are presented because all of these theories reflect multifaceted perspectives and emphases on social processes and therefore provide an understanding of adolescents' health behaviour, particularly smoking.

### 3.2.1 Social learning theory

The influence of environmental factors is acknowledged also in learning which is important particularly in health learning. Individuals will learn through the relationship between reciprocal and causal relations between an individual and the environment (Edberg 2007). Bandura (1977, 2001) developed *the social cognitive (or social learning) theory (SCT)* which highlighted this relationship. Specifically, SCT states that a behaviour (e.g., smoking) is more likely to be adopted during adolescence. Individuals observe and model the behaviour and its consequences. Observing a model can also prompt an individual to engage in behaviour already learned. Self-efficacy and self-regulatory mechanisms (control, observation, reflection and reaction) affect the observation of the living environment and via that to the learning. According to Bandura, learning will be divided into four partial processes, which are: 1) attention, 2) conservation, 3) execution and 4) motivation. Bandura also emphasises the rewards and punishments guiding the learning. Model learning is an example of the child's development; the child takes the model from parents, siblings and later from friends. Among adolescents, model learning is reflected to idols identification and the influence of the peers and peer group modelling.

Vygotsky (1978) introduced *the theory of constructive learning*, according to which knowledge builds because of the collaboration with others. The context and the quality of relationships influence the social learning processes in all key life domains where adolescents learn and conduct their daily activities. The above-mentioned social learning theories emphasise the interaction and influence in particular of family, peers and school (Eisenberg & Forster 2003). In summary, from the perspective of social learning theory, the health behaviour is seen as a learned behaviour from the socio-ecological environment.

### 3.2.2 Social identity theory

Social identity theory (Abrams & Hogg 1990) focuses on an individual's self-concept as a group member and categorizations of distinct social groups. Our sense of who we are is natural and enhanced by knowing that we belong to certain groups that are different from others (Tajfel et al. 1986). Accordingly, this theory states that individuals with group membership have a sense of social identity. Group membership provides us with the significance of values and emotions. Family, relations, friends, community, schools and regional entities are relational structures in which we engage and which help us to define who we are. Adolescents try on various identities and adopt the norms that are central to the social identity of the peer group (Terry et al. 2000). Adolescents' self-concepts are important in the development of homogeneity.

There is abundant evidence of this mechanism in adolescents' smoking behaviour with peer groups (Kobus 2003). Peer groups offer a source of purpose, meaning and the sense of belonging, but also emotional security and collaborative learning to build and maintain social identity (Ellemers et al. 2004; Reicher et al. 2005). Social identity has a key role in determining whether individuals engage in behaviour (e.g., non-smoking) that promotes well-being and health or, on the other hand, causes health risk (e.g., smoking). Adolescents are motivated to maintain a social identity and identify themselves as members of their social group. If a group with impermeable group boundaries defines themselves as smokers, the individuals act in line with the smoker status. Therefore, the more adolescents identify themselves as smokers to maintain social identity, the more they will act as smokers and are attached to their smoking identity.

### 3.2.3 Primary socialising theory

The fundamental basis of primary socialisation theory is that normative behaviours are learned from social, psychological, and cultural contexts (Oetting & Donnermeyer 1998; Oetting et al. 1998a, 1998b). This theoretical framework assumes that social contexts identify three primary contexts, including the family, school and peers. Moreover, theory suggests that adolescent peer group effects are stronger than the effect of family and school. The media and community are also considered, but the impact is indirect through family, peers and school.

Peers are considered to be the major source of transmission and the effect of learned behaviours and predictor of smoking among adolescents (Simons-Morton et al. 2001; Abrams et al. 2005). The findings indicate that parental influence remains important, while peer influence on smoking appears to increase during adolescence (Bauman et al. 2001). Kobus (2003) highlights the influence of schools on adolescent smoking, though school bonding and success or failure in school may affect the selection of peer groups and their influence on smoking behaviour. This is possible via bonds between environments and adolescents. When the bonds that adolescents have with family and school are weak, the role of peers becomes stronger and might lead to engagement in risk behaviours such as tobacco use.

### 3.2.4 Social network theory

The focus of social network theory is on the interdependence relations between individuals and a social structure (Granovetter 1973, 1983; Scott 2013). Social network theory assumes that the individuals in a social system interact with each other and affect others' decision-making such as the decisions of the smoking behaviour. The relations are seen as the facilitators which provide interactions between system members. This theory suggests that individuals have their own places in the system, connected with ties of different strengths. Social network theory has also been used to examine the exchange of information within a system and determine the value and importance of it (Granovetter 1973, 1983; Scott 2013). In the perspective of smoking, the norms might be communicated within these networks and transmitted the norms of the smoking or non-smoking across a system. In groups there are central persons and those who are on the margins, constructing different (multiple) roles, e.g., with their gender or age (Bruggeman 2008). Central individuals are key factors in the adoption of behaviour, but marginal individuals are considered most important when the issue is controversial. Centrally placed individuals are more vulnerable to social pressures (e.g., smoking) than marginal individuals. Once a number of marginal individuals adopt a controversial behaviour (e.g., non-smoking), their connections to distal parts of the system allow for its spread throughout the system.

The social network theory suggests the importance of considering the larger social system instead of merely focusing on interaction with family and peers in understanding the development of health behaviour (Simons-Morton et al. 2009). A wider social system requires identifying specific boundaries, such as adolescents in classrooms or school settings. In addition, these networks can be large and unstructured, connected also via social- or other culture-related media. Adolescents may have part in many networks in which the feedback of the networks defines the norms and values for behaviour.

## 3.3 SUMMARY

The presented theories were selected to the theoretical basis of this study because they share the perspective of a primary social influence to the development of adolescents' health behaviour. Socio-ecological models and behavioural ecological models present the mechanisms of the primary socializer but also the wider social and ecological reciprocal relations of culture and other important secondary influences that affect the development of health behaviour. Adolescents' health behaviour with the perspective on selected theories and models is presented on Figure 3.

Social learning theory presents the mechanisms of social influence in which adolescents learn behaviour by observing others. In view of this theory, smoking is a form of behaviour learned from family and peers. Primary socialisation theory is also based on learning and highlights the importance of individual personality and relational bonds between individual and primary socializers: family, peers and school. The strength of the ties defines behaviour and personality traits, especially those that impact peer relationships, and prior experiences in relationships and with specific behaviours are considered possible role models. It may be that non-smoking parents have previously had more strength to influence the adolescent but the smoking peers have in time become more important and these ties are stronger than the one with the parents.

Social identity theory introduces the adoption of social identities. It is founded on a sense of self-concept and the self-concept as a group member. In the context of one's view of smoking, during the adolescence, group identity (smokers) may become more important

than one's personal self-concept. Adolescents are expected, or feel that they have no choice but, to adapt to the group expectations and to share the social identity of the group's self-concept. This may lead to smoking initiation and later habitual smoking. The social network theory highlights the significance of system location and pathways of information exchange. This theory provides a wide angle for the mechanism of adolescents' decision making and influencing each other's behaviour, such as smoking, and provides a perspective on how information is passed throughout a large social system, such as a school.

The effect of social influence on adolescent smoking is exerted through social relations that operate on social norms such as the behaviours, beliefs and attitudes of one's family, school and peers. Social determinants affect the decision-making process concerning health behaviours, such as smoking. Each of the presented theories suggests that peers are important determinants for the development of behaviours, norms and attitudes. In view of smoking, theories suggest that the more adolescents associate with smoking peers and other primary socializers, the more likely they are to also smoke.

According to the socio-ecological models, there is complex interaction between individual and contextual factors, and the phenomenon is rooted in the assumption of interrelations between environmental factors and health behaviour with multiple levels of determinants incorporating social and psychological influence. Socio-ecological influence can be seen as a conceptual framework to understand adolescents' learning and decision-making on whether or not to smoke. Thus, this view provides a comprehensive framework for considering adolescents' smoking in a cross-border area in Finland and in Russia where long-standing differences in culture, economy and health policies have created two very different climates towards smoking.

Although the models and theories differ in the specific social and cognitive processes they emphasise, they all represent a phenomenon in which adolescents associate with their social and/or ecological context. Together, these models and theories provide a comprehensive framework for considering both social and ecological influence on adolescent health behaviour, particularly on smoking. The form of social influence with most strength is based on the relationships with which adolescents associate themselves most; however, secondary influence by culture and national law and policies is a wider phenomenon for understanding cultural differences. In this study, the focus of the selected theories and models is on adolescents' associations with their primary social context in two different cultures, which makes the adolescents' socio-ecological context different on the different sides of the border.

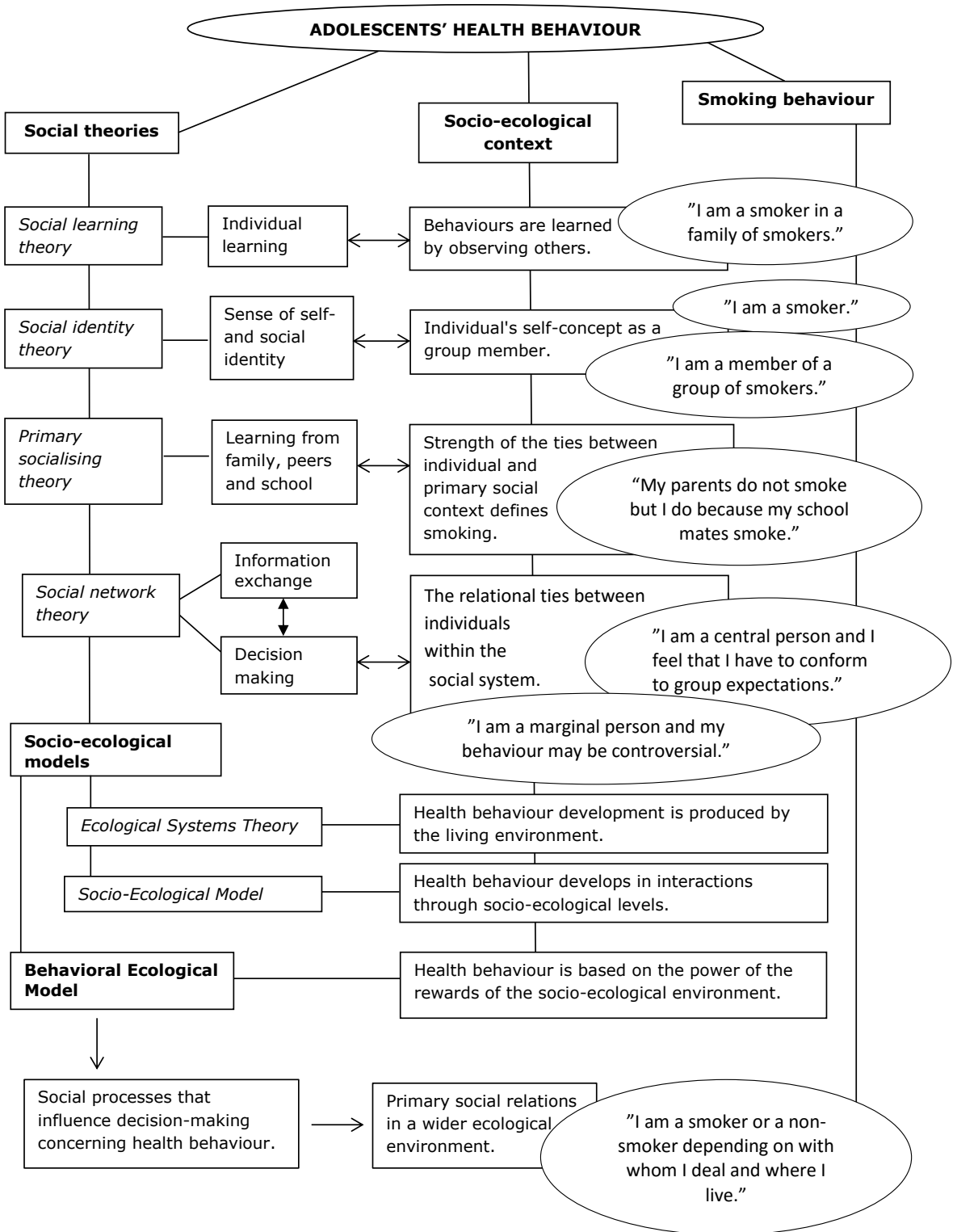


Figure 3. Adolescents' health behaviour in the context of the chosen theories and models of this study - smoking as an example.

## 4 Aims of the Study

This study is positioned in the field of nursing science in the frame of health behaviour and health promotion. The specific aim of the repeated cross-sectional comparative studies was to find out the trend of adolescents' health related behaviour, particularly smoking, between and within cross-border area in North Karelia (Finland) and in the Pitkäranta district, the Republic of Karelia (Russia) and between genders. Furthermore, the aim was to recognise different socio-ecological determinants affecting adolescents' health behaviour, taking into account growing inequalities in health behaviours.

The specific aims of the study were to find out:

What are the most important socio-ecological factors related to adolescents' health behaviours (smoking, alcohol consumption, physical activity and diet) in order to identify factors connected with possible inequalities in health-related behaviours? (Article I: literature review).

How the prevalence of smoking, smoking experimentation, and future intentions to smoke have changed over time, specifically between the years 1995 and 2013 in the Pitkäranta district, the Republic of Karelia, Russia, and to compare the trends with those of Eastern Finland and between the genders? (Article II: empirical research data).

- It was hypothesised that there would be differences between North Karelia and Pitkäranta district; in Pitkäranta, smoking, smoking experimentation and future intentions to smoke would have increased among girls and stayed high among boys, suggesting differences between the genders. In Finland, smoking, smoking experimentation and future intentions to smoke were hypothesised to have slightly decreased and differences between genders to have remained equal.

Whether there were differences in relations between the nearest socio-ecological relationships (best friend's, parents' and siblings' smoking) and adolescents' smoking in Eastern Finland and the Pitkäranta district and changes in those from 1995 to 2013. (Article III: empirical research data).

- It was hypothesised that in both cultures, smoking among family members and best friend would be positively related to adolescents' smoking, and that these relations have sustained over time even though the prevalence of smoking has changed in both countries.

Whether attitudes and opinions on smoking and smokers are associated with smoking experimentation, daily smoking and best friend's smoking among 9<sup>th</sup> grade adolescents in North Karelia, Eastern Finland and the Pitkäranta district, Republic of Karelia, Russia, in 2013.

(Article IV: empirical research data).

- It was hypothesised that the more non-normative (from the perspective of law and restrictions) the adolescents' attitudes related to smoking and the more positively they perceive smokers (from the perspective of a positive image of smokers), the higher the prevalence of smoking experimentation, daily smoking and best friend's smoking.

## 5 *Material and Methods*

### 5.1 STUDY AREA AND POPULATION

Finland and Russia have a 1340-kilometre-long common border. Different sides of this border have wide inequalities in living standards and health conditions due to different political and economic histories and current situations (McAlister et al. 2014). The Republic of Karelia is an autonomous part of the Russian Federation, located in northwest Russia, bordered in the west by Finland, in the north by the Murmansk region, in the east by the Arkhangels and Vologda and in the west by the Leningrad region.

