

University of Groningen

## Sociocultural determinants, gender and health-related behaviour in adolescence

Pitel, Lukas

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2013

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Pitel, L. (2013). *Sociocultural determinants, gender and health-related behaviour in adolescence*. s.n.

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

Sociocultural determinants, gender and health-related behaviour in adolescence

Lukáš Pitel

Copyright:

© Lukáš Pitel

© 2013 Japan Epidemiological Association (Chapter 3)

© 2012 BMJ Publishing Group Ltd. (Chapter 5)

© 2010 The Royal Society for Public Health (Chapter 7)

Thesis for the University of Groningen, the Netherlands – with summary in Dutch and Slovak.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the author.

Correspondence:

Lukas Pitel

lukas.pitel@gmail.com

This study was supported by the Slovak Research and Development Support Agency (APVV) under Contract No.: APVV-20-038 205 and APVV-0032-11 and was partially supported by the Agency of the Slovak Ministry of Education for the Structural Funds of the EU, under project ITMS: 26220120058 (30%).

The printing of this thesis was supported by the Graduate School for Health Research (SHARE), the Graduate School Kosice Institute for Society and Health (KISH), the University Medical Center Groningen (UMCG) and the University of Groningen.

Design: Klára Pitlová

Press: Equilibria s.r.o., Košice

Printed in the Slovak Republic

ISBN 978 90 367 6469 8

RIJKSUNIVERSITEIT GRONINGEN

**Sociocultural determinants, gender  
and  
health-related behaviour in adolescence**

**Proefschrift**

ter verkrijging van het doctoraat in de  
Medische Wetenschappen  
aan de Rijksuniversiteit Groningen  
op gezag van de  
Rector Magnificus, dr. E. Sterken,  
in het openbaar te verdedigen op  
maandag 25 november 2013  
om 16.15 uur

door

Lukáš Pitel

geboren op 24 augustus 1983

te Bratislava, Slowakije

Promotor: Prof. dr. S.A. Reijneveld

Copromotores: Dr. J.P. van Dijk  
Dr. A. Madarasova Geckova Safarik University,  
Kosice, Slovak Republic

Beoordelingscommissie: Prof.dr. A. Dijkstra  
Prof.dr. J.W. Groothoff  
Prof.dr. C.P. van der Schans

# Contents

<b>Chapter 1</b>	
Introduction	7
<b>Chapter 2</b>	
Data sources and design of the study	19
<b>Chapter 3</b>	
Socioeconomic differences in adolescent health-related behaviour differ by gender	25
<b>Chapter 4</b>	
Degree of urbanisation and gender differences in substance use among Slovak adolescents	39
<b>Chapter 5</b>	
Gender differences in the relationship between religiosity and health-related behaviour among adolescents	49
<b>Chapter 6</b>	
Socioeconomic gradient shifts in health-related behaviour among Slovak adolescents between 1998 and 2006	63
<b>Chapter 7</b>	
Gender differences in adolescent health-related behaviour diminished between 1998 and 2006	71
<b>Chapter 8</b>	
Discussion	83
<b>References</b>	99
<b>Summary</b>	111
<b>Samenvatting</b>	115
<b>Zhrnutie</b>	119
<b>Acknowledgements</b>	123
<b>About the author</b>	125



# Introduction

This thesis focuses on the role of gender in regard to the relationships between adolescent health-related behaviour (HRB) and several sociocultural determinants as well as on shifts in these relationships over the past decade. The aim of this chapter is to discuss the core concepts of the thesis and to provide a brief review of what is already known in this field. The aims of the study, the theoretical model, the research questions and the structure of the thesis are also included.

## 1.1 Health-related behaviour in adolescence

Sutton (2004) defines the term HRB as “any behaviour that may affect an individual’s physical health or any behaviour that an individual *believes* may affect their physical health”. This definition will be employed throughout this thesis as well. He also distinguishes between positive HRBs (contributing to someone’s health, e.g., regular exercise, regular fruits and vegetables consumption, going for annual health checks) and negative HRBs (e.g., smoking, binge drinking, driving too fast, eating a diet rich on saturated fat).

HRBs are important, because at least since the second half of the 20th century a substantial part of mortality and morbidity has become attributable to behavioural risk factors. This holds true especially for high-income countries (McGinnis and Foege, 1993; Lopez et al., 2006; Ikeda et al., 2012). Many HRBs originate and/or are consolidated during the period of adolescence (Williams et al., 2002). This consolidation also has an impact on both positive and negative HRBs in later periods of life (Holmbeck, 2002). In addition, these HRBs differ among individuals by the age of onset and by the degree to which they persist in later stages of life (Richter, 2009). Some of them tend to cluster together (van Nieuwenhuijzen et al., 2009); therefore, many of them may have similar patterns of determinants.

## 1.2 Sociocultural determinants of health-related behaviours in adolescence

HRBs have been shown to be associated with a number of sociocultural determinants. In the following section, we provide a brief review of previous



research regarding the association between HRBs and three particular sociocultural factors on which this thesis will focus: socioeconomic position (SEP), degree of urbanisation (DoU) and religiosity.

### **1.2.1 Socioeconomic position**

SEP has been repeatedly reported to be related to HRB (Nocon et al., 2007; Stringhini et al., 2011; Hanson and Chen, 2007). According to Galobardes et al. (2006), SEP “refers to the social and economic factors that influence what positions individuals or groups hold within the structure of a society”. SEP “is related to numerous exposures, resources, and susceptibilities that may affect health”. Several distinct indicators are employed to assess SEP, the main ones being education, income, occupation and household assets or housing conditions (Liberatos et al., 1988; Galobardes et al., 2006). There is evidence that occupation, education and income are associated with the HRB of adult population even after mutual adjustment (Nocon et al., 2007), indicating that each of them measures partially distinct aspects of SEP. This may also be interpreted as meaning that no single best indicator of SEP exists that is applicable for all study aims, at all points in time and in all settings. Each indicator measures different, often related aspects of the socioeconomic (SE) stratification and may be more or less relevant to different behaviours and at different life stages. Therefore, the choice of the SEP measure(s) should be considered according to the specific research question and the proposed mechanisms linking the SEP to the outcome (Liberatos et al., 1988; Galobardes et al., 2006). Regarding children and youth, SEP is mostly measured as the SEP of their parents, though among adolescents in particular educational level may be used as a proxy as well. A weakness of parental SEP as an indicator of SEP among adolescents is that the adolescents themselves may not always know the level of their parents’ SEP, e.g. parental education, income or occupation.

Among adults, mostly “traditional SE gradients” have been found: the higher the SEP, the healthier the HRB (Nocon et al., 2007; Stringhini et al., 2011). Regarding adolescents, evidence on the association between HRB and SEP is more heterogeneous than in relation to adults. In their review of research on the associations between SEP and adolescent HRBs, Hanson and Chen (2007) reported that some associations do exist but in general, these relationships were not as robust as in adulthood. In nutritional behaviour, physical inactivity and smoking a mostly traditional SE gradient was found, meaning that lower SEP was mostly associated with less healthy behaviour, while in alcohol consumption and marijuana use mostly no association was found. Most of the studies from the review by Hanson and Chen (2007) were conducted in the USA. In their survival analysis of virginity among American adolescents aged 13 to 18 years, Lammers et al. (2000) found a significant association of higher SEP (indicator not specified) with a delayed onset of sexual activity among both genders, even after adjustment for several confounders. However,

Upchurch et al. (1999) found that mother's education was not significantly associated with sexual debut among adolescents from Los Angeles, when controlled for race, neighbourhood type and family structure. Similarly, Kalina et al. (2011) found no association between sexual intercourse and parental education among Slovak adolescents.

The results of the international HBSC studies indicate that the associations between SEP (measured by family affluence) and several adolescent HRBs differ by country. For example, regarding soft drinks, a traditional SE gradient was found in the more affluent Northern and Western European countries, while an inverse SE gradient was found in the less affluent Central, Eastern and Southern European countries. Similarly, watching television was mostly negatively associated with SEP in most Western European countries, unrelated to SEP in most Central and Eastern Europe countries, but positively associated with SEP in several Balkan countries. Regarding smoking and alcohol use, no clear geographical pattern regarding their association with SEP can be identified, but this also varies widely by country (Currie et al., 2008 and 2012).

Moreover, the magnitude of the SE gradient in HRB may be changing over time. For example, Richter and Leppin (2007) reported a weak positive relationship between parental affluence and smoking among West German boys in 1994 which could not be replicated in 1998 and in 2002. Evidence on shifts in SE differences among adolescents from Central and Eastern European countries is scarce.

### **1.2.2 Degree of urbanisation (DoU)**

Among environmental and structural determinants, DoU may be relevant for adolescent HRB. In sociology and demography, the term DoU has been traditionally applied to "the proportion of the total population who reside in urban units" (Gibbs, 1966). However, in several epidemiological studies (Saarento et al., 1996; Pedersen and Mortensen 2006), DoU refers to a categorisation of residences of the study population according to the number of inhabitants in that particular residence. In our thesis, we use the term DoU according to the latter description.