The Pitkäranta district is one of the 18 districts in the Republic of Karelia, located in the northwestern coast of Lake Lagoda, approximately 150 kilometres from the Finnish border. The region covers an area of 2,250 km<sup>2</sup>. The biggest ethnic groups are Russians (82%) and Karelians (7%). There were 21,931 inhabitants in 2010, 12540 living in urban areas and 9391 inhabitants in rural areas. Since the early 1990s the population has continuously declined and the mortality has risen. In addition, in the area of the Republic of Karelia, the population has declined by over 30% and the proportion of under 15-year-olds has declined by over 50% (Federal State Statistics Service GomKosStat 2010.).

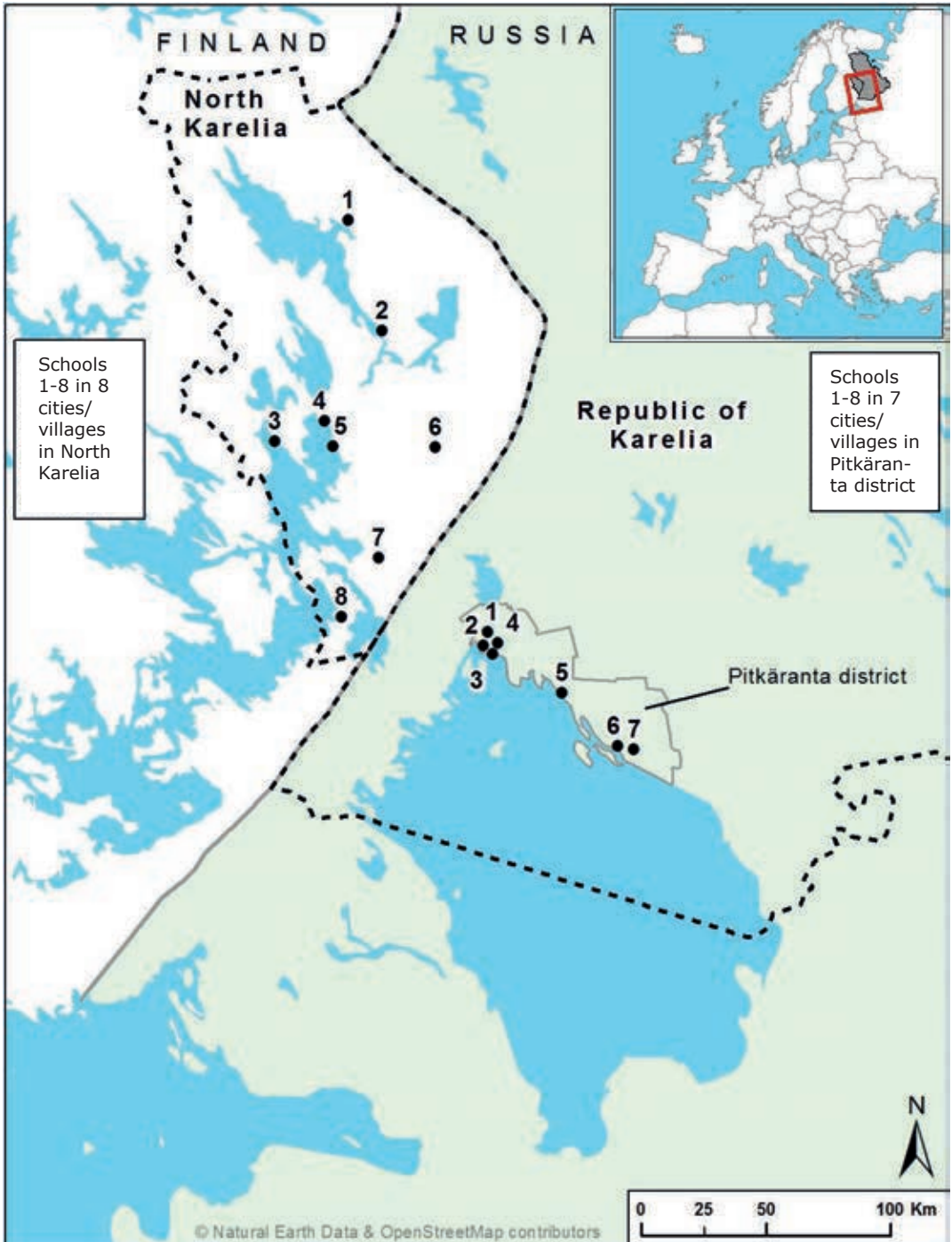
North Karelia is an eastern province of Eastern Finland and forms part of a common border with the Republic of Karelia. The province of Eastern Finland is formed by the provinces of North-Karelia, North- and East Savo and the area of Kainuu. The region covers an area of 85,200 km<sup>2</sup> and the population is about 644,000 inhabitants in 2014 (in which the proportion of under 15-year-olds is 14.5%), characterised as a low density of population (Statistics Finland 2014). The population is strongly decreasing and ageing because of out-migration (Regional Council of North Karelia 2016). Different ethnic minorities covered 2.7% of the population, of which Russians were the biggest ethnic group (Statistics Finland 2014).

### 5.2 STUDY SUBJECTS AND QUESTIONNAIRE

#### 5.2.1 Study subjects

The schools in cities and villages located in Figure 4 took part in the study in 2013. In 2013, the data were gathered in eight local schools in North Karelia, Eastern Finland and all eight schools in Pitkäranta district, Republic of Karelia, Russia. In North Karelia the selection of the schools was based on an earlier collection in this area and the chosen schools were part of the same schools as in earlier data collection in 1995 in Eastern Finland. Therefore, 8 out of 24 schools, representing both urban and rural schools, were invited to take part in the study. In Pitkäranta, the schools represented the total sample of schools that had 9<sup>th</sup> graders in 2013. The schools represented both urban and rural schools. In both countries, grades 1 to 9 (aged from 7 to 15) are compulsory and publicly funded.





*Figure 4.* The cities and villages in which schools took part in the study in Eastern Finland and in the Pitkäranta district, Republic of Karelia, Russia, in 2013.

Ninth grade pupils (15-year-old) in North Karelia and in Pitkäranta district were subjects in this study (Table 3). In 2013, the total amount of ninth graders in the schools 1-8 was 645 and 601 pupils (300 boys and 301 girls) completed the questionnaire in North Karelia. The response rate was 93%. In Pitkäranta district, the number 9<sup>th</sup> graders in schools 1-8 in seven different cities/villages were 182. In total, 179 pupils (101 boys, 78 girls) filled out the questionnaire. Response rate was 98%.

In this study, the data from the 1995 was also used. In 1995, the data consisted of pupils (n=385) in all 10 comprehensive schools in the Pitkäranta district and 2098 pupils in 24 randomly selected schools in the area of Eastern Finland. In all, 367 students (176 boys, 191 girls) in Pitkäranta and 1911 students (951 boys, 960 girls) in Eastern Finland completed the questionnaire and the response rates were 95% and 91%, respectively.

*Table 3.* The study subjects in the North-Karelia, Eastern Finland and in Pitkäranta district, Republic of Karelia in 1995 and in 2013.

	<b>1995</b>	<b>2013</b>	<b>1995</b>	<b>2013</b>
	Eastern Finland (n)	North-Karelia (n)	Pitkäranta district (n)	Pitkäranta district (n)
Total	1911	601	367	179
Boys	951	300	176	101
Girls	960	301	191	78
Response rate	91 %	93 %	95 %	98 %

### 5.2.2 Questionnaire

In 2013, the same questionnaire was used than earlier in the 1995 study (Kemppainen 2007) and which was produced already for the Karelia Youth Study in Finland (Vartiainen et al. 1983, 1990; Tossavainen 1993) based on different learning and development theories from psychology and social sciences. The study questionnaire included retrospective items concerning adolescents' exercise and sedentary lifestyle, smoking, diet, alcohol use, health choices, social relationships and family situations. In 2013, the questionnaire was updated based on the latest scientific evidence concerning adolescents' health related behaviour and by the law reforms concerning the issues of risk behaviour. This was done together with the Russian research group members, and the questionnaire was pretested before data collection. The pretest was carried out in both countries. First, the pretest was conducted in the one school in Eastern Finland on 25<sup>th</sup> March 2013 (n=75) and second, in Russian Karelia, on 21<sup>th</sup> May 2013 (n=40).

After the pretest some issues were corrected which concerned minor remodelling of the questions for better intelligibility in both countries. In addition, before the licence from ethic committee was given, some questions were modified again because these questions were considered to be ethically problematic. After the completion of the corrections, the questionnaire was assessed to be appropriate and acceptable for cultural comparison in both countries.

In this study, the questions concerning smoking were used (Appendix IV). In article II, the used outcome variables were adolescents' current smoking, smoking experimentation, and future intention to smoke. The current smoking was determined by the question, "Do you smoke?" Response options were scaled from 1 to 5 and based on these options, categories were created, namely 'not at all', 'less often than once a month', 'once or twice a month', 'once or twice a week' and 'daily'.

Smoking experimentation was assessed by the question, "Have you ever tried smoking? If you have, at what grade?" Response options were five-point scaled: "I have never tried", "6<sup>th</sup> grade or earlier", "7<sup>th</sup> grade", "8<sup>th</sup> grade", and "9<sup>th</sup> grade".

Future intention to smoke was asked by the question "What do you think about your smoking in the future?" Response options from 1 to 5 were "I do not smoke and I am not going to", "I do not smoke now but I might try sometime", "I do not smoke now but I might start when I am older", "I smoke now but I consider quitting", and "I smoke now and I am going to continue". Gender, country, and research year were used as explanatory variables.

Five questions were used for article III to address the smoking status of best friend, mother, father, and over 10-years-old sister or brother. The scale from 1 to 4 was used. Options for sister's or brother's smoking habits were "yes, no, quit, do not have sister/brother" and for mother's, father's and best friend's were "yes, no, quit, do not know". Selection of the response option 1 (yes) resulted in classifying the person as a smoker.

In article IV three questions were used. Questions included several statements concerning the opinions of social smoking and –pressure and smoking legislation. Statements were scaled with Likert-scaled symmetric agree-disagree response options. The opinions concerning social pressure were clarified with six and social smoking with nine different statements. Opinions towards smoking legislation were clarified with five claims. In addition, the above-mentioned questions concerning adolescents' own and best friend's smoking status and smoking experimentation were also used.

The study variables and the examples of the used measurements concerning adolescents' smoking behaviour are presented through the theoretical basis of this study in Figure 5.

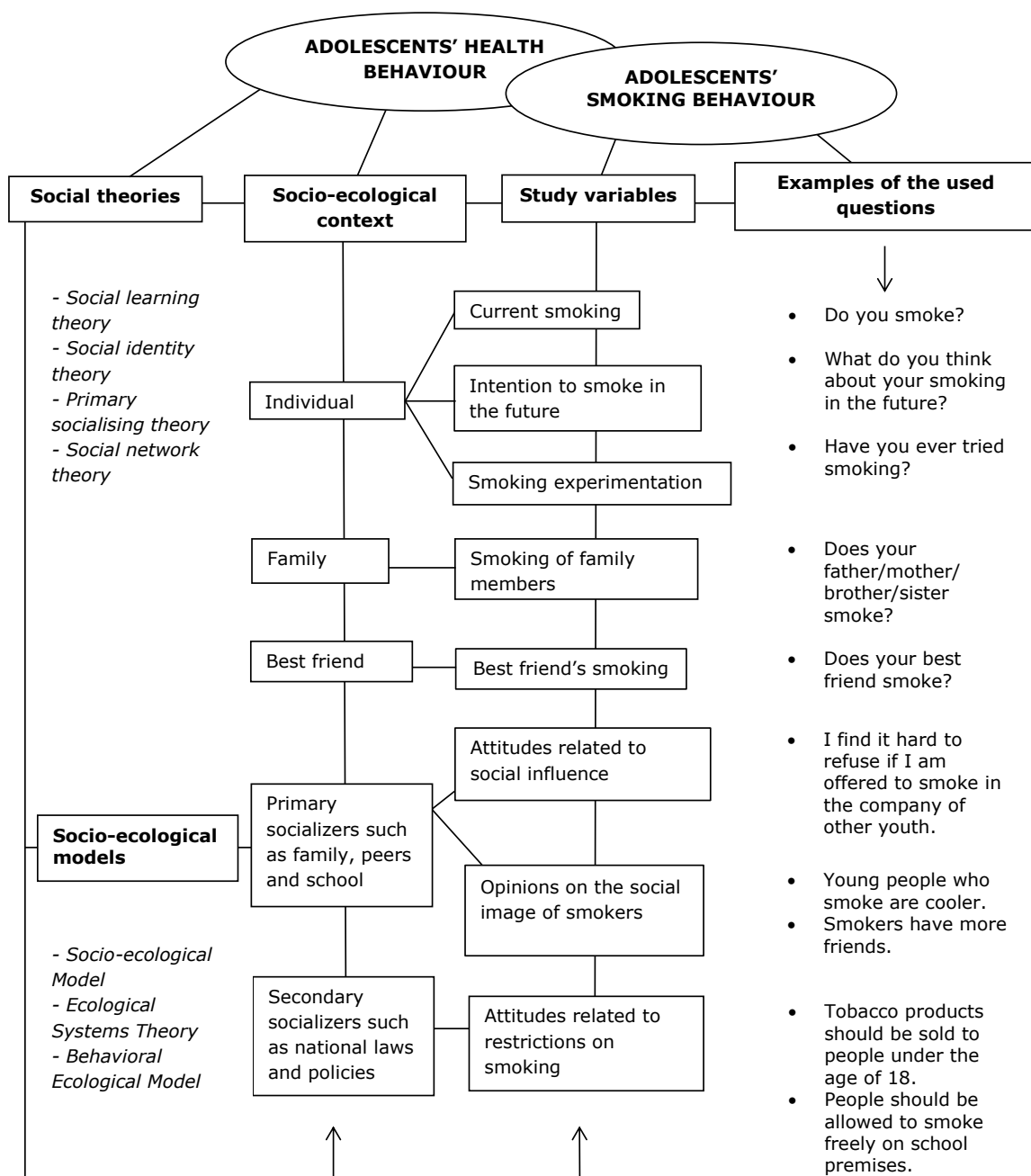


Figure 5. Used variables and measures of adolescents' smoking behaviour in the context of the theories and models chosen for this study.

## 5.3 DATA GATHERING

### 5.3.1 Qualitative data gathering

The qualitative data of this study (article I) were gathered by a systematic literature review which was needed to improve understanding of the highly complex relationship between socio-ecological factors and adolescents' health-related behaviours. This was also needed to evaluate and update the questionnaire for gathering the quantitative data. The review process was started with the formulation of appropriate research questions. After that, original studies were retrieved from six chosen electronic databases based on piloting searches and by manual search. The adequate search terms (socio-ecological, socioeconomic, young, youth, adolescent, teenager, juvenile, health, inequality and inequity) to retrieve all potentially relevant publications were used for a time-period concerning a total of 13 years. A manual search was conducted by checking reference lists of identified papers and central e-journals for other relevant papers.