Most research regarding the association between DoU and HRB has been conducted in the USA. During the 1990s, the prevalence of unhealthy behaviours was higher among rural youth than among urban youth in regard to the consumption of cigarettes, alcohol, marijuana and several other illicit substances (National Center on Addiction and Substance Abuse at Columbia University, 2000). Greggo et al. (2005) found mostly no differences in alcohol-related behaviours between rural, suburban and urban high school attendees in a nationally representative US sample. The only exception was driving after drinking, which showed a higher prevalence rate among rural youth than among urban youth.

Results of studies from outside the USA indicate that the relationship between DoU and HRB also varies by culture or country economy. In the Netherlands, Abraham (1999) found a positive relationship between municipality population density and illicit drug use, cannabis included, in the population aged 12 and older. In Madagascar, smoking was substantially more prevalent among urban adolescents compared with their suburban counterparts (Befinoana and Razanamihaja, 2011). Sandercock et al. (2010) carried out a review of research regarding the relationship between DoU and physical activity among children and adolescents. While the results of studies conducted in the USA regarding this relationship were mixed, nine out of ten studies from other developed countries (Canada, Australia and European countries) found no differences. The exception was Iceland (Kristjansdottir et al., 2001) with a U-shaped relationship: adolescents from towns were more physically active than urban or rural ones. In Central and Eastern Europe, meanwhile, there is a lack of studies exploring the relationship between DoU and HRB among adolescents.

### **1.2.3 Religiosity**

Research regarding the association between religiosity and HRB has a long tradition (McCullough and Willoughby, 2009). Durkheim (1915) defined religion as “a unified system of beliefs and practices relative to sacred things, that is to say, things set apart and forbidden - beliefs and practices which unite into one single moral community (...), all those who adhere to them”. Religiosity, a term closely related to religion, has been defined variably across academic disciplines and their different theoretical approaches (Holdcroft 2006). Bjarnason (2007) performed a concept analysis of religiosity in health care-related sciences. She found a consensus that religiosity was implicated by religious affiliation (e.g. Catholic, Protestant, Jewish, Muslim), activities (e.g. praying, church attendance) and beliefs (e.g. relationship with God, believing in religious scriptures, degree to which religion is important). Furthermore, expressions of religiosity could be personal (e.g. private prayer and perceived importance of religious beliefs in one’s life), public (e.g. church attendance) or both. However, many different indicators have been applied in public health research in order to assess the degree and quality of religiosity of subjects. Some of these reflected only one of the dimensions of religiosity (e.g. attendance), while others were composite and multidimensional. The indicators also differ according to their scales: some of them treat religiosity as a continuous variable and some as an ordinal or dichotomised one (Cheung and Yeung, 2011; McCullough and Willoughby, 2009).

Most studies indicate that the more religious people are, the healthier they behave. In a meta-analysis of 40 studies, Cheung and Yeung

(2011) reported a weak overall effect size for the relationship between less unhealthy and antisocial behaviour with more religiousness among adolescents (overall estimate of the correlation coefficient across studies ( $Z_r$ ): 0.173). Associations with personal measures of religiosity were slightly stronger than with public measures. In regard to delinquency, a meta-analysis by Baier and Wright (2001) showed a moderate effect across 60 studies (both on adolescents and adults), the majority of which concerned an inverse relationship between a measure of religion and some form of unlawful behaviour. The same pattern, i.e. a positive association between religiosity and healthy behaviour among adolescents, has also been found for nutritional behaviours and physical exercise, and this persisted even after adjusting for sociodemographic factors (Wallace and Forman, 1998). However, literature on the association between religiosity and these behaviours is otherwise scarce.

Most of these studies were cross-sectional and therefore the potential for causal inferences based on their findings is limited. However, results of an experiment by Fishbach et al. (2003) indicate that religious concepts are activated to help people exercise self-control in the face of temptation. Conversely, the activation of religious mental content reduces the accessibility of temptation-relevant mental content. Cullough and Willoughby (2009) interpret their findings as suggesting that religiosity promotes self-control, which in turn curbs unhealthy behaviour. In other words, self-control might mediate the relationship between religiosity and HRB.

Most research done on the association between religiosity and HRB among adolescents was carried out in the USA. In other parts of the world, including Central and Eastern Europe, studies on this topic are scarce. More attention should also be paid to potential confounders in order to assess the unique contribution of religiosity and also the function of potential mediators and moderators of the HRB-religiosity relationship.

### **1.3 The role of gender in adolescent health-related behaviour**

In this section we focus on gender as another important determinant of HRB, on gender differences in HRB among adolescents and finally on the moderating effect of gender regarding the selected sociocultural determinants of adolescent HRB that are to be explored in thesis (SEP, DoU and religiosity).

#### **1.3.1 Gender differences in adolescent health-related behaviour**

The terms *sex* and *gender* are often used interchangeably. However, they refer to somewhat different aspects of human biology and behaviour. "The term *sex* refers to biological and physiological characteristics that define males and females. (...) The term *gender* refers to the roles, behaviours,

activities and attributes that individual societies consider appropriate for men and women” (World Health Organisation, 2010).

Gender norms often differentially affect the HRB of men and women. For example, in some cultures, norms about smoking may differ between men and women, with smoking being more common in men than women (ibid). Also, in most industrialised countries boys tend to engage more frequently in some unhealthy behaviours during adolescence than girls (Piko and Fitzpatrick, 2007; Isralowitz and Rawson, 2006; Currie et al., 2012). However, this pattern varies by behaviour, by country (Currie et al., 2012) and over time (Boreham and Shaw, 2001; Kuntsche et al., 2011; Okulicz-Kozaryn and Borucka, 2008).

The 2009/2010 HBSC report (Currie et al., 2012) revealed that in almost all participating countries, 15-year-old girls behaved healthier compared with boys of the same age in terms of fruits consumption, soft drinks consumption and brushing teeth. They also universally fought less and almost universally bullied others less in comparison with boys. In contrast, girls from almost every participating country ate breakfast less often and were less physically active than boys. Regarding excessive television watching, either no gender differences were found or girls behaved more healthily, with no clear geographical pattern. However, gender differences varied widely by country regarding substance use and sexual intercourse. In general, a higher prevalence of these behaviours among boys than among girls was reported mostly in the former communist countries in Eastern, Central and South-Eastern Europe. In Western European countries – mainly in Scandinavia and Great Britain – either no gender differences were generally found or the prevalence rates were higher among girls (Currie et al., 2012).

There is evidence that these apparently culture-based disparities in gender differences concerning HRB may have been even greater in the past decades. A comparison between the 1997/1998 and 2005/2006 HBSC surveys from 23 countries showed that gender differences in drunkenness decreased both in Western and in post-communist Europe. In the West, gender convergence was due more to the decrease in drunkenness among boys than among girls. In Central and Eastern Europe, gender convergence was rather due more to the increase in drunkenness among girls than among boys (Kuntsche et al., 2011). Earlier HBSC reports (King et al., 1996; Currie et al., 2000, 2004, 2008) showed that similar trends may have occurred in several other HRBs as well, particularly in smoking. However, the data that were presented in these reports do not allow for a trend comparison. In England and Scotland, rates of regular smoking were similar among girls and boys in the early 1980s, but in the late 1980s and early 1990s, respectively, prevalence rates among girls surpassed those among boys. These higher prevalence rates in smoking among British girls compared with boys have prevailed up to the present (Boreham and Shaw, 2001; Fuller, 2007; Currie et al., 2012).

### **1.3.2 Gender as moderator**

Gender may also be a moderator of the associations that are assessed in this thesis. A moderator is a third variable that modifies the strength or direction of a causal effect. Moderation effect requires causation, as it is defined as “a causal model that postulates ‘when’ or ‘for whom’ an independent variable most strongly (or weakly) causes a dependent variable” (Wu and Zumbo, 2007). Even when the data does not permit a causal conclusion (e.g., cross-sectional data) analyses of moderation by nature concern directional inferences that are intrinsically causal (Rose et al., 2004; Wu and Zumbo, 2007).

Gender is recognised as a substantial factor related to HRB (World Health Organisation, 2010). However, relatively little is known about the role of gender in regard to the relationships between other sociocultural factors and HRB. In this thesis, we will focus on the moderating effect of gender on the relationship between several sociocultural determinants (SEP, DoU and religiosity) and HRB among adolescents. In current public health research, gender is often implicitly recognised as a substantial moderator in the aforementioned relationships: separate analyses are commonly performed for boys and girls. However, studies specifically assessing this moderating role of gender are scarce. This thesis aims to fill in this gap in the research.

### **1.4 Types and levels of influence on health-related behaviour**

The aforementioned determinants (SEP, DoU and religiosity) are only some of the many determinants which might be associated with adolescent HRB on various levels of influence. In their review of existing theories of HRB among adolescents, Petraitis et al. (1995) integrated the various theories on determinants of HRB into a model with three distinct types of influence (viz., intrapersonal, social/interpersonal and cultural/attitudinal) and three distinct levels of influence (viz., proximal, distal and ultimate). These are combined into a 3 x 3 matrix, depicted in Table 1.1. Based on the model of Petraitis et al. (1995), Veselska (2010) distinguished the following types of influence: genetics (e.g. a family history of addiction), intrapersonal factors (e.g. low self-esteem), interpersonal factors (e.g. family and/or peer support) and sociocultural factors (e.g. SEP).

**Table 1.1** A matrix of types and levels of influence on HRB, including examples of constructs (Petraitis et al., 1995 – modified).

	Type of influence		
Level of Influence	Intrapersonal	Social/interpersonal	Cultural/attitudinal
Proximal	determination to certain HRB; self-efficacy; refusal skills; refusal self-efficacy	prevalence estimates of certain HRB among other people; motivation to comply with others; beliefs that important others encourage certain HRB	expected costs and benefits of certain HRB; evaluation of costs and benefits of certain HRB; attitudes towards HRB by others; attitudes towards HRB by self
Distal	low self-esteem; temporary anxiety, stress, or depressed mood; poor coping skills; inadequate social skills; weak academic skills	weak attachment to and weak desire to please family members; strong attachment to and strong desire to please peers; greater influence from peers than parents; HRB-specific attitudes and behaviours of role models	weak commitment to conventional values and school; social alienation and criticism; weak desire for success and achievement, rebelliousness; desire for independence from parents; deviance; religiosity
Ultimate	impaired cognitive functions; genetic susceptibility; temperamental personalities; impulsivity; aggressiveness; emotional instability; extraversion; sociability; risk-taking; thrill-seeking; external locus of control	infrequent opportunities for rewards from family members; lack of parental warmth, support or supervision; negative evaluations from parents; home strain; parental divorce or separation; unconventional values of parents; unconventional values among peers	local crime and employment rates; inadequate schools; poor career and academic options; negative evaluations from teachers; media depictions of HRB; availability of substances; weak public policies; SEP; DoU

Petraitis et al. (1995) point out that theoretical attention has not been evenly distributed across all levels of influence and all types of influence, as depicted in Table 1.1. Less attention has been given to cultural influences, particularly at the distal and ultimate levels. Moreover, theoretical attention is rather concentrated on the proximal level of influence. Proximal influences, such as HRB-specific intentions and decisions or self-efficacy are often highly predictive. However, they explain the long-term roots of HRB in only a very limited way. Moreover, the interaction of various constructs or the role of moderator variables has received little attention, especially in the case of gender. Additionally, the reviewed models say little about whether different HRBs have similar or different aetiologies and patterns of moderation (Petraitis et al., 1995).

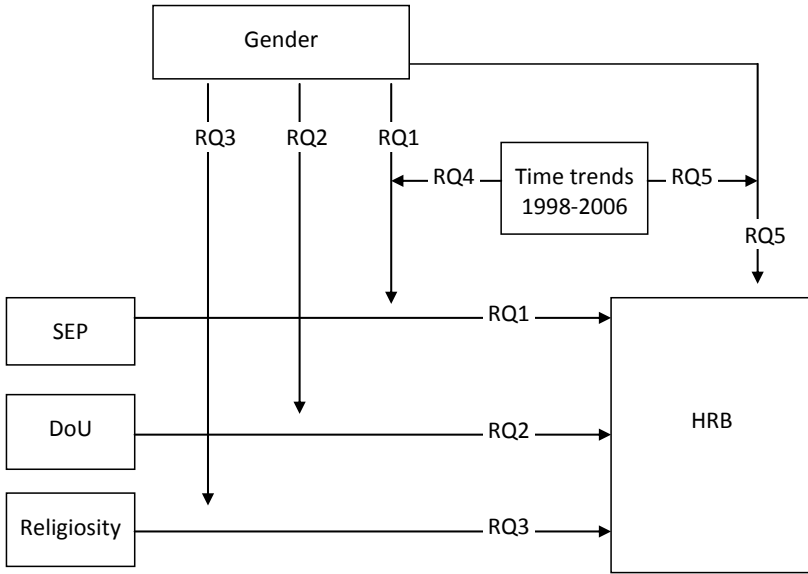
Therefore, the aim of this thesis is to contribute to a better understanding of the relationship between various HRBs among adolescents and selected sociocultural factors on the ultimate (SEP, DoU) and distal (religiosity) level. We also aim to assess the moderating effect of gender in these relationships. Furthermore, since contemporary societies are dynamic and their progress may have a certain impact on the mentioned relationships and on the role of gender, we aim at the shift in the gender differences regarding adolescents' HRB and the shift in the moderating effect of gender in the shift of the SE gradient over the last decade. Thus, besides the immediate potential use of our findings by policymakers, our empirical research may also contribute to further improvement of the theoretical framework regarding HRB among adolescents.

## **1.5 Aim of the study and research questions**

The aim of this thesis is to examine the moderating effect of gender on the relationships between a number of social determinants (SEP measured by parental education, DoU, and religiosity) and HRB among adolescents (Figure 1.1), including gender differences, as well as on shifts in one of the relationships over the past decade.



**Figure 1.1** Model of the relationships examined within this thesis.



Five main research questions were formulated based on the previous aim.

**Research question 1:**

Is SEP related to HRB among adolescents and does gender moderate the relationship between SEP and HRB among adolescents? (Chapter 3)

**Research question 2:**

Is DoU related to HRB among adolescents and does gender moderate the relationship between DoU and HRB among adolescents? (Chapter 4)

**Research question 3:**

Is religiosity related to HRB among adolescents and does gender moderate the relationship between religiosity and HRB among adolescents? (Chapter 5)

**Research question 4:**

Have shifts taken place in the relationship between SEP and HRB among Slovak adolescents between 1998 and 2006 and did the time shifts in the relationship between SEP and HRB differ by gender? (Chapter 6)

**Research question 5:**

Have the gender differences in HRB changed between 1998 and 2006 among Slovak adolescents and did the shift in gender differences in HRB differ by SEP? (Chapter 7)

**1.6 Structure of the thesis**

This thesis consists of eight chapters. Chapter 1 provides general information about the associations between the key variables explored in this thesis: adolescent HRB (smoking, drunkenness, cannabis use and others), selected social determinants (SEP, DoU and religiosity), time trends regarding gender differences and SE differences in adolescent HRB and gender.

Chapter 2 contains a description of the three research samples used in this thesis. It also provides information on measures and statistical analyses used.

Chapter 3 provides information on the association between SEP and a broad range of behaviours among adolescents, for boys and girls separately. Furthermore, gender differences in this association are explored.

Chapter 4 provides information on the association between DoU and adolescent smoking, drunkenness and cannabis use, for boys and girls separately. Furthermore, gender differences in this association are explored.

Chapter 5 provides information on the association between religiosity and a broad range of behaviours among adolescents, both for the whole sample and for boys and girls separately. Furthermore, gender differences in this association are explored.

Chapter 6 provides information on whether shifts took place in the association between SEP and smoking, use of alcohol and physical inactivity between 1998 and 2006 among Slovak adolescents.

Chapter 7 provides information on the magnitude of gender differences in smoking, use of alcohol and physical inactivity among Slovak adolescents and whether shifts took place in these gender differences between 1998 and 2006. These gender differences are also assessed in three separate groups of adolescents, according to their SEP.

Chapter 8 summarises and discusses the main findings of this thesis. It also addresses the strengths and limitations of the study as well as its implications for further research and public health practice.



# Data sources and design of the study

This chapter provides an overview of the data sources, measures and statistical analysis used in this thesis.

## 2.1 Data sources

This thesis is based on three different samples. Table 2.1 provides a brief description of the samples. The samples are described below in chronological order based on the year of data collection.

*Sample 1* was used in Chapters 6 and 7. In September and October 1998, data were collected in Kosice (235,000 inhabitants, Eastern part of Slovakia) among first year students from 100 classrooms at 31 secondary schools. The sample was stratified by type of school to maintain the share of the five educational tracks in the regular Slovak school system. The distribution of students in the first grade of post-elementary school in Slovakia in 1998 was obtained from the Slovak Institute of Information and Prognosis of Education (2011). These schools were contacted and asked to cooperate, and about 20% of them did not want to participate in the data collection. In the schools which did agree, data were collected in all available classes. A total of 2616 questionnaires were returned (mean age: 14.9 years; SD: 0.6 years; 52.4% boys; response rate 96.3%). About 60% of the sample was made up of inhabitants of Košice–town. Another 30% came from smaller towns and villages in the wider district of Košice. The remaining 10% came from other districts, mostly in Eastern Slovakia.

*Sample 2* was used in Chapters 3, 4, 6 and 7. Data were collected between October and December 2006 from the major Slovak cities of Bratislava (450,000 inhabitants, Western Slovakia), Košice (240,000 inhabitants, Eastern Slovakia) and Žilina (85,000 inhabitants, Central Slovakia), and from several other towns and villages with a population less than 40,000, mostly located in Eastern Slovakia. Due to changes in the educational system (the introduction of a 9-year elementary education instead of an 8-year one), 8th and 9th year students were approached at randomly chosen schools. The sample consisted of 3725 adolescents. The Slovak Institute of Information and Prognosis of Education provided a list of all elementary schools in these municipalities, and individual schools were randomly selected from this list until a sufficient number of participants were available. The schools were contacted and asked to

participate. Only one declined to do so (i.e.: 2.1%). Parents were contacted by school administrators before the study and were given the opportunity to opt out if they disagreed with their child's participation. Schools that had agreed to participate were visited, and data were collected from among all students in the 8th and 9th grades, unless their parents had opted out. We excluded 178 cases from special schools attended by pupils with special educational needs. Ultimately, data from a sample consisting of 3547 adolescents (mean age 14.3 years; SD 0.6 years; 49.4% boys; response rate 93.5%) from 45 ordinary elementary schools were analysed.