Study selection systematically followed previously agreed-upon inclusion criteria. The database search retrieved 3756 publications, and, after excluding duplicate articles and inappropriate titles against research questions, 164 publications were selected. The database search resulted in 86 and hand search in 48 suitable abstracts. After excluding non-scientific papers from further consideration, 90 articles were left for further evaluation. In the next stage, these articles were read. After a thorough reading, a quality assessment was made for these articles with nine specific evaluation sections using the criteria by Hawker et al. (2002). After evaluation, all publications (n = 90) formed the final qualitative data.

### 5.3.2 Quantitative data gathering

The quantitative data in this study (articles II, III and IV) were collected in both countries in 1995 and in April 2013. The 2013 data gathering was administrated by a group of team members in Finland, and the researcher conducted the data gathering in each classroom separately. In Pitkäranta, the Russian team members organised the schedule and arrangements in local schools and data were gathered in multiple classrooms at the same time. However, in each classroom there was at least one Finnish research group member available if there were any questions concerning the study or the questionnaire.

Adolescents and their guardians received a written information letter in advance delivered by the schools. During the normal school lesson (45 minutes) pupils were verbally informed in their own language of the meaning of the study. It was also addressed that the study participation was voluntary. Participants signed the informed consent form after being verbally informed.

Pupils filled out the questionnaire personally and anonymously in a confidential atmosphere. After completion, the questionnaires were immediately sealed into the envelopes. There were some non-participating pupils in both countries (Finland n=44, Russia n=3), including those who chose not to participate for personal reasons or if they were absent from school. In Pitkäranta, height and weight were also measured.

In 1995, the data collection was gathered at the same time in both countries. In Pitkäranta, the data collection was administrated by local research group members, and in Eastern Finland it was administered by informed teachers in schools. Before the data collections, consent was obtained from parents and schools. In classrooms, students were asked to participate in the study and they were informed of voluntary participation and assured of the confidentiality of their answers. Similar to 2013, after the pupils filled out the questionnaires, the questionnaires were sealed in nameless envelopes. The detailed description of data gathering in 1995 is described in the doctoral dissertation of Ulla Kemppainen (2007).

## 5.4 DATA ANALYSIS

### 5.4.1 Qualitative data analysis

The literature review (article I) summarises the previous scientific research on the relation of the socio-ecological factors and health behaviour in adolescence. *The qualitative data* in the literature review was analysed using *a content analysis and a narrative synthesis*. After the literature search, study selection and quality assessment of the selected studies were assigned to one of four different themes according to the type of health-related behaviour investigated (alcohol consumption, smoking, physical activity, and diet). Each of these four themes were analysed individually by using inductive content analysis. The objective was to describe phenomena and enhance understanding (Elo and Kyngäs, 2008). In all, the study selection was done by two researchers and was planned beforehand to minimise errors and ensure reproducibility. Analysis was done by the author, who was responsible for all stages of the analysis.

The content analysis was done according to the criteria by Hawker and colleagues (2002) and by phases. The first phase was to choose the unit of analysis appropriate to the research objectives and to set a general idea of the content to build a complete picture and find a basis for classification (Holloway & Wheeler, 2010). Secondly, the aim was to group abstracted themes (reduced expressions) with similar meanings to specify content areas. Thirdly, connecting subcategories yielded connective categories, which were abstracted. Fourthly, after completing the content analysis, a narrative synthesis was conducted to synthesise a holistic picture of the contents of all four themes. An example of the content analysis process of one main theme (socio-ecological inequalities in smoking) is illustrated in Figure 6.

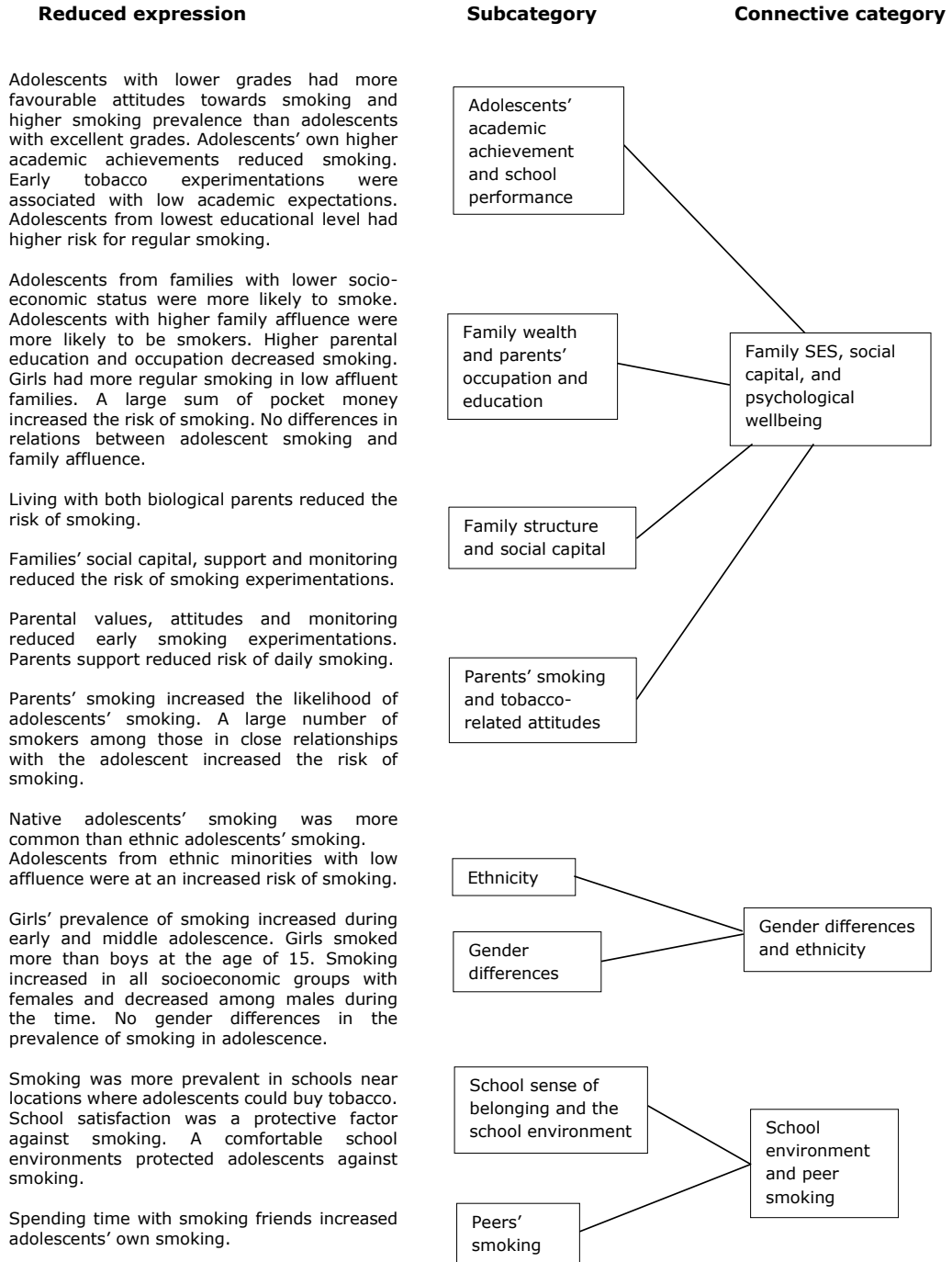


Figure 6. Example of the content analysis process in one main category, socio-ecological inequalities in smoking.

### 5.4.1 Quantitative data analysis

The whole *quantitative data* of this study consist of two separate cross-sectional studies from the years 1995 and 2013 in both Eastern Finland and in the Republic of Karelia, Russia. A significance level of 0.05 was used for all statistical analysis. The author was responsible for data analysis in close collaboration with the statistician.

In this study, the appropriate methods for descriptive analyses were to use *percentages and a chi-square test*. These methods were used to test differences in the distributions of categorised variables (article II). In addition, the *General linear model (GLM)* was used to analyse the statistical significance of the relationships between factors and the joint (combined) effects of the changes in smoking prevalence and future intention to smoke between countries, genders, and research years. The GLM is a wide class of statistics that can be used to model different types and different distributions of the variables and to determine whether the means of two or more groups differ. In addition, the model can be used to predict values for new observations and to identify the combination of values (Metsämuuronen 2006.).

In article II, the response options of outcome variables, current smoking, and future intention to smoke were revised from a 1-5 scale: 1=0.00, 2=0.25, 3=0.50, 4=0.75, and 5=1.00 and the variable mean values varied from 0 to 1. The risks of early smoking experimentation were calculated by using the relative risk (RR) and a 95% confidence interval (CI). Descriptive data were analysed with the IBM SPSS statistics for Windows software (IBM Corp. version 19.0) and GLM was done by the NCSS 9 statistical software.

*Structural equation modelling (SEM)* was used to analyse the models of socio-environmental influences for adolescents' smoking with SPSS Amos (Analysis of Moment Structures) Version 23 (article III). SEM is based on general linear modelling with advanced modelling techniques and it is a set of techniques that allow a set of relations between one or more independent variables and one or more dependent variables (Ullman & Bentler 2009).

SEM is intended for the analysis when the researcher has a theory about how the variables should correlate with each other (Ullman 2006a, 2006b). The analysis aims to explore whether the data supports the theory. This is examined by means of correlation (or covariance) matrix. The basic idea is that if the theory proposes that a number of variables is connected to one another, correlations between these should be stronger than between those which should not correlate (Metsämuuronen 2006). Generally, SEM is composed of a measurement model which defines the measured variables in connection with latent variables and the structure of the model, which establishes a relationship between the latent variables and taking into account measurement errors. In addition, the model sample size depends on the amount of the estimated parameters, not directly on the number of variables. The sample size, in small or medium-sized models, does not necessarily need to be greater than 200; however, SEM has a large data technique (Metsämuuronen 2006). Evaluation of the goodness of model is based on Chi-square distribution.

In article III, four models were based on the original model by Kempainen et al. (2006) constructed by the two countries (Finland and Russia) and the two different research years (1995 and 2013). The hypothesis was tested from the basis of the theoretical model suitability of an observed data (confirmatory approach). It was hypothesised that in both cultures, the smoking among family members' and best friend would be positively related to adolescents' smoking, and these relations have stayed over time even though the prevalence of smoking has changed in both countries. The exogenous variables were smoking among mothers and fathers, while the endogenous variables were smoking of the best friend or sisters or brothers over ten years of age. Mothers' and fathers' smoking through smoking among siblings (from mother to sister and from father to brother) and best friend represented the path of indirect relations, similarly as sisters' and brothers' smoking through best friend's smoking. The SEM is found to be a suitable method for modelling the health behaviour in health sciences (Kempainen et al. 2006; Kaplan, 2009).

The estimation method of the SEM was maximum likelihood (ML) with bootstrapping because this method did not require the multivariate normality assumption of the observed variables and, moreover, it protected against the relatively small sample sizes of the Russian data. 500 bootstrap



samples were taken with replacement from each of the four data. Bootstrapping was successful in all samples, and the solution was found without singular covariance matrices. The method required that persons with missing values were excluded from the analysis and, therefore, only cases with complete data in the six observed variables were included. This was possible because of the low amount of the missing cases. For country and year estimates comparison, a 95% confidence interval was used. Bootstrapping produces amended standard errors, bias-corrected confidence intervals and bias-corrected p-values. If confidence intervals were not overlapping, the difference of estimates was statistically significant at significance level  $p < 0.05$ .

*Exploratory factor analysis (EFA)* and *logistic regression analysis (LRA)* were used to examine whether attitudes on smoking and smokers were associated with smoking experimentation, daily smoking and best friend's smoking (article IV).

EFA can be characterised as a set of multivariate statistical methods using a structural equations model for data reduction using a principal axis factoring (Fabrigar et al. 1999). Moreover, it is an appropriate method when there is little theoretical basis for specifying a priori, the number and patterns of common factors (Hurley et al. 1997). However, EFA is particularly effective when the researcher has a basic idea of theory that combines the examined variables. In all, the EFA is used to summarise information and reduce the number of variables in the phenomenon (Metsämuuronen 2006).

EFA was used to combine the explanatory variables. Twenty statements of Likert-scaled symmetric agree-disagree response options which were related to attitudes on smoking and smokers were included in a factor analysis. Statements included topics on the attitudes on smoking legislation and restrictions, social pressures for smoking and the image of smokers. The opinions concerning social pressure were clarified by six and image related to smokers with nine different statements. Opinions on smoking legislation and restrictions were clarified with five claims.

Six variables were removed stepwise and the final model included fourteen variables in three factors and all factor loadings were  $> 0,500$ . In EFA, extraction method was principal axis factoring and factor matrix was rotated by varimax with Kaiser Normalisation. In each factor an item analysis was made to test reliability. Cronbach's alpha coefficients varied from 0.673 to 0.868 (the limit value for Cronbach alpha is 0,700). Factor 2 did not quite reach that, but removing any of the variables would not have improved the value of Cronbach alpha, and therefore it was accepted. In factor 1, two variables were recoded because of the opposite loading. The factors were named by the social-behavioural content. The results were expressed as odds ratios (OR) with 95% confidence interval (CI).

The associations between smoking experimentation, daily smoking and best friend's smoking with related factors were analysed by LRA adjusted with country and gender. LRA method is used when the aim is to find, among several explanatory variables, the best variables to explain the phenomenon. Moreover, LRA is an appropriate method both to search for variables and to examine the combined effect of variables (Metsämuuronen 2006).

The data were analysed with the IBM SPSS statistics for Windows software (IBM Corp. version 19.0.). The associations between smoking experimentation, daily smoking and best friend's smoking with factor and country interaction were identified by using NCSS 10 Statistical Software (2015), Kaysville, Utah, USA.

## 5.5 ETHICAL CONSIDERATIONS

In this study, before carrying out research activities, study approval was received from the Committee on Research Ethics of the University of Eastern Finland on 18<sup>th</sup> March 2013. The permissions to conduct the data collection were obtained separately from each school in Finland. In Pitkäranta, the concerted study permission was given by the Senior Physician of the Pitkäranta Central District Hospital. The study has been carried out according to the ethical principles of the National Advisory Board on Research Ethics (2002) that are presented in the Guideline on Research Ethics of the Academy of Finland (2003). In 1995, the data collection permissions were obtained from each school headmasters in Finland. In Pitkäranta, the similar concerted study permission was given as in 2013.

Before data collection, it was assessed that, particularly on the Russian side of the border, there was not up-to-date scientific information available concerning adolescents' health behaviour and health inequalities. This study was considered to provide significant new cross-sectional comparative information as well as information of the changes between the years 1995 and 2013 concerning adolescents' health-behavioural trends in the border regions. Information about smoking-related attitudes among adolescents cannot be obtained otherwise than by asking young people themselves. Therefore, it was assessed that this study was ethically legitimate and justified.

The number of pupils in Pitkäranta was relatively small. It was evaluated that statistically significant changes between 1995 and 2013 would occur if there were 10% changes (OR 0.8). However, the sample size in Pitkäranta could not be increased because all schools in the Pitkäranta district participated in the study. Therefore, the sample size was assessed to be ethically justified.

The study was carried out in accordance with the researcher's professional ethics and good scientific research ethics based on the Declaration of Helsinki (2013). The data gathering was operated in accordance with the right of the subjects and with respect of their self-determination. Data collection was based on participants' voluntary participation. Two weeks before data collection, participant's guardians received written information on the study. In both countries, 15-year-old adolescents may decide themselves to participate in research. Therefore, the written informed consent was asked from pupils themselves after they had been verbally informed in classrooms. Pupils filled in the questionnaires personally and anonymously. The atmosphere was peaceful. The researcher or a group member was in a classroom during the data gathering and answered the questions of pupils in their own language. Before the pupils left, their questionnaires were sealed in an envelope to ensure anonymity.

## 6 Results

### 6.1 SOCIO-ECOLOGICAL INEQUALITIES IN HEALTH BEHAVIOUR AMONG ADOLESCENTS

*Families' wealth* was found to be one of the most important socio-ecological factors related to adolescents' health behaviour according to a systematic international literature review. Families' wealth (including parental SES, family affluence and parental occupational and educational stage) was related to all four behavioural outcomes: smoking, the quality of diet, physical activity and alcohol consumption. Adolescents from less wealthy families were at a higher risk of smoking, eating breakfast irregularly, decreased fruit and vegetable intake and inactivity. The results concerning alcohol use were partly controversial but most suggested that low family wealth was a protective factor against alcohol use.

Family wealth was shown to influence the prevalence of smoking, so that low SES was a risk factor for smoking among adolescents. The protective factors against smoking were high levels of parental education, parental anti-smoking values and attitudes and adolescents own higher academic achievement. Also, family structure was connected to smoking, and intact families with both biological parents reduced the likelihood of smoking in adolescents. In addition, the smoking among family members was an important factor; smoking family members, particularly parents, were a risk factor for adolescent smoking. The main findings on the association between socio-ecological factors and smoking are presented in Table 4.

Adolescents from less wealthy families showed lower levels of physical activity. They were engaged in fewer sport activities and used media excessively. In general, excessive television watching was related to lower parental occupational status and parents' unemployment. Moreover, family wealth was related to better diet quality. Adolescents from less affluent families ate less fruit and vegetables, consumed breakfast less frequently and drank more soft drinks and ate more sweets than their more affluent peers.

With respect to alcohol use, adolescents in less affluent families were at lower risk of alcohol use. In more affluent families, particularly girls showed more frequent alcohol consumption and earlier alcohol use than adolescents in less affluent families. Adolescents from single-parent families had an increased risk of alcohol use, particularly if parental control was low.

*Supportive parenting and control*, including positive family interaction and sense of belonging, was a protective factor overall for unhealthy behaviour. It fostered more regular breakfast consumption, healthier beverage intake, lower risk of smoking and alcohol use and, most of all, less passive lifestyles than in less supportive families.

*School* related factors were also found to be important in affecting health behaviour; poor school environment, poor school satisfaction and academic failure were related to higher levels of substance use. Smoking and alcohol use were less prevalent in schools with a supportive atmosphere and strong sense of belonging. Poor school environment was associated with not eating breakfast regularly and a higher intake of soft drinks

*Peers* were shown to be an important factor in predicting health behaviour. Widely networking adolescents (e.g. those engaging in networks at school or through free-time activities) were more likely to use alcohol and tobacco. In addition, the more smokers who had close relationships with adolescents, the greater the adolescents' apparent risk of smoking. However, peers also have a positive influence. Adolescents were more active physically if their peer group was active because physical activity was an important way to meet friends and increase social capital.

*Gender* was related to health behaviour, and girls' behaviour seemed to be more strongly influenced by family background than boys'. Girls from less affluent families seemed more likely to be physically inactive. With respect to smoking, some original articles suggested that girls had more experimental and regular smoking as well as more favourable attitudes towards smoking than boys. However, girls seemed to eat fruit and vegetables more regularly than boys.

*In summary*, the results of the literature review suggest that smoking, irregular eating and sedentary lifestyle were more common in less affluent families. Girls were more likely to be physically inactive and accept smoking in less affluent families, but also if their academic achievement or school connectedness was low. Peer smoking seemed to be a crucial factor for smoking behaviour in both genders.

*Table 4.* The main findings on associations of socio-ecological factors and adolescents' smoking

<b>Category</b>	<b>Main findings</b>	<b>References*</b>
Family SES, social capital and psychological wellbeing	Adolescents from families with lower socio-economic status were more likely to smoke.	<i>Evans and Kutcher 2011; Geckova et al. 2002; Kisliitsyna 2010; Mathur et al. 2013; Pitel et al. 2013; Rasmussen et al. 2009; Richter et al. 2009a; Richter et al. 2009b; Richter et al. 2012; Soteriades and DiFranza 2003</i>
	Adolescents with higher family affluence were more likely to be smokers.	<i>Hanson and Chen 2007</i>
	No differences in relations between adolescent smoking and family affluence.	<i>Richter et al. 2009b; Richter and Leppin 2007; Sutherland 2012</i>
	Higher parental education and adolescents own higher academic achievements decreased smoking.	<i>Johansen et al. 2006; Jung and Chung 2012; Kuntz and Lambert 2013; Maes and Lievens 2003; Pennanen et al. 2011; Richter and Leppin 2007; Schnohr et al. 2009</i>
	Large sums of pocket money increased the risk of smoking.	<i>Jung and Chung 2012; Scragg et al. 2002</i>
	Living with both biological parents reduced the risk of smoking.	<i>Griesbach et al. 2003; Hemovich et al. 2011; Johansen et al. 2006</i>
	Families' social capital, support and monitoring reduced the risk of smoking experimentation.	<i>Beam et al. 2002; Evans and Kutcher 2011; Jessor et al. 2003; Kristjansson et al. 2008; Simons-Morton 2004</i>
	Parents' smoking increased the likelihood of adolescents' smoking.	<i>de Vries et al. 2003; Gilman et al. 2009; Griesbach et al. 2003; Kisliitsyna 2010; Maes and Lievens 2003; Mak et al. 2012; Tjora et al. 2011</i>

Table 4 continues

<b>Category</b>	<b>Main findings</b>	<b>References*</b>
	A large number of smokers among those in close relationships with the adolescent increased the adolescent's risk of smoking. Adolescents' psychological wellbeing reduced their likelihood of smoking.	<i>Harakeh et al. 2007; Wen et al. 2009</i> <i>Mistry et al. 2011</i>
Gender differences and ethnicity	Adolescents from ethnic minorities with low affluence were at an increased risk of smoking.  Smoking was more common among native adolescents than among ethnic adolescents.  In all socioeconomic groups, girls' prevalence of smoking increased during early and middle adolescence.	<i>Gerevich et al. 2010</i> <i>Mistry et al. 2011; Wallace et al. 2003</i> <i>Gerevich et al. 2010; Johansen et al. 2006; Morgan and Haglund 2009; Pitel et al. 2013; Simetin et al. 2011</i>
	No gender differences existed in the prevalence of smoking during adolescence.	<i>Rasmussen et al. 2009</i>
School environment and peer smoking	Smoking was more prevalent in schools near locations where adolescents could buy tobacco.  School satisfaction was a protective factor against smoking.  Comfortable school environments protected adolescents against smoking.  Spending time with smoking friends increased adolescents' own smoking.	<i>Mistry et al. 2011</i> <i>Morgan and Haglund 2009; Schnohr et al 2009; West et al. 2004</i> <i>Lee et al. 2014; Xue et al. 2007</i> <i>Danielsson et al. 2011; Johansen et al. 2006; Jung and Chung 2012; Kemppainen et al. 2006; Kristjansson et al. 2008; Kristjansson et al. 2013; Maes et al. 2003; Mak et al. 2012; Rogazheva et al. 2008; Tjora et al. 2011; Wen et al. 2009</i>

\*The original references will be found in the reference list in article I: Aura et al. 2016. The relations of socio-ecological factors to adolescents' health-related behaviour – A literature review. *Health Education* 116(2), 177-201.

## 6.2 CURRENT SMOKING BEHAVIOUR AMONG ADOLESCENTS IN THE TWO KARELIAS AND CHANGES FROM 1995 TO 2013

*Smoking prevalence* did not change in either Finland or Russia among girls or boys from 1995 to 2013. The percentages of daily smokers, current non-smokers and less occasional smokers (weekly-, monthly- or less than monthly smokers) are presented in Table 5. However, there were statistically significant differences in smoking rates between Finnish and Russian adolescents by gender. Among girls, the proportion of daily smokers was higher in Finland than in Russia, both

in 1995 ( $p < 0.001$ ) and 2013 ( $p < 0.001$ ). Controversially, the prevalence of daily smoking among the Finnish boys was lower than among the Russian boys in both years (1995:  $p < 0.01$ ; 2013:  $p < 0.05$ ). In 2013 and particularly in Russia, the adolescents were divided very clearly between daily smokers and current non-smokers. While the smoking prevalence did not change from 1995 to 2013, the proportion of current non-smokers increased.

Table 5. Current smoking status in 1995 and in 2013 by country and gender

	<b>1995</b>	<b>2013</b>	<b>1995</b>	<b>2013</b>
	<b>Finland</b>	<b>Finland</b>	<b>Russia</b>	<b>Russia</b>
	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
<i>Daily smokers</i>				
Boys	19 (183)	19 (58)	29 (51)	27 (27)
Girls	21 (204)	18 (55)	7 (14)	7 (5)
<i>Current non-smokers</i>				
Boys	64 (605)	67 (199)	65 (112)	71 (72)
Girls	56 (535)	61 (184)	85 (159)	91 (71)
<i>Less occasional smokers</i>				
Boys	17 (138)	14 (41)	6 (12)	2 (2)
Girls	23 (215)	9 (62)	8 (14)	2 (2)
<i>Total</i>				
Boys	100 (926)	100 (298)	100 (175)	100 (101)
Girls	100 (954)	100 (301)	100 (187)	100 (78)

The results revealed significant differences in current smoking when the combined effects of gender, research year and country were adjusted. The country and gender were very significant factors in predicting smoking, both separately and jointly. Smoking was more common among Finnish adolescents than among Russians ( $p < 0.001$ ), and gender differences revealed that smoking was more common among boys than among girls ( $p < 0.001$ ). In all, the combined effect of these two variables was statistically very significant as well ( $p < 0.001$ ).

The percentages of *smoking experimentation* are presented in Table 6. In Finland, the percentages among both boys and girls who had never tried smoking increased (boys from 23% to 41% and girls from 24% to 45%). The percentage of adolescents who had tried smoking in 6<sup>th</sup> grade or earlier halved among both genders (boys from 52% to 26% and girls from 35% to 17%). Boys' RR in 2013 compared with 1995 was 0.51 (95% CI 0.42–0.63). Among girls, the RR was 0.49 (95% CI 0.38–0.63).

The changes in smoking experimentation were statistically very significant among both genders in Finland ( $p < 0.001$ ) and among Russian girls ( $p < 0.001$ ) from 1995 to 2013. In Russia, the proportion of girls who had never tried smoking almost halved from 1995 to 2013 (from 51% to 28%). However, the proportion of girls who had tried smoking at a very early stage (in 6<sup>th</sup> grade or earlier) increased from 10% to 31%; in addition, the relative risk (RR) of girls' early smoking experimentation tripled in 2013 compared with 1995 (RR 3.03, 95% CI 1.76–5.20).

Table 6. First smoking experimentation in 1995 and in 2013 by country and gender

	<b>1995</b>	<b>2013</b>	<b>1995</b>	<b>2013</b>
	<b>Finland</b>	<b>Finland</b>	<b>Russia</b>	<b>Russia</b>
	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
<i>Never tried</i>				
Boys	23 (216)	41 (123)	26 (45)	33 (31)
Girls	24 (236)	45 (135)	51 (95)	28 (22)
<i>6<sup>th</sup> grade or earlier</i>				
Boys	51 (481)	26 (78)	44 (78)	38 (36)
Girls	35 (339)	17 (52)	10 (19)	31 (24)
<i>7<sup>th</sup> grade</i>				
Boys	15 (140)	19 (58)	9 (15)	14 (13)
Girls	26 (246)	17 (52)	11 (20)	23 (18)
<i>8<sup>th</sup> grade</i>				
Boys	8 (81)	11 (32)	12 (22)	11 (11)
Girls	10 (93)	13 (40)	16 (30)	14 (11)
<i>9<sup>th</sup> grade</i>				
Boys	3 (30)	3 (8)	9 (16)	4 (4)
Girls	5 (45)	8 (22)	12 (23)	4 (3)
<i>Total</i>				
Boys	100 (948)	100 (299)	100 (176)	100 (100)
Girls	100 (959)	100 (301)	100 (187)	100 (81)

The percentages of *future intention to smoke* are present in Table 7. The proportion of girls who were smokers but considered quitting decreased from 28% to 21%. In Russia, the corresponding numbers were 14% and 6%, respectively. However, the proportion of girls who did not smoke and who also believed they would stay smoke-free increased (from 61% to 80%) in Russia. The future intention to smoke changed statistically very significantly among Finnish girls ( $p < 0.001$ ) from 1995 to 2013.

The comparison of the differences between the countries revealed that in 1995, differences existed in future smoking intentions among both boys ( $p < 0.001$ ) and girls ( $p < 0.001$ ), but in 2013, the difference was only among girls ( $p < 0.01$ ). The effects of year ( $p < 0.01$ ), country ( $p < 0.05$ ) and gender ( $p < 0.001$ ) as well as the combined effect of country and gender ( $p < 0.001$ ) were statistically significant. Adolescents' future intention to smoke changed more in Russia, where more adolescents believed that they would remain smoke-free compared with adolescents in Finland. In addition, a higher proportion of current non-smoking girls than of boys believed that they would not start smoking.

*In summary*, the results indicate that the smoking prevalence among 15-year-old 9<sup>th</sup> grade adolescents did not change either by country or from 1995 to 2013. However, there were other noteworthy results concerning adolescents' polarisation into daily smokers and current non-smokers in Pitkäranta, and differences between and within countries and genders in smoking behaviour.