In Chapters 6 and 7, only a part of Sample 2 was used. Data came from the same 2006 data collection as described in the previous paragraph. However, in order to provide a valid comparison with Sample 1, only participants from 15 schools in Košice–town were included in these chapters. In these 15 schools, 1081 questionnaires were returned in which gender was specified (mean age: 14.3 years; SD: 0.6; 47.0% boys; response rate: 93.0%).

*Sample 3* was used in Chapter 5. Data were collected in May and June 2010 in Slovakia as a part of the Health Behaviour in School-aged Children research project. Based on a list of schools from the Slovak Institute of Information and Prognosis of Education, 134 schools were chosen randomly after the selection was stratified according to region, type of school (elementary vs. grammar) and size of the schools in order to create a nationally representative sample. Of the 108 schools contacted, 106 took part in the survey, representing a 98.1% school response rate. One class per grade from each school was chosen randomly and sampled. The original sample consisted of 8491 adolescents from the 5th to the 9th grades of elementary schools and corresponding grades from grammar schools across Slovakia (response rate 79.5%). Our study was restricted to adolescents from the 8th and 9th grades. Therefore, analyses were performed on a sample consisting of 3674 adolescents (mean age  $\pm$  SD=14.98 $\pm$ 0.66 years; 48.7% boys). Questions on marijuana use and sexual intercourse were included only in the 9th grade questionnaires. Therefore, in the case of these variables, analyses were performed on a smaller sample (1784 adolescents; mean age  $\pm$  SD=15.48 $\pm$ 0.45 years; 48.0% boys).

In all three data collections (in 1998, 2006 and 2010), participation in the study was voluntary and anonymous, and respondents completed the questionnaire at school, in their classrooms and under the guidance of field workers in the absence of the teachers.

**Table 2.1** Basic characteristics of research samples.

	Sample 1	Sample 2: whole sample	Sample 2: Košice-town schools only	Sample 3
Chapter(s)	6, 7	3, 4	6, 7	5
Year of data collection	1998	2006	2006	2010
Origin of the data (area)	schools in Košice-town	schools across Slovakia	schools in Košice-town	schools across Slovakia
National representativeness	no	no	no	yes
Types of schools	all types of secondary schools	ordinary elementary schools	ordinary elementary schools	grammar and elementary schools (including church schools and Hungarian language schools)
Sample size	2616	3547	1081	3674
Males (%)	52.4	49.4	47.0	48.7
Students from Košice-town (%)	60.3	29.9	98.1	(information not available)
Mean age	14.9	14.3	14.3	15.0
SD of age	0.6	0.6	0.6	0.7
Response rate (%)	96.3	93.5	93.0	79.5

## 2.2 Measures

In this section an overview of the variables and measures used in this thesis is presented. The dependent variables always concerned HRB. These were substance use (smoking, use of alcohol, drunkenness, cannabis use), nutritional behaviour (breakfast, fruits consumption, vegetables consumption, sweets consumption, soft drinks consumption), physical inactivity, screen-based activities, insufficient tooth brushing, sexual intercourse, truancy, fighting and bullying others. However, the occurrence of the particular HRBs that are explored varies by chapter. The independent variables used in this thesis concerned gender, level of parental education as an indicator of SEP, degree of urbanisation (DoU) as an indicator of urbanisation and religious attendance and religious salience as indicators of religiosity. Control variables used for standardisation of the analyses concerned age, level of parental education, family affluence (measured by FAS II), parental divorce and language spoken at home as a proxy measure of ethnicity.

Brief information about the origin of the measures and a short description is provided in Table 2.2.

**Table 2.2** Brief overview of the variables and measures used in this study.

Measure	Source	Role in analyses	Chapters	Short description
Smoking	Derived from King et al. (1996)	Dependent	3,4,5,6,7	Indicator of HRB
Use of alcohol	Derived from King et al. (1996)	Dependent	3,6,7	Indicator of HRB
Drunkness	Derived from Currie et al. (2004)	Dependent	3,4,5	Indicator of HRB
Cannabis use	Derived from Currie et al. (2004)	Dependent	3,4,5	Indicator of HRB
Physical inactivity	Derived from King et al. (1996)	Dependent	3,5,6,7	Indicator of HRB
No breakfast	Derived from Currie et al. (2004)	Dependent	3,5	Indicator of HRB
No daily fruits	Currie et al. (2004)	Dependent	3,5	Indicator of HRB
No daily vegetables	Currie et al. (2004)	Dependent	3,5	Indicator of HRB
Daily sweets	Derived from Currie et al. (2004)	Dependent	3,5	Indicator of HRB
Daily soft drinks	Currie et al. (2004)	Dependent	5	Indicator of HRB
Screen-based activities	Derived from Currie et al. (2004)	Dependent	5	Indicator of HRB (sedentary behaviour)
Insufficient tooth brushing	Currie et al. (2004)	Dependent	5	Indicator of HRB
Sexual intercourse	Currie et al. (2004)	Dependent	5	Indicator of HRB
Truancy		Dependent	5	Indicator of HRB
Fighting	Currie et al. (2004)	Dependent	5	Indicator of HRB
Bullying others	Derived from Currie et al. (2004)	Dependent	5	Indicator of HRB
Gender		Independent	3,4,5,6,7	Indicator of HRB
Parental education		Independent	3,5,6,7	Indicator of HRB
Degree of urbanisation		(Ch.3,6,7), control (Ch.5) Independent	4	Measure of degree of urbanisation according to number of inhabitants of the school residence
Religious attendance		Independent	5	Measure of religiosity (frequency of attending church or religious sessions)
Religious salience		Independent	5	Measure of religiosity (importance of religious beliefs in one's life)
Age		Control	3,4,5,6,7	
FAS II	Currie et al. (2004)	Control	5	Indicator of SEP
Parental divorce		Control	5	
Language spoken at home		Control	5	Proxy measure of ethnicity

## 2.3 Statistical analysis

In the various chapters of this thesis, similar statistical methods were used to answer the research questions. First, we calculated frequencies and simple prevalence rates for the HRBs concerned, usually by categories of the explored sociocultural determinants or by cohort, overall and also split by gender. Next, age-adjusted odds ratios for the categories of the sociocultural determinants were computed for each gender separately (Ch 3, 4, 5 and 6). In Chapter 7, male/female age-adjusted odds ratios were computed. In Chapters 3, 4 and 5, the effects of gender and the determinants and their interaction on HRB for different levels of the determinants were analysed using a logistic regression model, also adjusted for age. In Chapter 6, the additional age-adjusted logistic regression model concerned the effects of SEP and the cohort and their interaction on HRB for each gender separately. In Chapter 7, the additional age-adjusted logistic regression model concerned the effects of SEP and the cohort and their interaction on HRB, both overall and for each SE group separately.

In Chapter 5, we repeated the analyses while adjusting not only for age, but also for parental divorce, parental education, family affluence, degree of urbanisation and ethnicity. This was performed in order to control for the effects of potential confounders.

In Chapter 3, indexes of dissimilarity for each kind of HRB were also calculated among boys and girls. The index of dissimilarity represents the percentage of all cases (individuals) that has to be redistributed to obtain the same prevalence rate in all SE groups (Kunst and Mackenbach 1995).

Because data was collected in entire school classes, a clustering of the students' outcomes per class could affect our findings. To account for such clustering, we repeated the logistic regression analyses on the 2006 data using MLWiN 2.02 (<http://www.cmm.bristol.ac.uk/MLwiN/>) in Chapters 3 and 7.

A power analysis was not performed *ex ante*. Post-hoc power analyses were performed on gender differences for prevalence rates of smoking and on SE gradients per gender in Chapters 3 and 7, using PASS (Nam 1987).

Apart from the multilevel analyses, power analyses and calculating the indexes of dissimilarity, all other analyses were performed using the statistical software package SPSS, versions 14.0 and 16.0. Further details of the analyses can be found in the "Statistical analyses" section of the separate chapters.





# Socioeconomic differences in adolescent health-related behaviour differ by gender

Lukas Pitel, Andrea Madarasová Gecková,  
Sijmen A. Reijneveld, Jitse P. van Dijk

*Published: Journal of Epidemiology, 2013, 23:211-18.*

## Abstract

**Background:** Many studies of adolescent health-related behaviours have assessed the effects of gender and parental socioeconomic position (SEP) but not their mutual modification. We investigated socioeconomic differences in health-related behaviours among Slovak adolescents and the potential modification of those differences by gender.