Table 7. Future intention to smoke in 1995 and in 2013 by country and gender

	<b>1995</b>	<b>2013</b>	<b>1995</b>	<b>2013</b>
	<b>Finland</b>	<b>Finland</b>	<b>Russia</b>	<b>Russia</b>
	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
<i>Do not smoke and not going to</i>				
Boys	63 (594)	63 (188)	50 (87)	61 (61)
Girls	57 (542)	59 (176)	61 (115)	80 (62)
<i>Do not smoke but might try later</i>				
Boys	9 (87)	7 (21)	7 (13)	6 (6)
Girls	10 (90)	11 (33)	16 (30)	9 (7)
<i>Do not smoke now but might start</i>				
Boys	2 (17)	3 (8)	6 (11)	6 (6)
Girls	1 (9)	4 (13)	9 (16)	4 (3)
<i>Smoke now but consider to quit</i>				
Boys	21 (203)	21 (63)	34 (59)	25 (25)
Girls	28 (266)	21 (64)	14 (26)	6 (5)
<i>Smoke now and going to continue</i>				
Boys	5 (44)	6 (18)	3 (5)	2 (2)
Girls	4 (39)	5 (14)	0 (1)	1 (1)
<i>Total</i>				
Boys	100 (945)	100 (298)	100 (175)	100 (100)
Girls	100 (946)	100 (300)	100 (188)	100 (78)

### 6.3 THE RELATIONSHIP OF FAMILY MEMBERS' AND BEST FRIEND'S SMOKING TO ADOLESCENTS' SMOKING – THE DIFFERENCES BETWEEN THE KARELIAS

The aim was to determine whether the smoking of an adolescent's mother, father, sibling aged over ten years and best friend were related to adolescents' smoking in two different cultures in North Karelia, Eastern Finland, and in Pitkäranta district, Republic of Karelia, Russia. In more detail, it was examined whether these relations were different between the countries and whether changes in relations existed between the years 1995 and 2013. According to statistical tests, the model fit of the final models of SEM was good, as presented in Table 8. The idea was to fit the same model in all four sets of data. Inevitably, the model fitted differently but was reassessed to fit. Largest value in CMIN/DF 4.524 corresponds to chi-square tests where H0: Model fits and H1: Model does not fit, and p-value was 0.011. Thus H0 was rejected. CMIN/DF 2.101 corresponds to  $p=0.122$ , and 3.419 to 0.033, and 1.648 to 0.192.



Table 8. Summary of the group analyses to test the model fit of the four models

Type of analysis	Chi-square	df	p	NFI*	CMIN/DF**	RMSEA (CI90)***
Finland 1995 (n=1823)	4.203	2	.122	.997	2.101	.025 (.000-.058)
Finland 2013 (n=585)	9.049	2	.011	.973	4.524	.078 (.032-.132)
Russia 1995 (n=335)	6.838	2	.033	.943	3.419	.085 (.021-.159)
Russia 2013 (n=174)	3.298	2	.192	.930	1.649	.061 (.000-.175)

\*Normed fit index (NFI) should be above 0.900.  
\*\*Minimum discrepancy/degrees of freedom (CMIN/DF) should be under 2.00.  
\*\*\*Root mean square error of approximation (RMSEA) should be under 0.100.

An example of the models is presented as Figure 7 showing the relations of family members' and best friend's smoking to adolescents' daily smoking in Finland in 2013.

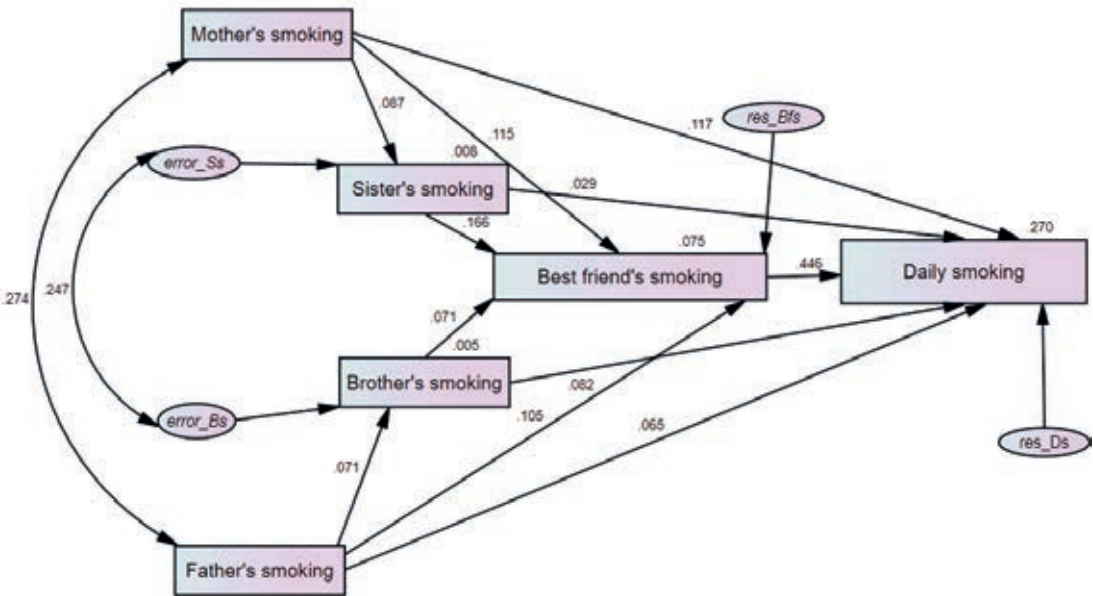


Figure 7. An example of the SEM model of the relations of family members' and best friend's smoking to adolescents' daily smoking with standardized estimates in Eastern Finland in 2013 (n=585).

The four models revealed that differences existed between the countries and research years; in more detail, changes in relations occurred from 1995 to 2013. The standardized regression weights (SRW) with bias-corrected 95% confidence intervals (CI) and bias-corrected p-values are presented in Tables 9 (North Karelia, Eastern Finland in 1995 and 2013) and 10 (Pitkäranta district, Republic of Karelia, Russia in 1995 and 2013). Statistically significant relationships are presented as bolded values.

Table 9. Standardized regression weights (SRW) with bias-corrected 95% confidence intervals (CI) and bias-corrected p-values in North Karelia, Eastern Finland in 1995 and 2013.

North Karelia, Eastern Finland	1995		2013	
	SRW (95% CI)	p	SRW (95% CI)	p
From mother's smoking to daily smoking	<b>.075</b> (.032-.116)	.005**	<b>.117</b> (.028-.199)	.013*
From father's smoking to daily smoking	.034 (-.001-.075)	.058	.065 (-.015-.141)	.114
From sister's smoking to daily smoking	<b>.065</b> (.020-.106)	.010*	.029 (-.055-.120)	.492
From brother's smoking to daily smoking	<b>.090</b> (.047-.131)	.006**	.082 (-.004-.146)	.066
From friend's smoking to daily smoking	<b>.566</b> (.522-.609)	.004**	<b>.446</b> (.372-.529)	.003**
From mother's smoking to sister's smoking	<b>.048</b> (.002-.108)	.040*	.087 (-.005-.173)	.067
From mother's smoking to friend's smoking	<b>.134</b> (.084-.186)	.004**	<b>.115</b> (.027-.204)	.022*
From father's smoking to brother's smoking	<b>.065</b> (.020-.116)	.011*	.071 (-.012-.159)	.119
From father's smoking to friend's smoking	<b>.113</b> (.063-.158)	.006**	<b>.105</b> (.017-.193)	.013*
From sister's smoking to friend's smoking	<b>.131</b> (.081-.181)	.003**	<b>.166</b> (.072-.246)	.005**
From brother's smoking to friend's smoking	<b>.097</b> (.051-.151)	.002**	.071 (-.012-.153)	.108

\*<.05  
\*\*<.01

The most powerful association with smoking was found between adolescents and their best friend in both countries and study years ( $p < 0.01$ ).

The relations were different between Eastern Finland and Pitkäranta in 2013. In Finland, among family members, statistically significant relations were found from mother's smoking to daily smoking ( $p < 0.05$ ) and best friend's smoking and from sister's ( $p < 0.01$ ) and father's ( $p < 0.05$ ) smoking to best friend's smoking. All of the other relations were statistically significant to daily smoking in 1995 except father's smoking.

In Finland, all of the total relations were statistically significant in both study years. In Pitkäranta, statistically significant total relations were only found between brother's smoking and daily smoking in 1995 ( $p < 0.05$ ) as well as between friend's smoking and daily smoking in both study years ( $p < 0.01$ ).

In the Finnish data, a difference between the study years was found between best friend's smoking and current smoking. In 2013, the relationship was somewhat less prominent than in 1995. However, the standardised regression coefficient in 1995 was 0.566 (95% CI 0.522–0.609), while in 2013, it was 0.446 (95% CI 0.372–0.529), suggesting that this relationship did not quite yield to the significance at the level of 0.05.

Table 10. Standardized regression weights (SRW) with bias-corrected 95% confidence intervals (CI) and bias-corrected p-values in Pitkäranta district, Republic of Karelia, Russia in 1995 and 2013.

Pitkäranta district, Republic of Karelia	1995		2013	
	SRW (95% CI)	p	SRW (95% CI)	p
From mother's smoking to daily smoking	.054 (-.048-.175)	.307	.019 (-.114-.175)	.776
From father's smoking to daily smoking	.059 (-.047-.154)	.271	-.040 (-.166-.116)	.656
From sister's smoking to daily smoking	-.032 (-.126-.067)	.532	.051 (-.069-.202)	.412
From brother's smoking to daily smoking	.083 (-.037-.203)	.187	-.009 (-.114-.146)	.997
From friend's smoking to daily smoking	<b>.412</b> (.310-.502)	.005**	<b>.426</b> (.265-.553)	.005**
From mother's smoking to sister's smoking	<b>.122</b> (.003-.263)	.047*	.024 (-.144-.169)	.793
From mother's smoking to friend's smoking	.048 (-.074-.151)	.458	.104 (-.056-.256)	.219
From father's smoking to brother's smoking	<b>.199</b> (.102-.293)	.004**	.015 (-.151-.141)	.094
From father's smoking to friend's smoking	.006 (-.107-.105)	.904	.065 (-.064-.215)	.352
From sister's smoking to friend's smoking	.003 (-.112-.119)	.968	-.018 (-.155-.115)	.751
From brother's smoking to friend's smoking	<b>.142</b> (.026-.256)	.015*	.054 (-.093-.224)	.443

\*<.05  
\*\*<.01

In Pitkäranta, the only significant association was found between best friend's smoking and adolescent's daily smoking in 2013. In 1995, other significant relations were found between mother's smoking and sister's smoking ( $p < 0.05$ ), father's smoking and brother's smoking ( $p < 0.01$ ) and brother's smoking and friend's smoking ( $p < 0.05$ ). In 1995, squared multiple correlations (SMC, the proportion of total variation) was 0.387 (95% CI 0.342–0.434) in Finland and 0.199 (95% CI 0.107–0.271) in Russia.

In 2013, the corresponding numbers were 0.270 (95% CI 0.194–0.336) and 0.184 (95% CI 0.065–0.301). All of these bootstrapped proportions were statistically significant, and the bias-corrected p-values varied between 0.005 and 0.025 indicating that parents', siblings' and best friend's smoking explain adolescent's daily smoking. In addition, as the 95% CIs indicate, Finland 1995 vs Russia 1995 and 2013 as well as the decrease in Finland between 1995 and 2013 were statistically significant at a significance level of  $< 0.05$ .

Standardized direct, indirect, and total relationships of socio-environmental smoking on adolescents' daily smoking by country and research year with bias-corrected p-values are presented in Table 11. Statistically significant relationships are presented as bolded values. In Finland, all total relations were significant in both study years. In Pitkäranta, significant total relations were found only between brother's smoking and daily smoking in 1995 ( $< 0.05$ ) and friend's smoking to daily smoking in both study years ( $< 0.01$ ).

Table 11. Standardized direct, indirect, and total relationships of socio-environmental smoking on adolescents' daily smoking by country and research year with bias-corrected p-values.

	Direct effects				Indirect effects				Total effects			
	FI	p	RU	p	FI	p	RU	p	FI	p	RU	p
Mother's smoking												
1995	<b>.075</b>	.005**	.054	.307	<b>.082</b>	.004**	.016	.585	<b>.157</b>	.002**	.070	.259
2013	<b>.117</b>	.013*	.019	.776	<b>.060</b>	.013*	.045	.173	<b>.177</b>	.004**	.064	.371
Father's smoking												
1995	.034	.058	.059	.271	<b>.073</b>	.004**	.031	.263	<b>.107</b>	.004**	.090	.163
2013	.065	.114	-.040	.656	<b>.055</b>	.007**	.027	.391	<b>.120</b>	.009**	-.012	.962
Sister's smoking												
1995	<b>.065</b>	.010*	-.032	.532	<b>.074</b>	.003**	.001	.960	<b>.139</b>	.003**	-.031	.580
2013	.029	.492	.051	.412	<b>.074</b>	.004**	-.008	.714	<b>.103</b>	.028*	.043	.519
Brother's smoking												
1995	<b>.090</b>	.006**	.083	.187	<b>.055</b>	.002**	<b>.058</b>	.012*	<b>.145</b>	.004**	<b>.141</b>	.025*
2013	.082	.066	-.009	.997	.032	.112	.023	.364	<b>.114</b>	.020*	.014	.776
Best friend's smoking												
1995	<b>.566</b>	.004**	<b>.412</b>	.005**					<b>.566</b>	.004**	<b>.412</b>	.005**
2013	<b>.446</b>	.003**	<b>.426</b>	.005**					<b>.446</b>	.003**	<b>.426</b>	.005**

FI= North Karelia, Eastern Finland

RU= Pitkäranta district, Republic of Karelia, Russia

\*p<.05

\*\*p<.01

*In summary*, these results suggest that adolescents' best friend has the strongest influence on their smoking. Moreover, it seems that family members' smoking is related to adolescents' daily smoking in Finland but not in Pitkäranta.

## 6.4 TOBACCO-RELATED ATTITUDES ASSOCIATED WITH SMOKING EXPERIMENTATION, DAILY SMOKING AND BEST FRIEND'S SMOKING

The purpose was to determine whether attitudes towards smoking and smokers were associated with smoking experimentation, daily smoking and best friend's smoking. It was hypothesised that the more non-normative (from the perspective of law and restrictions) the adolescents' attitudes related to smoking and the more positively they thought of smokers (from the perspective of positive image of smokers), the higher their prevalence of smoking experimentation, daily smoking and best friend's smoking. The EFA extracted three factors, which were named as follows: Factor 1 includes the thoughts and attitudes concerning social pressure, legislation and restrictions on smoking, and was named "*non-smoking attitudes related to social pressure and restrictions on smoking*". Factor 2 includes items related to positive images of smokers and was named "*positive image on smokers*". Factor 3 included expectations related to smoking status between boys and girls and was named "*smoking status expectations in relations between boys and girls*".

The associations between the factors and smoking experimentation, daily smoking and best friend's smoking are presented in Table 12. Both the uni- and multivariate models revealed that factor 1 was statistically very significantly related to smoking experimentation ( $p < 0.001$ ), daily smoking ( $p < 0.001$ ), and the likelihood of best friend's smoking ( $p < 0.001$ ). The more agreeable the non-normative attitudes and opinions about restrictions and difficulties in refusing to smoke or to be smoke-free, the higher the risk of smoking experimentation and daily smoking, and the higher the likelihood that the adolescent's best friend is a smoker. In all, the loadings were high among adolescents who had difficulties resisting social pressure. They also perceived smoking as being calming, enjoyable and worth the risks. Moreover, these adolescents thought that smoking and the sale of tobacco products should be legal for minors, and that smoking in schoolyards and other public places should be allowed.

Table 12. Uni- and multivariate exploratory logistic regression analysis on the associations among smoking experimentation, daily smoking and best friend's smoking with attitude factors.