**Methods:** Data were collected in 2006 (N=3547; 49.4% boys; mean [SD] age, 14.3 [0.6] years; response rate, 93.5%). The sample comprised students in the eighth and ninth grades of randomly selected elementary schools in Slovakia. Gender-specific prevalence rates for nine types of health-related behaviours, including nutritional behaviour, physical activity and substance use, were calculated for three socioeconomic groups, which were defined by the highest educational level attained by both parents. Gender differences in socioeconomic gradients for health-related behaviours were tested.

**Results:** Socioeconomic differences were found in nutritional behaviour, physical activity, and smoking. Adolescents with lower parental education behaved less healthily. The largest relative socioeconomic difference was no daily vegetable consumption among girls (90.3% of those with high SEP vs 95.2% of those with middle SEP; odds ratio, 2.33). Regarding no daily fruit consumption, differences among girls were 1.51 times and 1.92 times as large as those among boys for children with medium and low SEP, respectively, as compared with those with high SEP.

**Conclusions:** Socioeconomic differences in health-related behaviour were small, especially for nutritional behaviour and physical activity. Interventions that aim to improve health-related behaviours among

adolescents with lower SEP should focus on these two behaviours, particularly on healthy nutrition in girls with low SEP.

## Introduction

*Health-related* behaviour (HRB) has traditionally been defined as any kind of behaviour undertaken by individuals that potentially influences their health (Kasl and Cobb 1966). Because adolescence is a crucial period of development with respect to future HRB habits (Williams et al. 2002), it has implications for health and illness later in life. In childhood, HRB is strongly subject to parental influences: parents set the standards for the behaviours of their children and control their compliance. With the beginning of adolescence, young people increasingly decide their own behaviour and spend progressively more time with their peers, which may partially explain why adolescence is the key period for initiation of substance use (Richter 2009).

However, particular behaviours may be initiated and consolidated at different stages of childhood and adolescence. Dietary and exercise habits, although established more permanently during adolescence, often originate in childhood (Cohen et al. 1990). Nutritional behaviour seems to be influenced more by parents than by peers (Johansen et al. 2006) and is partially associated with parental socioeconomic position (SEP) (Tuinstra et al. 1998; Xie et al. 2003; Wardle et al. 2003). Substance use is mostly initiated during adolescence (Chassin et al. 1996; Chen and Kandel 1995) and seems to be influenced to a greater degree by friends and classmates (Johansen et al. 2006; Madarasová Gecková et al. 2005). This may explain why some studies have found socioeconomic (SE) differences in adolescent HRB, while others have not (Tuinstra et al. 1998; Hanson and Chen 2007; Bergman and Scott 2001). When SE differences were found, they were less pronounced than in childhood or adulthood (Tuinstra et al. 1998; Geckova et al. 2002).

Another important predictor of adolescent and adult health behaviour is gender (Raithel 2004). In general, boys cope with developmental tasks and transitions in a more externalizing way, eg, by physical activity but also through substance use. Girls tend to cope with these tasks in a more internalizing way, eg, by problematic nutritional behaviours (Raithel 2004). Therefore their substance use prevalence is usually lower than that of boys (Piko and Fitzpatrick 2007; Isralowitz and Rawson 2006). However, in many countries there has been a trend in recent decades toward equalisation or even reversal of these gender differences (Pitel et al. 2010; King 1996; Currie et al. 2000, 2004, 2008). Richter (2009) hypothesizes that this gender convergence in substance use concerns less risky behavioural patterns only. As for nutritional behaviour, girls usually consume more

fruit and fewer soft drinks (Currie et al. 2008), but also more frequently skip meals (Currie et al. 2008) and are more often dissatisfied with their bodies, than boys (Sujoldzić and De Lucia 2007).

Due to differences in socialisation patterns, it can be assumed that there are gender differences in the association between adolescent HRB and parental characteristics such as parental SEP. Most studies in this field now assess the effects of gender and parental SEP but not their joint effects (Johansen et al. 2006; Piko and Fitzpatrick 2007). Few studies have assessed the SE gradient in HRB separately in boys and girls. Furthermore, only a small number of studies have examined a range of health behaviours instead of focusing on a single behaviour (Richter 2009).

There are even fewer studies from the former communist countries in Central and Eastern Europe on the health behaviours of younger age groups and SE differences in these behaviours. The Health Behaviour in School-aged Children (HBSC) report, published in 2008 (Currie et al. 2008), revealed that SE gradient, measured by Family Affluence Scale, in Central and Eastern Europe countries was similar to that in the rest of Europe for most health behaviours. The exception was breakfast consumption, which - unlike in the rest of Europe - had mostly no traditional gradient in Central and Eastern Europe. This was true for both genders. However, affluence is only one possible measure of SEP (along with income, occupation, and education), and each of these indicators may be associated with adolescent HRB in a different way.

We assessed SE differences, as measured by parental education, in HRB among Slovak adolescents in relation to nutritional behaviour, physical inactivity, smoking, frequent alcohol consumption, drunkenness, and cannabis use, as well as the potential modification of these differences by gender.

## **Methods**

### **Subjects**

The sample consisted of 3725 adolescents in the eighth and ninth grades of ordinary elementary schools across Slovakia. Data were collected from October through December 2006 in the major cities of Bratislava (450,000 inhabitants, Western Slovakia), Kosice (240,000 inhabitants, Eastern Slovakia), and Zilina (85,000 inhabitants, Central Slovakia), and from several other towns and villages, mostly in Eastern Slovakia, with a population less than 40,000. The Slovak Institute of Information and Prognosis of Education provided us with a list of all elementary schools in these municipalities. From this list, we randomly selected individual schools until we had a sufficient number of participants. The schools were contacted and asked to participate. Only one declined to

do so. Parents were contacted by school administrators before the study and were given the opportunity to opt out if they disagreed with their child's participation. Schools that had agreed to participate were visited, and data were collected from among all students in the eighth and ninth grades, unless their parents had requested to opt out. We excluded 178 cases from special schools attended by students with special educational needs. Ultimately, data from a sample consisting of 3547 adolescents (mean [SD] age, 14.3 [0.6] years; 49.4% boys; response rate, 93.5%) were analysed. The primary reasons for nonresponse were illness and other types of absence. The study was approved by the Ethics Committee of the Faculty of Science at PJ Safarik University in Kosice.

### **Instruments**

Sociodemographic measures included gender, age, and highest educational level of the father and mother, categorised as three SEP levels: low (elementary school and apprenticeship), middle (completion of secondary school, including graduation examinations), and high (university education). The SEP level of the adolescent was defined as the highest educational level attained by both parents, as in previous studies (Geckova et al. 2002; Salonna et al. 2008; Kolarcik et al. 2009; Veselska et al. 2011; Tomcikova et al. 2011).

Health-related behaviour concerned frequency of having breakfast, consumption of fruit, vegetables, and sweets, physical activity, smoking, and frequency of alcohol consumption, drunkenness, and cannabis use. The wording of the questions was derived from the questions used in the HBSC studies (King 1996), and the answers were dichotomized.

Having breakfast was assessed by the question: "How many times a week do you have breakfast?" Respondents could choose from the following options: not even once, 1 to 2 times, 3 to 4 times, 5 to 6 times, and every day. All those who selected any option other than "every day" were labeled as behaving unhealthily.

Consumption of fruit was measured by the question: "How many times a week do you eat fresh fruit?" Respondents could choose from the following options: not even once, 1 to 2 times, 3 to 4 times, 5 to 6 times, every day. All those who selected any option other than "every day" were labeled as behaving unhealthily. Similar wording, the same options, and the same cut-off point were used to assess consumption of vegetables.

For consumption of sweets (without further specification), similar wording and the same options were used. All those who reported daily consumption of sweets were considered to be behaving unhealthily.

Physical inactivity was measured by the question: "How many days per week are you usually physically active for more than 60 minutes?" Respondents could choose the number of days, from 0 to 7. Those who

were physically active fewer than 5 days per week were considered to be behaving unhealthily.

Cigarette smoking was measured by the question: "Have you ever smoked a cigarette (even just once)?" Respondents could choose from the following options: "I do not smoke", "I have already tried smoking", "I used to smoke but I have stopped completely", "I smoke occasionally but not daily", and "I smoke daily". Unhealthy behaviour was defined as smoking daily or occasionally.

Drunkenness was measured by the question: "Have you been drunk during the past 4 weeks?" In everyday Slovak language, the word "drunk" refers only to drunkenness induced by a high dose of alcohol. Respondents could choose from the following options: not even once, 1 to 2 times, or 3 or more times. All subjects who reported having been drunk at least once in the previous 4 weeks were labeled as behaving unhealthily.

Alcohol consumption was measured by the question: "How many times during the past 4 weeks have you drunk alcohol ( $\geq 1$  glass of beer, brandy, or wine)?" Respondents could choose from the following options: not even once, 1 to 2 times, or 3 or more times. All subjects who reported having drunk alcohol 3 or more times during the previous 4 weeks were labeled as behaving unhealthily.

Cannabis use was measured by the question: "Have you ever smoked hashish or marijuana?" Respondents could choose from the following options: "No, never", "I have tried it already", "I smoke from time to time but not daily", or "I smoke daily". All those who reported having smoked hashish or marijuana daily or from time to time were labeled as behaving unhealthily.

The dichotomisations were established in accordance with previous research, so as to differentiate behaviours with potential health consequences, discriminate the population at risk in a suitable way, and enable comparisons with previous, similar studies (Levin et al. 2012; Deschamps et al. 2010; Ortiz-Hernández et al. 2008; Charilaou et al. 2009).

## **Procedure**

The questionnaire was completed in respondents' classrooms, in the absence of teachers, under the guidance of field workers and on a voluntary and anonymous basis. The study was approved by the local ethics committee.

## Data analysis

Prevalence rates for the 9 HRB categories both overall and for each SE group were computed and analysed separately by gender. Next, age-adjusted odds ratios (ORs) and 95% CIs for the medium and low SE groups, as compared with the high SE group, were computed for both genders. Additionally, the interactions of the effects of gender and SEP on all separate HRBs for the 3 SEP levels were analysed using a logistic regression model, also adjusted for age. Finally, indices of dissimilarity (IDs) for each type of HRB were calculated for boys and girls. The index of dissimilarity represents the percentage of all cases (individuals) that must be redistributed to obtain the same prevalence rate in all SE groups (Kunst and Mackenbach 1995). The statistical analyses were performed using SPSS 16.0.

To account for clustering of student outcomes per class, the logistic regression analyses were repeated on 2006 data using MLwiN 2.02 (<http://www.cmm.bristol.ac.uk/MLwiN/>).

## Results

The sample comprised 1705 boys and 1749 girls: 1342 (39.8%) had parents with a university degree, 1650 (48.9%) had parents who were high school graduates, and 379 (11.2%) had parents with a lower educational degree.

A power analysis was not performed *ex ante*. Post-hoc power analyses were performed on gender differences in prevalence rates and on SE gradients per gender (Nam 1987), both at  $p$  less than 0.05, using PASS. Regarding gender differences, the power to detect differences in prevalence rates of smoking as found (ie, 2.7%) was about 45%. The power was much higher for HRBs with larger differences, like alcohol use, cannabis use, physical activity, and daily breakfast. Regarding socioeconomic gradients in smoking, the power was 58% for girls and about 28% for boys. The power to detect gradients varied according to the strength of the gradient and was lowest for alcohol use in girls (4%) and highest for no daily fruit consumption in girls (99.8%).

Multilevel analyses showed very limited clustering by class and yielded identical or nearly identical ORs and 95% CIs (Pitel et al. 2010; Tomcikova et al. 2009), eg, the ORs (95% CI) for males versus females regarding alcohol use, smoking, and lack of physical activity were 1.26 (0.89-1.80), 0.80 (0.59-1.08), and 0.58 (0.43-0.78), respectively in the multilevel analyses, as compared with 1.27 (0.89-1.80), 0.79 (0.59-1.06), and 0.58 (0.44-0.78), respectively, in ordinary logistic regression. Therefore, all analyses were performed using ordinary logistic regressions with SPSS version 16.0.

The results of these analyses are presented in Tables 3.1, 3.2, and 3.3. The prevalence of unhealthy behaviours varied widely: from 3.4% for cannabis use (among girls) to 93.2% for no daily vegetables (among girls). Prevalence rates for frequent alcohol consumption and daily and occasional cannabis use were significantly higher among boys than among girls. The prevalence rates for skipping breakfast, physical inactivity, and smoking were significantly higher among girls than among boys (Table 3.1).

SE differences were found in nutritional habits (skipping breakfast, daily consumption of fruit [among girls], daily consumption of vegetables [among girls], daily consumption of sweets [among girls]), physical inactivity, and smoking (among boys), but not in drunkenness, alcohol consumption, or cannabis use (Table 3.2). For skipping breakfast and physical inactivity, the SE gradient was similar for boys and girls (Table 3.3). As compared with the highest SE group, the lowest SE group had significantly higher proportions of breakfast-skippers and physically inactive adolescents, with ORs of approximately 1.5 and 1.6, respectively. However, the SE gradients of some other nutritional behaviours differed significantly ( $p < 0.05$ ) by gender. While no SE differences were found in daily fruit or vegetable consumption among boys, girls from lower SE groups tended to behave less healthily (Table 2). For daily fruit consumption, a gender effect on SE differences was found for both the middle (OR, 1.51; CI, 1.09-2.10) and lowest SE groups (OR, 1.92; CI, 1.09-3.38), while for daily vegetable consumption there was a gender effect only for the middle group (OR, 1.85; CI, 1.01-3.37; Table 3.3). Boys from the lowest SE group had a significantly higher odds of eating sweets daily, as compared with their high SE group counterparts (OR 1.58). The only significant difference in the prevalence rates for substance use was for smoking among girls from the middle SE group who, after age adjustment, had a 1.38 times higher odds of smoking in comparison with their peers from the highest SE group. In all other groups, no significant SE differences in prevalence rates of substance use were found (Table 3.2). The gender effect on SE differences was not significant for any type of substance use (Table 3.3).

IDs were generally small, and the highest indices were for cannabis use among boys (6.48%) and smoking among girls (5.04%). In all other groups, the indices were lower than 4% (Table 3.2).



**Table 3.1** Overall prevalence rates for health-related behaviours by gender, and age-adjusted odds ratios (ORs) and 95% CIs for males versus females.

Behaviour	Boys		Girls		OR (95% CI)	p
	n	in %	n	in %		
No daily breakfast	678/1514	44.8	923/1605	57.5	0.59 (0.50-0.69)	<0.001
No daily fruit	1044/1514	69.0	1115/1603	69.6	1.04 (0.87-1.24)	0.703
No daily vegetables	1381/1495	92.4	1480/1588	93.2	1.19 (0.87-1.64)	0.282
Daily sweets	578/1510	38.3	633/1591	39.8	0.88 (0.74-1.03)	0.105
Physical activity <5 times/week	952/1575	60.4	1295/1642	78.9	0.41 (0.34-0.48)	<0.001
Smoking (daily or occasionally)	337/1619	20.8	394/1679	23.5	0.73 (0.58-0.91)	0.005
Drunk at least once in last 4 weeks	310/1584	19.6	295/1662	17.7	0.90 (0.71-1.16)	0.417
Alcohol ≥3 times in last 4 weeks	281/1608	17.5	207/1669	12.4	1.56 (1.21-2.00)	0.001
Cannabis (daily or occasionally)	119/1605	7.4	57/1669	3.4	2.77 (1.86-4.12)	<0.001

**Table 3.2** Prevalence rates for nutritional behaviour, physical inactivity, and several types of substance use; age-adjusted odds ratios (ORs) and 95% CIs by socioeconomic position (SEP); and indices of dissimilarity, expressed as percentages (ID).

	Boys				Girls				p
	n	in %	ID (%)	OR (95% CI)	n	in %	ID (%)	OR (95% CI)	
No daily breakfast									
High SEP	284/675	42.1	2.70	1	305/578	52.8	2.97	1	0.038
Medium SEP	325/707	46.0		1.16 (0.94-1.45)	485/821	59.1		1.22 (0.98-1.52)	
Low SEP	69/132	52.3		1.51 (1.02-2.22)	133/206	64.6		1.50 (1.07-2.09)	
No daily fruit									
High SEP	459/672	68.3	0.42	1	361/578	62.5	3.68	1	<0.001
Medium SEP	491/710	69.2		1.02 (0.80-1.28)	591/819	72.2		1.53 (1.21-1.93)	
Low SEP	94/132	71.2		1.10 (0.72-1.68)	163/206	79.1		2.05 (1.40-3.00)	
No daily vegetables									
High SEP	612/670	91.3	0.50	1	519/575	90.3	1.14	1	0.001
Medium SEP	644/693	92.9		1.25 (0.83-1.89)	771/810	95.2		2.33 (1.51-3.60)	
Low SEP	125/132	94.7		1.76 (0.74-4.19)	190/203	93.6		1.63 (0.87-3.06)	
Daily sweets									
High SEP	248/673	36.8	1.98	1	223/577	38.6	1.04	1	0.802
Medium SEP	268/705	38.0		1.07 (0.86-1.35)	327/812	40.3		1.08 (0.86-1.34)	
Low SEP	62/132	47.0		1.58 (1.07-2.33)	83/202	41.1		1.07 (0.77-1.49)	
Physical activity									
<5 times/week									
High SEP	407/701	58.1	1.76	1	441/583	75.6	1.45	1	0.045
Medium SEP	453/738	61.4		1.19 (0.96-1.48)	666/835	79.8		1.25 (0.97-1.62)	
Low SEP	92/136	67.6		1.60 (1.06-2.40)	188/224	83.9		1.62 (1.07-2.45)	
Smoking (daily or occasionally)									
High SEP	138/718	19.2	3.40	1	120/596	20.1	5.04	1	0.054
Medium SEP	166/758	21.9		1.17 (0.90-1.52)	215/855	25.1		1.38 (1.06-1.78)	
Low SEP	33/143	23.1		1.09 (0.69-1.72)	59/228	25.9		1.27 (0.88-1.84)	
Drunk at least once in last 4 weeks									
High SEP	128/703	18.2	3.09	1	97/592	16.4	2.74	1	0.657
Medium SEP	150/745	20.1		1.18 (0.90-1.55)	154/844	18.2		1.14 (0.86-1.52)	
Low SEP	32/136	23.5		1.20 (0.75-1.91)	44/226	19.5		1.13 (0.75-1.69)	
Alcohol ≥3 times in last 4 weeks									
High SEP	116/713	16.3	3.06	1	73/591	12.4	0.64	1	0.798
Medium SEP	134/752	17.8		1.17 (0.88-1.55)	107/852	12.6		0.98 (0.71-1.35)	
Low SEP	31/143	21.7		1.34 (0.84-2.13)	21/226	11.9		0.85 (0.53-1.38)	
Cannabis (daily or occasionally)									
High SEP	45/711	6.3	6.48	1	21/593	3.5	3.13	1	0.464
Medium SEP	62/751	8.3		1.34 (0.89-2.01)	30/846	3.5		1.02 (0.58-1.83)	
Low SEP	12/143	8.5		1.18 (0.59-2.24)	6/226	2.7		0.56 (0.21-1.53)	

**Table 3.3** Gender modification of associations of socioeconomic position (SEP) with health-related behaviours, adjusted for age: odds ratios (95% CI).