	Smoking experimentation OR (95 % CI)	Daily smoking OR (95 % CI)	Best friend's smoking OR (95 % CI)
<b>Univariate exploratory logistic regression analysis adjusted with country and gender</b>			
Factor 1	7.923 (5.787–10.847)***	9.575 (6.727–13.628)***	3.154 (2.579–3.858)***
Factor 2	1.391 (1.151–1.681)*	1.313 (1.055–1.636)*	1.077 (0.887–1.308)
Factor 3	0.837 (0.716–0.978)*	0.636 (0.529–0.763)***	0.813 (0.695–0.951)*
<b>Multivariate exploratory logistic regression analysis</b>			
Factor 1	8.709 (6.246–12.142)***	11.959 (7.998–17.883)***	3.540 (2.837–4.417)***
Factor 2	0.810 (0.630–1.043)	0.536 (0.383–0.752)***	0.662 (0.520–0.843)**
Factor 3	1.166 (0.954–1.425)	0.908 (0.686–1.203)	1.046 (0.867–1.262)
Country	3.629 (2.241–5.876)***	3.632 (1.762–7.487)***	1.431 (0.905–2.264)
Gender	0.935 (0.647–1.350)	1.544 (0.905–2.636)	1.226 (0.859–1.752)
p<.05*			
p<.01**			
p<.001***			

Factor 2 described positive images of smokers. The results showed that the more agreeable the attitudes towards a positive image of smokers, the higher the risk of smoking experimentation and daily smoking. High loadings were found among adolescents who perceived smokers as being cooler and more mature than non-smokers. They thought that smokers had more friends and that smoking would help them to get to know better other adolescents.

In factor 3, a preference for non-smoking girls and boys was associated with lower risk of daily smoking and having smoking friends. The factor loadings were high among both boys and girls preferring in general a non-smoking opposite gender.

When all three factors were included in the same model, the effects of factors 2 and 3 were reversed, suggesting a very strong independent effect of factor 1. In addition, country and factor interactions were also analysed but these were not associated with smoking experimentation, daily smoking or best friend's smoking indicating that the associations are similar in both countries.

*In summary*, adolescents' difficulties with resisting social pressure and attitudes against smoking restrictions were associated with smoking experimentation, daily smoking and a best friend who smokes. Moreover, the more positive thoughts adolescents had regarding their image of smokers, the more they experimented with smoking and smoked daily. These results suggest that adolescents' attitudes and thoughts are strongly related to smoking behaviour and best friend's smoking.

## **6.5 SUMMARY**

In view of these results, one of the most important socio-ecological factors influencing youth health behaviour was families' lack of wealth, which was related to a higher risk of unhealthy behaviour, particularly daily and experimental smoking, lower levels of physical activity and poor diet. With respect to smoking behaviour, daily smoking prevalence among 9<sup>th</sup> graders did not change in either country from 1995 to 2013. In all, smoking was more common among boys than girls, and Finnish adolescents smoked more than Russian adolescents; however, this was due to girls' very low smoking prevalence in Pitkäranta. In Pitkäranta, with respect to girls' early smoking experimentation, the results were noteworthy. Smoking among peers and among a best friend were the most important predictive factors for adolescents' own smoking. The best friend's smoking was the most important determinant for an adolescent's daily smoking in both study areas, from 1995 to 2013.

The attitudes against restrictions on smoking and difficulty with resisting social pressure from peers were positively associated with smoking experimentation, daily smoking and smoking of a best friend. The risk of smoking experimentally, becoming a daily smoker or having a smoking friend were more likely if adolescents thought that smoking was worth taking the risk. The positive attitudes and opinions towards smoker's image were positively associated with smoking experimentation and daily smoking. In general, it seems that the preference for a non-smoking boy/girl was related to a lower amount of daily smoking and best friend's smoking. In all, these attitudes were similar in both Karelias.

## 7 Discussion

### 7.1 EVALUATION OF THE STUDY FINDINGS

The purpose of this study was to assess adolescents' health behaviour, particularly smoking, between and within Eastern Finland and Pitkäranta district, the Republic of Karelia, Russia, from 1995 to 2013. Also, gender differences were analysed. The aim was to examine adolescents' health behaviour from a socio-ecological perspective due to the growing inequalities in health behaviours from an international perspective.

The first aim was to use a literature review based on previous research evidence to examine how inequalities in socio-ecological factors are shown to be related to adolescents' health behaviour. This information is needed for a deeper understanding of the growing inequalities in health behaviours. In this section the smoking behaviour has raised. The second aim was to discover the current smoking situations in Eastern Finland and Russian Karelia, and to observe possible changes between the study years. Third aim considered socio-ecological factors (family members' and best friend's smoking) that have an impact on adolescents' daily smoking. Fourth, the aim was to examine the associations between smoking-related attitudes and smoking behaviour.

In this section, the results are reviewed, and the validity and reliability of this study are critically evaluated. Finally, recommendations are presented based on these results and suggestions for future researches are presented.

#### 7.1.1 Relations of the socio-ecological factors with adolescents' health behaviour

Families' wealth (including parental SES, family affluence and the level of the parents' occupation and education) was related to all four behavioural outcomes: smoking, the quality of diet, physical activity and alcohol consumption. Adolescents from less affluent families were at a higher risk of smoking, eating breakfast irregularly, decreased fruit and vegetable intake and inactivity. The results concerning alcohol use were partly controversial but mostly suggested that low family wealth was a protective factor against alcohol use.

In the context of smoking, the results of the literature review indicated that smoking was more common in less affluent families. Similar results were also found earlier based on the literature review (Hanson & Chen 2007). Adolescents from less affluent groups were more likely to smoke. By contrast, families' social capital, values and attitudes, reduced the likelihood of experimental smoking. Parents' own smoking was related to adolescents' smoking and it seemed that the more smokers among those in close relationships with the adolescents, the greater their apparent risk of smoking. This relationship has raised a concern which is justified, as harmful health tendencies, such as smoking, may contribute to wider health inequalities between adolescents from affluent and less affluent families across populations. Family wealth, adolescents' social relationships and contextual factors, such as school, have the potential to play vital roles in reducing health disparities.

Peer group particularly influences smoking behaviour. These results were in line with earlier literature findings indicating that peer smoking was the most important predictor for adolescents' own smoking (Kobus, 2003; Hoffman et al., 2006). This requires special attention to adolescents' smoking, but it is a highly complicated and socially influenced behavioural outcome. Therefore, smoking prevention programmes should focus not only on adolescents but also their

family members, especially parents. More emphasis should be put on intensive collaboration in smoking prevention programmes to promote non-smoking environments for adolescents. It is also important to take girls into account, because the prevalence of smoking increased more rapidly during early and middle adolescence compared to boys.

Researchers and practitioners must take socio-ecological factors into account when developing effective approaches for improving adolescents' health behaviour. The multiple layers of behavioural influence are the basis of adolescent health. Moreover, because peers have a strong effect on smoking, it is important to increase knowledge among adolescents that smoking is not part of normal behaviour. The most effective smoking prevention methods for youth have been shown to be school-based with close school-family collaboration, and school health education is a key policy tool (Aveyard 2004; Langford 2013).

A health-promoting approach has been widely embraced in school health care (IUHPE 2008). Schools are ideal places for increasing understanding on the impact of health behaviour for health and well-being following an eco-holistic approach. School health education and promotion should focus on encouraging pupils and the entire school community for systematic and planned actions, in close collaboration with families and communities. Adolescents should be central in their own health promotion. School staff should focus on actions that involve adolescents in order to empower, activate and motivate the adolescents in their own health learning and enable them to take responsibility for their personal and social development. It has been proposed that there is still a gap in public understanding of the negative health effects of tobacco use and that not all adolescents fully understand the consequences of habitual smoking (Roberts et al. 2012). Therefore, it is still important to expand knowledge among adolescents and to prevent smoking initiation as much as possible as well as to support smoking cessation by teaching adolescents' supportive self-cognition.

### **7.1.2 The current smoking behaviour among adolescents in the cross-border area**

The hypothesis was that there are differences between North Karelia and the Pitkäranta district; in Pitkäranta, smoking, smoking experimentations and future intentions to smoke would have increased among girls and stayed high among boys, suggesting a narrowing gender gap in smoking among adolescents. In Finland, smoking, smoking experimentation and future intentions to smoke were hypothesised to slightly decrease and differences between the genders stayed equal. The results indicated that there were no changes in smoking prevalence either in North-Karelia or in Pitkäranta from 1995 to 2013. In Pitkäranta, with respect to girls' early smoking experimentation, the results were noteworthy. However, although the prevalence of smoking did not change, differences existed between these areas as well as between boys and girls in Pitkäranta as it was hypothesised.

In Pitkäranta, boys engaged in daily smoking more often than girls, and the gap in their smoking prevalence stayed large from 1995 to 2013. Girls' smoking prevalence has stayed very low and has not yet followed the general, growing trend among young women in the Russian Federation. One explanation may be that the socio-ecological influence continues to be different among boys and girls, as the Pitkäranta district is a rural area in Russia where the smoking prevalence has been generally lower among women than in bigger cities. In Pitkäranta, attitudes towards women's smoking may be still being more socially traditional than in bigger cities. The results supported this, as girls' intention to remain non-smokers in the future was high. In addition, role modelling might have stayed traditional between boys and girls. Differences in role modelling in the Pitkäranta district have been shown before (Rogacheva et al. 2008). Cultural traditions may still be strong in rural areas and among families. Mahalik et al. (2007) have been proposed that fathers and other male adults are models for masculine males, depicting smoking as normal behaviour. Indeed, smoking prevalence is high among adult males in Pitkäranta, which may be a strong sign of the cultural acceptability of smoking among the boys in the area. Adolescents may be modelling and learning adults' smoking behaviours and attitudes towards



smoking, which helps smoking become the behaviour perceived as normal and normative. Fitting a culturally correct social image may demand smoking, which may be one explanation for the still-high prevalence of smoking among boys in Pitkäranta.

Although the low smoking rates among girls do not follow the women's increasing smoking rates that have been observed in Pitkäranta (Vlasoff 2008), girls' early smoking experimentation, in particular, has increased, compared with the unchanged situation among boys and the change towards later onset of smoking among Finnish adolescents from 1995 to 2013. Mahalik et al. (2013) reported that adolescent females were more likely to smoke early than males of the same age. In view of this, the results concerning adolescent girls' increased early smoking experimentation were noteworthy. The increased experimentation may also have been brought about by cultural and socio-ecological influences. As mentioned before, smoking in Russia has become more common among women, and the attitudes towards smoking have become more liberal. It is possible that the influence of Western-style smoking among women and, e.g., tobacco advertising from the media as well as public liberal attitudes and atmospheres encourage young girls to experiment with smoking. However, because of the traditional model of women in Pitkäranta, early experimentation has not yet resulted in daily smoking among adolescent girls.

Early experimentation is very problematic because of the social and biological vulnerability that may be stronger among younger adolescents. This experimentation may start a transition towards becoming habitual smokers, and in general may lead to engage in other risky behaviours. Unfavourable choices cumulate among the same social groups, which will increase health inequalities and, eventually, mortality across populations. The right timing for preventive actions to inhibit early experimentation and to prevent smoking initiation is crucial to the future equality in health and well-being of adolescents because early smoking experimentation may have very serious consequences in the future, particularly among the most vulnerable groups. However, the prevalence of smoking between socio-economic groups was not studied; therefore, it cannot be confirmed.

In North Karelia in Finland, smoking was still fairly prevalent among both boys and girls, at nearly 20%. Smoking was similar among Finnish boys and girls, being very typical for Western Europe. Although the overall smoking prevalence among adolescents has continuously decreased smoking is still quite prevalent. Different social groups might have their own social boundaries, beliefs and attitudes that are connected to their lifestyle, thus making smoking still common among Finnish adolescents in the area of North Karelia.

### **7.1.3 Socio-ecological factors related to adolescents' daily smoking in the cross-border area**

It was hypothesised that in both cultures, smoking among family members and best friend would be positively related to adolescents' smoking, and these relations have remained unchanged over time even though the prevalence of smoking has changed in both countries. The results clearly indicated that best friend's smoking has stayed the strongest predictor for adolescents own smoking in both countries and study years. However, family members' smoking also affects adolescents' smoking, but there have been changes to the relations and, therefore, the relations were clearly different between the areas in 2013.

The relationship between best friend's and adolescent's own smoking has remained the strongest environmental predictor in both areas. In these areas, similar results have been reported earlier (Kemppainen et al. 2006; Rogacheva et al. 2008), confirming best friend's smoking as perhaps the most important predictor for adolescents' own smoking. Smoking best friend reinforces smoking behaviour and increases the likelihood of adolescents also smoking.

In Finland, family members' smoking was related to adolescents' smoking in both study years. In 2013, there were fewer direct significant relations than in 1995, although the relations in total were found to be significant. Recent results from Finland have proposed that smoking is strongly concentrated on the same families (Heloma et al. 2012), and therefore adolescents in smoking

families are at a higher risk for smoking (Harakeh et al. 2007; Tjora et al. 2011; Mak et al. 2012). It seems that behavioural learning and socialising influenced by family members' smoking consist of different aspects, such as knowledge and modelling and exposure to smoking-related cognitions, such as attitudes, norms and expectations. Smoking-related behaviour during adolescence may be related to one or more of these aspects and be moderated by situational and individual characteristics.

Smoking parents may allow their children to smoke and create an environment with attitudes favouring tobacco use and increase the possibility of smoking by allowing it. In addition, it might be that they are more approving towards friends who smoke than non-smoking parents. In general, adolescents with smoking parents were also most likely to become associated with a best friend who smokes. Smoking may have accumulated in these families and smoking may be perceived as normal behaviour in them. As the results indicate, there were correlations in smoking behaviour between parents and adolescents, both directly and through siblings and the adolescent's best friend, and this may influence adolescents' peer selection and the functioning of the relationships with friends. In addition, siblings share adolescents' living environment and possibly also friends, and may thus have an important role in sharing experiences, particularly one's related to the initiation of smoking. The immediate social rewards of a shared identity through group membership may support the smoking and the construction of a shared social identity and acceptance of the group member in a wider social smoking community.

In Pitkäranta, the relations between parents' and adolescents' smoking were not significant. This was very interesting, as smoking among mothers almost doubled between the years of research and almost half of the fathers were daily smokers in Pitkäranta in 2013. Similar results have been found before in this area (Rogacheva 2008). At the same time, the social climate has become more accepting of smoking among women and the current cultural atmosphere in Russia has become more liberal. However, it may be that smoking adults do not want their children to smoke and, therefore, the attitudes and rules may be strict against adolescent smoking in Pitkäranta. In addition, the parental attitudes may be more approbatory in Russia than in Finland.

Health behaviours have been proposed to be formed not only within socio-ecological relationships between individuals but also by societal structure and cultural conventions (Bronfenbrenner 1979; Bronfenbrenner & Evans 2000). While individuals have freedom to choose whether to smoke or not, this freedom occurs in the framework of social constraint by peers, families and cultures. In Russia, smoking is a norm while in Finland it has become more abnormal behaviour. The normative smoking behaviours are very different in these countries and may partially explain differences in the relationship between family members and adolescents' smoking in North Karelia and the Pitkäranta district.

#### **7.1.4 Attitudes related to smoking among adolescents in the cross-border area**

It was hypothesised that the more non-normative (from the perspective of law and restrictions) the adolescents' attitudes related to smoking and the more positively they perceived smokers (having a positive image of smokers), the higher the prevalence of smoking experimentations, daily smoking and best friend's smoking. As hypothesised, the attitudes were associated with experimenting with smoking, daily smoking and the likelihood that the best friend was a smoker. Adolescents' own positive attitudes towards and opinions of smoking were related to higher daily smoking and smoking experimentation. In addition, adolescents who find it hard to refuse peer pressure were at a high risk of experimenting with smoking as well as for their own daily smoking and that of their best friend. In particular, a positive image of smokers was associated with these factors.

With respect to the abovementioned results, peers and peer groups have constantly been shown to be the strongest social predictors for adolescents' own smoking (Kobus 2003; Hoffman et al. 2007). It is due to the social identity construction and inclusion as well as acceptance and a

positive image of smoking. It may be that, in general, the difficulty to refuse smoking is based on assumed expectations of peers.

Socialisation as a group member includes indirect pressure, and possible harmful effects of smoking are not apparent, which makes smoking worth the risk for the adolescents. Adolescents share values, attitudes and an image of a more mature individual with their peers. Adolescents may think that experimenting with smoking is worth the risk or, as previously suggested, adolescents do not always have the correct information on the adverse effects of smoking, and this may be particularly the case among adolescents in Pitkäranta (Rogacheva 2008).

Social pressure, direct or indirect, is of crucial importance because of the social cohesion of peer group, which may be more important for group members than the harmful adverse effects of smoking experimentation and habitual smoking. In more detail, the implicit expectations of peer groups and the individual need for social inclusion may lead to smoking and shared attitudes towards smoking. Behaviour may also be influenced by a larger social context such as the entire school. Larger social networks of peers and group memberships affect the decision-making regarding whether or not to smoke.

The positive image of smokers was associated with smoking experimentations and daily smoking. It may be that the positive image of smokers as adult-like and mature individuals encourages adolescents to smoke. It may also be that smoking adolescents choose the attitudes towards smokers that fit in with and support their own smoking behaviour. Smoking or non-smoking is likely to be part of a desired image, depending on what kind of social values is predominant in the adolescent's social contexts. Individuals' popularity in a social group may demand a certain kind of behaviour, such as smoking. Therefore, the adolescent may feel compelled to experiment with smoking and become a habitual daily smoker later. This behaviour may occur not only because of direct social pressure, but also due to the adolescent's desired social image, which supports the adolescent in portraying the right social image.

The findings of this study suggested that adolescents generally prefer non-smoking members of the opposite gender with less smoking experimentation and daily smoking. Therefore, some factors from outside of the adolescent's own peer group (such as possible interest in a member of the opposite gender) may also play part in affecting the adolescent's decision to start smoking or to not smoke. In addition, adults who smoke can act as role models and thus influence adolescents' attitudes with their lifestyles. For adolescents whose parents are smokers, it might come more naturally to build friendships and spend time with other smokers to support their individual image.

Socio-ecological structural constraints may play part in forming individual health behaviours and smoking-related attitudes within and between societies (Cockerham et al. 1997). In principle, individuals have freedom of choice, but the freedom of self-direction occurs within social constraints; therefore, participation in a non-smoking lifestyle may not be fully the choice of an individual. In Russia, smoking is still culturally normative behaviour, particularly among males, but also among females, and attitudes towards women who smoke have in general become very liberal. In Russia, recent social, political and economic changes and the influence of marketing by TTCs targeting both genders, but particularly young women, combined with the insufficient implementation of health policies and legislation have led to an increase in smoking among women. In Finland, smoking is starting to become an increasingly abnormal lifestyle choice. In view of this, the normative smoking behaviours in the two countries are very different.

Although challenging, it is important to promote non-smoking attitudes to restrict smoking experimentations and daily smoking among adolescents. Smoking prevention programmes in schools should focus not only on adolescents but also their family members. Increasing attention must be put on building close collaboration between school and homes as part of smoking prevention programmes in order to promote non-smoking environments for adolescents. Health-related behaviour is part of development, especially social development, during the transition from adolescence to adulthood. Therefore, despite the message sent by smoking adults to minors, strictly non-smoking values should always be promoted. In addition, personal cognitions of

adolescents should be supported to stay smoke-free. This could be achieved through youth social groups by promoting non-smoking lifestyles and, above all, by emphasizing the positive effects of non-smoking and by influencing the social image of smokers.

## 7.2 RESEARCH STRENGTHS AND LIMITATIONS

The qualitative part of this study was conducted as a systematic literature review. It was planned and defined very precisely beforehand to maximise its validity. The review was conducted systematically and controlled in phases to minimise errors and ensure reproducibility. The study search strategy was done in collaboration with library professionals, and two authors selected the studies to increase the validity (Whittemore & Knafl 2005). Inter-rater agreement on the selection and quality of articles was 90%. The chosen articles were mostly quantitative studies in which the sample size was large, and several articles included data from more than one country, which strengthens and generalises the results, and increases the reliability. However, a larger number of qualitative studies would have brought deeper understanding regarding the socio-ecological relations among individuals and the cultural conventions that may affect the results (Wills & Cleary 1997; Bauman & Ennett 1998).

The most severe limitation was the extensive number of socio-ecological concepts used in the studies. However, different types of measurements (e.g. socioeconomic, family wealth, occupational or educational status) were used as one concept – socio-economic status – which might have affected the findings' reliability. Moreover, a problematic aspect of the selection process was the adolescents' age range in the studies under consideration. Very strict inclusion criterion was set beforehand concerning the age, which was based on the WHO definition of age range of adolescence. Therefore, several otherwise relevant articles were excluded. Also, a wider time range in publishing would have brought a larger number of included articles. Articles may have been rejected due to the inclusion criteria; therefore, there might be some bias in the selection process, which may have affected the final synthesis of the results. However, all of the selected articles were analysed by their quality and the final articles were all original, peer-reviewed study results with good quality.

The literature review was analysed with content analysis, which is an appropriate method for both qualitative and quantitative data, and is repeatable in other research (Elo & Kyngäs 2008). The analysis was made by the author alone but the discussion with other authors helped the author to stay in context.

The empirical part of this study was cross-sectional and thus any causality assumptions cannot be drawn. However, repeated cross-sectional surveys provide valuable information on time changes in different phenomena such as smoking behaviour. In addition, the data were collected from a small cross-border area and cannot be widely generalised. However, collecting the data in the above-mentioned areas might also be considered strength of the study. The previous research conducted on Pitkäranta concerning adolescents' smoking was from the year 1995 (Kemppainen et al. 2006; Kemppainen 2007) and also some results were reported from 2004 (Rogacheva et al. 2008), and it can thus be argued that there was dire need for the data from 2013. In addition, this data collection made it possible to compare the changes on smoking behaviour between study areas and from the year 1995 to 2013, a period during which massive political, economical and cultural changes occurred, particularly in the Russian side of the border. Therefore, this data has unique and valuable significance.

In 2013, data were gathered from schools separately, in each class. In both countries, the schools were common schools using a national curriculum. A self-administered questionnaire was used for data collection, and different cultural conventions may have affected the accuracy of honest reporting (Wills & Cleary 1997; Bauman & Ennett 1998). However, the data collection

method itself has been evaluated to be reliable (Vartiainen et al. 1990; Prokhorov et al. 1993). The questionnaire was closely the same as in 1995; however, the cultural atmosphere may have changed during the studied years. Therefore, the underlying socially desirable answer options may have differed between the study years, which may have impacted the final data.

The data were collected in a very narrow time span – within a few weeks. There were minor differences among the data collection protocols between the countries. In Pitkäranta, the author was not personally present each time in classes because the data were collected at the same time in several classes. Instead, at least one study member of the AHIC project team was present. This ensured peacefulness and privacy, and therefore maximised the probability of honest answering. In Finland, the author was present in each class because the collection was done in each school class separately.

Another difference was that the teacher was present in the classes in Pitkäranta but not in Finland. In addition, the pupils in Pitkäranta asked more questions concerning the questionnaire. This was assessed to be more due to cultural differences than difficulties in answering, because the suitability of the questionnaire was pretested and evaluated beforehand, together with Russian team members, to ensure its validity. The questions were easily worded, and the constructions were evaluated to be clear. All in all, underlying cultural factors may have affected the results, particularly because of the presence of the teacher in Pitkäranta. However, the team members of AHIC, particularly in Pitkäranta, were almost the same as in 1995, which strengthened the validity and reliability of the data collection, and increase the truthful comparison between the study years.

The reliability and credibility of the results were supported by the high response rates in both survey years and in both countries. In Pitkäranta, both data collections covered all of the schools and therefore represent the total age cohort. In Finland, the schools were randomised in 1995, and the schools were selected in 2013, but among the same schools as in 1995. This selection was assessed to be appropriate because the schools represented both urban and rural areas and therefore characterised very typical areas of Eastern Finland.

There were critical methodological limitations. The number of 9<sup>th</sup> graders was very low in Pitkäranta in 2013; therefore, the study from 1995 produced statistically significant results more easily. From 1995 to 2013, the number of 9<sup>th</sup> graders strongly declined due to intense migration, which has resulted in lower birth rates. This may cause some problems related to the data, because Russian women have previously been shown to underreport their smoking (Engels et al. 2004); therefore, the proportion of girls who smoke might be an underestimation. In contrast, adolescents have been shown to overestimate their friends' smoking (Prokhorov et al. 1993). The critical observation in study was that respondents in both countries more frequently reported their best friend as smoker than themselves in both study years. It might be that adolescents project their own behaviour onto their best friend and overestimate the friend's smoking. All in all, these abovementioned factors may have caused some bias in the results.

Another methodological limitation concerns the statistical methods used, particularly SEM. SEM was developed for large sample sizes and is based on covariances (Ullman 2006a, 2006b). Covariances are less stable when small samples are estimated. In some cases, it has also been shown to be a useful method for small sample sizes, particularly if the relations between the factors are well known (MacCallum et al. 1996; Ullman 2006b). In the model of this study, the theoretical assumption of the parents', siblings' and best friend's impact on adolescents' own smoking has been well established; however, the different sample sizes between the countries, particularly in Pitkäranta in 2013, may have affected the final models. The issue of the different sample sizes between the areas and the relatively small sample size in Pitkäranta were solved with the chosen estimation method, which did not require the assumption of a normal distribution. In addition, the association between best friend's and adolescents' smoking was strong in both countries and years.

The idea of the models was to fit the same model in all four sets of data. Inevitably, there was variation in model fit, but in any instance, model fit was not poor. NFIs were good and in RMSEA,

the model fit would be poor with values above 0.100. The values of the CMIN/DF differed between the models but the largest value 4.524 corresponded to the p-value 0.044 and thus  $H_0$  was rejected, but not as clearly as the case would be, e.g.  $p < 0.001$ . With the respect to all of the above-mentioned issues concerning the SEM, the model construction was assessed to be valid.

For SEM, a basic issue is the choice of the theoretical basis of the selected model versus all other possible models (Ullman 2006a). Methodological concerns exist stating that the relations may not be real and other affected factors exist that are not present in the model. In the model of this study and according to statistical tests, the model fit of the final models was good in both years and both countries. In this study the influence of the best friend and the family members were only modelled in the one-way relations. The results indicated that the relationship between the best friend's and adolescents' own smoking existed in both countries and in both years.

In view of the SEM modelling, the critical question is whether there are other social and/or environmental and reciprocal relations that affect smoking among adolescents not included in the model. It has been proposed in previous reviews that school system and the smoking policy and boundaries with school health education alter smoking-related norms and attitudes and influence a sense of connection at the school (Boner et al. 2013a; Boner et al. 2013b). In addition, the relationships between individuals' shape adolescents' health behaviour through many environmental and social influences. A potential factor influencing the behaviour is schoolmates' or even school personnel's smoking behaviour, which is, in turn, affected by the school's smoking policy, boundaries, norms and values, and health education at the school. Schools are central places for socialising processes occurring through many different theories, and pupils may not act as independent individuals because of clustering. Even weak ties between pupils in the school clustering (social networking theory) may influence smoking (or non-smoking) behaviours during a developmental period as well as increase vulnerability to social influences. In addition, adolescents in schools might learn through modelling outside of the official curriculum, e.g. from school personnel smoking. As it has been mentioned before, new and stricter smoking legislation entered into force only in 2013 in Russia, forbidding smoking in public places such as schools. Therefore, school smoking policies have been traditionally very different in the study areas. The model may thus not represent the whole picture of the relationships involved in daily smoking among adolescents, which may have affected the final conclusions of the study.

### **7.3 CONCLUSIONS AND RECOMMENDATIONS**

The study provides information on the prevalence of smoking behaviours among 9<sup>th</sup> grade adolescents, as well as their attitudes and thoughts and associations between family members' and best friend's smoking and smoking experimentation in North Karelia, Eastern Finland and Pitkäranta district, Republic of Karelia, Russia. Furthermore, information was gathered on socio-ecological factors of adolescents' smoking, alcohol use, diet and physical activity, which may result in inequalities in health behaviour and later health.

The following conclusions and recommendations can be presented on the basis of this study:

*Conclusion* Adolescents' unhealthy behaviour, particularly smoking, sedentary lifestyle and irregular eating, seem to be more common in low affluence families.

*Recommendation* Socio-ecological differences in family background should be taken into account when health education and health promotion programmes are planned and implemented. The adequate health promotion in schools performed in close co-operation between the home and school, offer equality in the adoption of healthy behaviour and increase possibilities to prevent health problems in later life.

*Conclusion* The proportion of daily smokers was still relatively high among boys in Pitkäranta and among both genders in Finland.

*Recommendation* It is still crucially important to continue targeting health education to decrease smoking among adolescents. In Russia, anti-smoking legislation should be better implemented to restrict the availability of tobacco products and sales for minors. For this, schools are the central agencies to talk about an overall smoke-free environment and to build healthier, smoke-free communities and schools.

*Conclusion* Peers' and best friend's smoking was found to be the most important predictor for adolescents' own smoking.

*Recommendation* It is important to support adolescents' skills in refusing smoking and to promote the positive influence of non-smoking in peer groups. In addition, despite the smoking of parents, the non-smoking message from adults to adolescents and their friends must be unconditional. Responsibility in supporting, teaching, guiding and monitoring non-smoking among adolescents and their friends should be shared by parents and school personnel in close and coherent collaboration.

*Conclusion* Family members' smoking was related to adolescents' smoking in Eastern Finland but not in Pitkäranta.

*Recommendation* Smoking prevention programmes in schools should not focus only on adolescents but should also involve family members. Close and culturally tailored home-school collaboration together with school nurses, teachers, school personnel, adolescents and their families need increased attention to promote non-smoking environments for adolescents.

*Conclusion* Girls were found to be more positive towards smoking and were more physically passive in low affluence families than boys. In addition, very early smoking experimentation increased among girls between the study years, particularly in Pitkäranta.

*Recommendation* Special attention should be paid on girls' vulnerability to socio-ecological influences and early smoking experimentation.

*Conclusion* Adolescents' difficulties in resisting social pressure and attitudes against restrictions on smoking were positively associated with smoking experimentation, daily smoking and smoking by their best friend. In addition, the positive attitudes and opinions towards smokers were positively associated with daily smoking and smoking experimentation.