	No daily breakfast	No daily fruit	No daily vegetables	Daily sweets	Physical activity <5 times/wk
Model with main effects only					
Age	1.14 (1.01-1.28)*	1.26 (1.11-1.44)*	1.00 (0.80-1.26)	1.06 (0.94-1.20)	1.10 (0.97-1.25)
Gender	1	1	1	1	1
Male	1.66 (1.43-1.92)***	1.05 (0.90-1.23)	1.04 (0.78-1.38)	1.07 (0.03-1.25)	2.35 (2.00-2.77)***
Female	1**	1**	1**	1	1**
SEP					
High	1.20 (1.02-1.39)*	1.25 (1.06-1.47)**	1.69 (1.25-2.29)**	1.08 (0.92-1.26)	1.22 (1.03-1.44)*
Medium	1.50 (1.16-1.93)**	1.55 (1.17-2.05)**	1.60 (0.96-2.65)	1.25 (0.97-1.61)	1.61 (1.20-2.15)**
Low					
Model with main effects and the interaction terms					
Age	1.13 (1.01-1.28)*	1.26 (1.11-1.43)***	1.00 (0.79-1.25)	1.06 (0.94-1.20)	1.10 (0.97-1.25)
Gender	1	1	1	1	1
Male	1.61 (1.28-2.03)***	0.81 (0.64-1.03)	0.82 (0.55-1.22)	1.12 (0.88-1.41)	2.29 (1.79-2.93)***
Female	1	1	1	1	1
SEP					
High	1.16 (0.93-1.45)	1.01 (0.80-1.28)	1.25 (0.83-1.90)	1.07 (0.86-1.34)	1.19 (0.96-1.48)
Medium	1.49 (1.01-2.19)*	1.08 (0.71-1.66)	1.80 (0.75-4.28)	1.57 (1.07-2.32)*	1.59 (1.06-2.40)*
Low					
Female (vs male) gender by SEP					
High	1	1*	1	1	1
Medium	1.06 (0.77-1.44)	1.51 (1.09-2.10)*	1.85 (1.01-3.37)*	1.01 (0.73-1.38)	1.06 (0.75-1.48)
Low	1.02 (0.61-1.69)	1.92 (1.09-3.38)*	0.88 (0.30-2.58)	0.68 (0.41-1.14)	1.03 (0.58-1.83)

**Table 3.3** (continued)

	Smoking (daily or occasionally)	Drunk at least once in last 4 weeks	Alcohol ≥3 times in last 4 weeks	Cannabis (daily or occasionally)
Model with main effects only				
Age	1.51 (1.31-1.73)***	1.66 (1.44-1.93)***	1.49 (1.27-1.75)***	1.64 (1.28-2.11)***
Gender				
Male	1	1	1	1
Female	1.18 (0.99-1.40)	0.91 (0.76-1.10)	0.69 (0.56-0.84)***	0.45 (0.32-0.62)***
SEP				
High	1*	1	1	1
Medium	1.27 (1.05-1.52)*	1.16 (0.95-1.41)	1.08 (0.88-1.34)	1.23 (0.88-1.72)
Low	1.18 (0.89-1.57)	1.15 (0.85-1.56)	1.07 (0.77-1.49)	0.91 (0.51-1.61)
Model with main effects and the interaction terms				
Age	1.51 (1.31-1.73)***	1.66 (1.44-1.93)***	1.50 (1.27-1.75)***	1.65 (1.28-2.11)***
Gender				
Male	1	1	1	1
Female	1.07 (0.80-1.41)	0.94 (0.70-1.27)	0.80 (0.58-1.10)	0.56 (0.32-0.96)*
SEP				
High	1	1	1	1
Medium	1.17 (0.90-1.51)	1.18 (0.90-1.55)	1.17 (0.88-1.55)	1.34 (0.89-2.01)
Low	1.10 (0.70-1.74)	1.21 (0.76-1.93)	1.34 (0.84-2.14)	1.18 (0.59-2.36)
Female (vs. male) gender by SEP				
High	1	1	1	1
Medium	1.18 (0.82-1.70)	0.96 (0.65-1.43)	0.84 (0.55-1.29)	0.77 (0.38-1.55)
Low	1.14 (0.64-2.04)	0.92 (0.50-1.69)	0.63 (0.32-1.23)	0.48 (0.14-1.62)

Asterisks after the odds ratio (OR) of reference category correspond to the p-value for the improvement of the fit of the model by adding that variable to the model: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001.

## Discussion

Our study explored SE differences in several different HRB categories and the potential modification of these differences by gender. The results confirm that SE differences are generally small during adolescence. In addition, our findings show that SE gradients in adolescent HRB differ by gender only for some behaviours. Although more differences were found among girls than among boys in fruit consumption and vegetable consumption, the sizes of SE differences were similar between genders for other behaviours.

Our finding in a Central European country of only small SE differences in health behaviours with largely varying prevalence rates confirms previous evidence from Western Europe, which showed SE differences to be small or absent during adolescence (Tuinstra et al. 1998; West et al. 1999). The largest SE inequalities were in nutritional behaviour among girls. For physical inactivity, a slight SE difference was found between the highest and lowest SE groups in both genders. For substance use, almost no differences were found. This supports the theory of Richter (2009), namely that parental SE position has little effect on adolescent substance use, as such behaviours have a later onset and are more influenced by peers than by family background. Although nutritional behaviour and physical inactivity can be altered during adolescence, they stem from childhood, making them more subject to parental influence (Johansen et al. 2006). The same process may also explain the relatively large SE difference in physical inactivity among both genders.

Interestingly, the overall prevalence rates of drunkenness were almost equal for boys and girls (19.6% vs 17.7%, respectively). However, for multiple alcohol use ( $\geq 3$  times during the previous 4 weeks, without explicitly asking about drunkenness), the gap between boys and girls was much wider (17.5% vs 12.5%). This seems to contradict the claim of Richter (2009) that the trend toward gender-specific equalisation in HRB applies more to patterns of moderate HRB, while male dominance remains for “harder” HRB. The results of our study show exactly the opposite, ie, minimal differences in the hard category of alcohol consumption and a higher prevalence in the more moderate category.

The strengths of this study are its large sample size and very high response rate. The study includes several HRB categories (nutritional behaviour and physical inactivity, but also substance use), whereas other studies often focus on a single behaviour.

A limitation of this study is the use of self-reports for data collection, which could have caused bias due to underreporting of risk behaviours (Adams et al. 2008). Underreporting may be more likely for use of substances that are either illicit (cannabis) or illicit in Slovakia for youths younger than 18 years (tobacco and alcohol). However, self-report was

shown to be moderately valid, at least regarding alcohol use (Brenner et al. 2003; Del Boca and Noll 2000). Moreover, the present questionnaires were completed voluntarily and anonymously, which makes reporting bias less likely (Brenner et al. 2003). Another limitation of this study is its cross-sectional design, which does not allow us to track possible alterations in SE gradient from childhood and adolescence until adulthood. Therefore, we cannot determine from our results that SE differences in Slovakia are less pronounced only in adolescence or how this relationship may change with age. Moreover, parental education is only 1 available measure of SEP. If a different measure of SEP (such as family income, parental occupations, or household assets) or a combination of such measures were used, the SE gradient for these behaviours could have differed as well. However, parental educational level is frequently used to assess the SEP of young people. Third, information on educational level of the parents was obtained from the adolescents, who might not know the education level of their parents. However, among those who returned the questionnaires, the response rate for these items was 96.9% and 94.1% for maternal and paternal education, respectively. Nevertheless, the adolescents may not have had accurate knowledge of parental education level (Currie et al. 1997). However, according to Lien et al (2001), the strength of agreement between adolescent and parental reports of parental education was fair (kappa coefficients, 0.30 and 0.38 for paternal and maternal education, respectively).