*Recommendation* Health policy and health education by families and in schools are an important channel for delivering non-smoking messages and for formulating adolescents' attitudes and norms. However, these need to be carefully tailored and planned to fit into the adolescents' socio-ecological environment, with an understanding of the underlying socio-ecological determinants.

## **7.4 SUGGESTIONS FOR FUTURE RESEARCH**

Suggested research areas for future research based on this study:

1. Longitudinal studies and qualitative research should be emphasised to deepen the understanding of socio-ecological factors related to health behaviour and, hence, health inequality, separately among both genders. This is particularly important in the cross-border area in the North Karelia, Eastern Finland, and in the Pitkäranta district, Republic of Karelia, Russia.

2. It is important to continue the long-standing health promotion collaboration in the cross-border area. More research is still needed to clarify the socio-ecological and cultural factors that influence the transition from the first smoking experimentation to daily smoking.
3. More research is needed to determine culture-specific values, norms and attitudes related to smoking in families, schools and communities that could clarify factors affecting smoking behaviour and help in planning health promotion interventions with appropriate learning environments in cross-border area.



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## **APPENDICES**

*Appendix I. Research information for guardian.*

## **TIEDOTE TUTKIMUKSESTA HYVÄ VANHEMPI/HUOLTAJA**

Olemme pyytäneet perheenne nuorta osallistumaan nuorten terveystietäytymistä kartoittavaan tutkimukseen, joka toteutetaan huhtikuun 2013 aikana. Pyydämme teitä tutustumaan huolellisesti tähän tutkimustiedotteeseen.

Tutkimuksen tarkoituksena on selvittää yhdeksäsluokkalaisten nuorten terveystietäytymistä ja niissä tapahtuneita muutoksia. Tutkimuksesta saatavaa tietoa käytetään nuorten terveyttä ja hyvinvointia edistävän toiminnan suunnitteluun mm. kouluissa.

Tutkimuksen toteuttaa Itä-Suomen yliopisto, Terveyden ja hyvinvoinnin laitos, Pohjois-Karjalan Kansanterveyden keskus ja Pitkärannan alueen keskussairaala. Tutkimusryhmämme koulutetut tutkijat ja hoitajat vastaavat tutkimuksen käytännön toteuttamisesta.

Tutkimukseen osallistuminen edellyttää perheenne nuorelta osallistumista koulupäivän aikana toteutettavaan tutkimukseen. Tutkimus toteutetaan kyselylomakkeilla, joissa kysytään nuoren kokemuksia ja ajatuksia liikunnasta, ruokailusta, tupakoinnista, alkoholin käytöstä ja perhe- ja kaverisuhteista. Lisäksi kysymme perheenne nuorelta näkemyksiä ja mielipiteitä teidän vanhempien ja sisarusten terveystietäytymiseen liittyvistä asioista kuten tupakoinnista ja alkoholinkäytöstä. Lomakkeeseen vastaaminen vie aikaa noin 45 minuuttia.

Tutkimuslomakkeen kysymyksiin vastaamisesta ei aiheudu nuorelle haittaa, mutta mikäli teitä tai perheenne nuorta jää jokin asia askarruttamaan, niin pyydämme teitä ottamaan yhteyttä meihin, jotta saamme yhdessä vastauksen kysymyksiinne. Yhteystietomme löytyvät tämän tiedotteen lopusta.

Tutkimukseen osallistuminen on täysin vapaaehtoista ja perheenne nuori voi halutessaan keskeyttää tutkimuksen. Kieltäytymisestä tai keskeyttämisestä ei aiheudu mitään seurauksia. Nuorene osallistuessa tutkimukseen hän allekirjoittaa suostumuslomakkeen tutkimukseen.

Kaikki tiedot käsitellään luottamuksellisesti salassapitovelvollisuutta ja henkilötietolakia noudattaen. Tietoja käytetään ainoastaan tieteelliseen tutkimukseen ja tulokset analysoidaan ja julkaistaan kokonaisuuksina, jolloin yksittäisiä vastaajia ei voi tunnistaa. Tutkimusaineiston käsittelystä ja säilytyksestä vastaa Terveyden- ja hyvinvoinnin laitos.

### **Lisätietoja tutkimuksesta antavat:**

Suomessa:

Professori Kerttu Tossavainen, 040 5127291 ([kerttu.tossavainen@uef.fi](mailto:kerttu.tossavainen@uef.fi))

Tutkija Annamari Aura, 040 355 3387 ([annamari.aura@uef.fi](mailto:annamari.aura@uef.fi))

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Itä-Suomen yliopisto, terveystieteiden tiedekunta, hoitotieteen laitos.

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Postiosoite: PL 1627, 70211 Kuopio

Venäjällä:

Tutkimuskoordinaattori Ljubov Raiskio, puh. +7 921 226 06 35.

*Appendix II. Research information for adolescent.*

## **TIEDOTE TUTKIMUKSESTA HYVÄ NUORI**

Pyydämme sinua osallistumaan nuorten terveystietäytymistä kartoittavaan tutkimukseen, joka toteutetaan huhtikuun 2013 koulupäivän aikana. Pyydämme sinua tutustumaan huolellisesti tähän tutkimustiedotteeseen.

Tutkimuksen tarkoituksena on selvittää yhdeksäsluokkalaisten nuorten terveystietäytymistä ja niissä tapahtuneita muutoksia. Tutkimuksesta saatavaa tietoa käytetään nuorten terveyttä ja hyvinvointia edistävän toiminnan suunnitteluun mm. kouluissa.

Tutkimuksen toteuttaa Itä-Suomen yliopisto, Terveyden- ja hyvinvoinnin laitos, Pohjois-Karjalan kansanterveyden keskus ja Pitkärannan alueen keskussairaala. Tutkimusryhmämme koulutetut tutkijat ja hoitajat vastaavat tutkimuksen käytännön toteuttamisesta.

Tutkimukseen osallistuminen edellyttää sinulta osallistumista koulupäivän aikana toteutettavaan tutkimukseen. Tutkimus toteutetaan kyselylomakkeilla, joissa kysytään kokemuksiasi ja ajatuksiasi liikunnasta, ruokailusta, tupakoinnista, alkoholin käytöstä sekä perhe- ja kaverisuhteista. Lisäksi kysymme näkemyksiäsi ja mielipiteitäsi vanhempiesi ja sisarustesi terveystietäytymiseen liittyvistä asioista kuten tupakoinnista ja alkoholinkäytöstä. Lomakkeeseen vastaaminen vie aikaa noin 45 minuuttia.

Tutkimuslomakkeen kysymyksiin vastaamisesta ei aiheudu haittaa, mutta mikäli sinua jää jokin asia askarruttamaan, niin ota yhteyttä meihin, että saamme yhdessä vastauksen kysymyksiisi. Yhteystietomme löytyvät tämän tiedotteen lopusta.

Tutkimukseen osallistuminen on täysin vapaaehtoista ja voit halutessasi keskeyttää tutkimuksen. Kieltäytymisestä tai keskeyttämisestä ei aiheudu sinulle mitään seurauksia. Osallistuessa tutkimukseen sinua pyydetään allekirjoittamaan suostumuslomake.

Kaikki tiedot käsitellään luottamuksellisesti salassapitovelvollisuutta ja henkilötietolakia noudattaen. Tietoja käytetään ainoastaan tieteelliseen tutkimukseen ja tulokset analysoidaan ja julkaistaan kokonaisuuksina, jolloin yksittäisiä vastaajia ei voi tunnistaa. Tutkimusaineiston käsittelystä ja säilytyksestä vastaa Terveyden- ja hyvinvoinnin laitos.

### **Lisätietoja tutkimuksesta antavat:**

Suomessa:

Professori Kerttu Tossavainen, 040 5127291 ([kerttu.tossavainen@uef.fi](mailto:kerttu.tossavainen@uef.fi))

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Itä-Suomen yliopisto, terveystieteiden tiedekunta, hoitotieteen laitos.

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*Appendix III. Informed consent form for adolescent.*

**NUOREN SUOSTUMUS**

Olen saanut tätä tutkimusta koskevan kirjallisen tiedotteen etukäteen ja olen perehtynyt siihen. Tutkimuksen toteuttamisesta vastaava henkilö on kertonut minulle suullisesti koulun luokkahuoneessa tutkimuksen tarkoituksen ja toteutuksen sekä oikeuteni osallistuessani tähän tutkimukseen. Lisäksi minulla on ollut mahdollisuus lisätietojen saamiseen ennen tutkimusta. Tutkimuksen jälkeen olen tietoinen, keneen henkilöön olen yhteydessä, mikäli minulle tulee mieleen asioita tai lisäkysymyksiä, joihin haluan vastauksen.

Olen ymmärtänyt tutkimuksen kulun ja tarkoituksen, ja suostun osallistumaan tutkimukseen annettujen ohjeiden mukaisesti. Voin halutessani peruuttaa tai keskeyttää osallistumiseni tai kieltäytyä tutkimuksesta missä vaiheessa tahansa. Tutkimustuloksiani saa käyttää tieteelliseen raportointiin sellaisessa muodossa, jossa yksittäistä tutkittavaa ei voida tunnistaa.

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Paikka ja päiväys

Tutkittavan nuoren allekirjoitus

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Paikka ja päiväys

Suostumuksen vastaanottajan allekirjoitus

Appendix IV. Questions from original questionnaire used in this study.

**Have you ever tried smoking?**

If you have, what grade were you in?

- 1 I have never tried it
- 2 6<sup>th</sup> grade or earlier
- 3 7<sup>th</sup> grade
- 4 8<sup>th</sup> grade
- 5 9<sup>th</sup> grade

**If you have ever smoked, when was the last time you smoked?**

- 1 I have never smoked.
- 2 over a year ago
- 3 half a year – a year ago
- 4 1 month – half a year ago
- 5 2 days - 1 month ago
- 6 yesterday or today

**Do you smoke?**

- 1 no
- 2 less often than once a month
- 3 once or twice a month
- 4 once or twice a week
- 5 daily, about \_\_\_\_\_ cigarettes a day

**What do you think about your smoking in the future?**

- 1 I do not smoke, and I am not going to.
- 2 I do not smoke now, but I might try sometime.
- 3 I do not smoke now, but I might start when I am older.
- 4 I smoke now, but I am considering quitting.
- 5 I smoke now, and I am going to continue smoking.

**Does your best friend smoke?**

- 1 yes
- 2 no
- 3 she/he quit
- 4 I cannot tell

**Does your father smoke?**

- 1 yes
- 2 no
- 3 he quit
- 4 I cannot tell

**Does your mother smoke?**

- 1 yes
- 2 no
- 3 she quit
- 4 I cannot tell

**Does your sister (who is older than 10) smoke?**

- 1 yes
- 2 no
- 3 she quit
- 4 I cannot tell
- 5 I am the only child

**Does your brother (who is older than 10) smoke?**

- 1 yes
- 2 no
- 3 he quit
- 4 I do not have a brother older than 10
- 5 I'm the only child

**How often do you smoke in the following situations?**

	<b>Never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Often</b>
<b>1</b> When I am alone	1	2	3	4
<b>2</b> With my friend	1	2	3	4
<b>3</b> During breaks	1	2	3	4
<b>4</b> After school, before going home	1	2	3	4
<b>5</b> At home, and my parents know about it	1	2	3	4
<b>6</b> At home, and my parents do not know about it	1	2	3	4
<b>7</b> On weekdays, outside home in the evening	1	2	3	4
<b>8</b> On weekends, outside home	1	2	3	4
<b>9</b> At parties, when out dancing, nightclubs	1	2	3	4

**If you smoke, how do you get cigarettes?**

- 1 I do not smoke.
- 2 I buy them myself in shops or stands.
- 3 Older friends buy them for me.
- 4 other sources, please specify \_\_\_\_\_  
(For example, I take them from parents, siblings, etc.)

**Do you think a person under 18 can buy cigarettes in a shop or a stand near school?**

- 1 always
- 2 often
- 3 sometimes
- 4 seldom
- 5 never

**Smoking on the school yard is (..... for students).**

- 1 very difficult
- 2 difficult
- 3 quite difficult
- 4 quite easy
- 5 easy
- 6 very easy

**Have any of your friends or peers asked you to smoke?**

- 1 yes, often
- 2 yes, sometimes
- 3 no

Look at the following statements and encircle 1 if you absolutely agree, 2 if you partially agree, 3 if it is hard to tell, 4 if you partially disagree, and 5 if you totally disagree.

	<b>Absolutely agree</b>	<b>Partly agree</b>	<b>Hard to tell</b>	<b>Partly disagree</b>	<b>Totally disagree</b>
<b>1</b> I find it hard to refuse if I am offered a cigarette in the company of other youths.	1	2	3	4	5
<b>2</b> Smoking cigarettes in the company of friends is worth the risk.	1	2	3	4	5
<b>3</b> It is easy for young people to quit smoking.	1	2	3	4	5
<b>4</b> You get addicted to tobacco easily.	1	2	3	4	5
<b>5</b> It is hard to stay a non-smoker with friends who smoke.	1	2	3	4	5
<b>6</b> Young people find it hard to decline if their brother or sister offers them a cigarette.	1	2	3	4	5

Read the following statements and encircle the most appropriate option.

	<b>Absolutely agree</b>	<b>Partly agree</b>	<b>Hard to tell</b>	<b>Partly disagree</b>	<b>Totally disagree</b>
<b>1</b> Tobacco products should be sold to people under the age of 18.	1	2	3	4	5
<b>2</b> People should not smoke at home.	1	2	3	4	5
<b>3</b> I am glad than smoking is illegal for young people	1	2	3	4	5
<b>4</b> Smoking in public places should be prohibited.	1	2	3	4	5
<b>5</b> People should be allowed to smoke freely on school premises.	1	2	3	4	5



Read the following statements and encircle the most appropriate option.

	<b>Absolutely agree</b>	<b>Partly agree</b>	<b>Hard to tell</b>	<b>Partly disagree</b>	<b>Totally disagree</b>
<b>1</b> Young people who smoke are cooler.	1	2	3	4	5
<b>2</b> Young people who smoke are more mature.	1	2	3	4	5
<b>3</b> Smoking calms you down.	1	2	3	4	5
<b>4</b> Girls prefer non-smoking boys.	1	2	3	4	5
<b>5</b> Boys prefer non-smoking girls.	1	2	3	4	5
<b>6</b> It is foolish to smoke.	1	2	3	4	5
<b>7</b> Smokers have more friends.	1	2	3	4	5
<b>8</b> Smoking helps getting to know people.	1	2	3	4	5
<b>9</b> Smoking is enjoyable.	1	2	3	4	5



## ANNAMARI LASTUNEN

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*This study examined smoking behaviour of 9th grade pupils at a cross-border area of Finland and Russia and changes in it from 1995 to 2013 clarifying the factors affecting the health behaviour. The findings indicated no change in the smoking prevalence during the research period. Best friend's smoking, the non-normative attitudes and difficulties in refusing to smoke predicted pupil's own smoking. Adolescents from indigent families were at a higher risk for unhealthy behaviour. These findings can be utilized in developing and improving health education and health promotion interventions.*



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