This study revealed that parental background, although not a very strong factor during adolescence, is related to some dietary habits, especially among females. It would be useful to explore the pathways of this relationship—for example, if their nutritional behaviour is caused by direct intervention, example, advice, or global health consciousness of parents, or if parental SEP perhaps plays an indirect role by choosing peers with similar habits, as is often the case in substance use (Madarasová Gecková et al. 2005; Urberg et al. 1997). In comparing present and past results, it is important to be aware that some studies used as a proxy of family SEP the highest educational degree achieved by each parent individually rather than the highest educational degree achieved by both parents. Finally, despite its relatively large sample, our study still had rather low statistical power to detect gender differences in the gradients for some behaviours, which indicates that the likelihood of false-negative findings is relatively large in those instances. However, this limitation relates only to relatively small differences that will generally be of less practical importance.

A very high proportion of students of both genders and in all SE groups did not eat vegetables daily. Thus, all adolescents should be targeted by prevention activities that aim to increase regular vegetable consumption. However, girls from middle and low SE groups, and boys

from the lowest SE group, require special attention because the prevalence rates of other unhealthy nutritional behaviours were high in these groups, as was the prevalence rate of physical inactivity. The results suggest that, among girls, parents seem to have a more important role in consumption of fruit and a regular breakfast than in HRBs, which suggests that parents should be included in the promotion of these healthy nutritional habits.

# Degree of urbanisation and gender differences in substance use among Slovak adolescents

Lukas Pitel, Andrea Madarasová Gecková,  
Jitse P. van Dijk, Sijmen A. Reijneveld

*Published: International Journal of Public Health, 2011, 56:645-51.*

## Abstract

**Objectives:** Substance use among adolescents varies by gender and between countries. Urbanisation may contribute to this. The aim of our study is to explore the association between the degree of urbanisation and gender differences in adolescent smoking, binge drinking and cannabis use.

**Methods:** A cross-sectional questionnaire survey of Slovak adolescents was used (N=3493; mean age=14.33), stratified by degree of urbanisation. The effects of gender and urbanisation of the area and their interaction on substance use (smoking, binge drinking, cannabis) were analysed using a logistic regression model adjusted for age.

**Results:** Gender and area and their interaction had statistically significant ( $p < 0.01$ ) associations with substance use. The lower the urbanisation of the area, the less riskily females behaved. An exception was found in the case of binge drinking where the results of the interaction of gender and degree of urbanisation were not significant for the second least urbanised area.

**Conclusions:** Prevalence rate of substance use among girls increased along with an increasing degree of urbanisation, while the prevalence rate of substance use among boys remained constant.



## Introduction

In most countries, boys tend to engage more frequently in most adverse health-related behaviour (HRB) than girls (Geckova et al. 2002; Ilhan et al. 2009; Isralowitz and Rawson 2006; Makela et al. 2006; Piko and Fitzpatrick 2007). However, this pattern does not seem to be universal. It varies by time (Abbott-Chapman et al. 2008; Pitel et al. 2010), country (Currie et al. 2004; Baska et al. 2009), degree of urbanisation within a country (Cronk and Sarvela 1997), age and socioeconomic position (Salonna et al. 2008; Williams et al. 2007).

Gender differences in substance use are probably strongly related to culturally bound gender roles (Van Gundy et al. 2005). Extreme examples of the impact of gender roles on gender disparities in HRB can be found in Islamic societies, in which there is traditionally a much higher prevalence of smoking (Ghouri et al. 2006) and also alcohol and drugs addiction (Hafeiz 1995) among males than among females. Gender is a strong predictor of HRB in North America and Europe as well, but its impact varies by country and age group (Graham 1996; Makela et al. 2006). Moreover, gender patterns are not stable over time. For instance, the gender ratio regarding smoking has shifted (or is still shifting) from a higher prevalence rate among males towards equalisation, or even a higher prevalence rate among females in the UK (Matheson and Summerfield 2000) and in several other Western and Southern European countries (Graham 1996). This also holds true for adolescents; e.g. in England smoking prevalence rates were rather equal by gender in the early 1980s, and a decline in the male smoking and rise in female smoking occurred in the mid 1980s. This has led to higher prevalence rates of smoking among girls compared to boys since then.

A rather uneasy societal transition from a socialist system to a market-oriented one took place during the 1990s in Slovakia. Concurrently, the country opened itself to aggressive advertising of Western tobacco corporations without having any legislative control mechanisms in that period. The first (insufficient) law which regulated smoking in public places was just passed in 1997 and its stronger upgrades followed in 2006 and 2009. It is likely that these circumstances influenced the uptake of substance use in the transitional countries in the 1990s (Puska 1997). The social turmoil connected with the transition also may have influenced differences in substance use by gender but evidence is lacking about this.

During this transition, adolescent substance use among Slovak adolescents indeed increased. Representative studies of substance use among Slovak adolescents during this period are the Health Behaviour in School-aged Children (HBSC) studies, with data collections in 1993-1994 and 1997-1998 (King et al. 1996, Currie et al. 2000) and the European

School Survey Project on Alcohol and Other Drugs (ESPAD) studies with data collections in 1995, 1999, and 2003 (Hibell et al. 1997, 2000, 2004). The HBSC studies show an increase of smoking and binge drinking in the mid-1990s (King et al. 1996; Currie et al. 2000) among Slovak adolescents. The ESPAD studies indicate a further continued increase in smoking, binge drinking and also in cannabis initiation from 1995 to 1999. While the smoking prevalence rates remained relatively stable between 1999 and 2003, the prevalence rates of binge drinking and cannabis lifetime use kept increasing during that period (Hibell et al. 1997, 2000, 2004) in Slovakia. Although the prevalence rate of self-reported substance use was higher among boys in the beginning of the explored period, the prevalence rate among girls increased faster and eventually, gender differences in these three kinds of substance use decreased over time.

Sociocultural patterns in substance use do not only vary between nations but may also differ within countries, for example according to the degree of urbanisation. In adults, a higher degree of urbanisation seems to increase probability of substance use (Sundquist and Frank, 2004), particularly among females (Pomerleau et al. 2004; Idris et al.) Regarding adolescents, Cronk and Sarvela (1997) reported that in 1976 use of most substances was more prevalent among urban adolescents compared to rural. However, till 1992, the differences between the urban and rural areas decreased. They also found that rural adolescents had higher prevalences for the use of alcohol and tobacco, particularly in excessive use. Similar trends were observed among both genders, although rural girls caught up later substance use compared with urban girls. Abraham (1999) found a positive relationship between municipality population density and illicit drug use, cannabis included, in a Dutch population aged 12 and older, but the relationship between gender and drug use prevalence was equivalent in all cities.

The differences in substance use by urbanisation and the time trends in gender ratios per country may be related, gender ratios changing faster in for instance urbanised areas than in rural areas. However, studies on the link between urbanisation and gender differences in adolescent substance use are very scarce (Cronk and Sarvela 1997; Abraham 1999). Therefore the aim of our study is to explore the association between the degree of urbanisation and gender differences in adolescent smoking, binge drinking and cannabis use.

## Methods

### Sample

Data were collected between October and December 2006. The sample consisted of 3725 adolescents in the 8th and 9th grade of randomly selected ordinary elementary schools across Slovakia. We excluded 178 cases from special schools which were attended by adolescents with special education needs (e.g., a special high school for sportsmen) so that the analyses were performed on a sample consisting of 3547 adolescents (mean: 14.3 years; SD: 0.5 years; 49% boys; response rate: 93.5%). The primary reasons for non-response were illness and other types of absence. The respondents completed the questionnaire in their classrooms and under the guidance of field workers.

### Measures

We obtained data on the use of alcohol, smoking and the use of hashish/marijuana. These were measured by simple questions about the occurrence and frequency of use. The wording of the questions was derived from the questions from the HBSC studies (Currie et al 2004). The answers provided were then dichotomized.

For cigarette smoking, the wording of the question was: "Have you ever smoked a cigarette (even if only once)?" Respondents could choose from the options: "I do not smoke", "I have already tried smoking", "I used to smoke but I have ceased completely", "I smoke occasionally but not daily" and "I smoke daily". The indication of risky behaviour was current smoking on a daily or occasional basis.

For alcohol consumption, the wording of the question was: "Have you been drunk during the past 4 weeks?" Respondents could choose from the options: "Not even once", "1-2 times", or "3 times and more". All subjects who reported to have been drunk at least once in the previous four weeks were labelled as participating in risky behaviour.

For cannabis use, the wording of the question was: "Have you ever smoked hashish or marijuana?" Respondents could choose from the options "No, never", "I have tried it already", "I smoke from time to time but not daily" or "I smoke daily". All who reported to have ever smoked hashish or marijuana were labelled as behaving riskily.

Urbanisation was measured using four types of areas which largely differ in degree of urbanisation. The most highly urbanised category consisted of adolescents from Bratislava, the biggest Slovak city (population 455,000; regional GDP 14,342 EUR in 2004) and the Slovak capital, situated in the western part of the country. It has a high proportion of university students, is the richest region of the country and has the

lowest unemployment. The second group (high degree of urbanisation) consisted of adolescents from Kosice (population 235,000; regional GDP 4,696 EUR in 2004). It is also a university city but in the eastern part of Slovakia and with much lower incomes and higher unemployment rates than those of Bratislava. The third group (low degree of urbanisation) consisted of adolescents from Zilina (population 85,000; regional GDP 5,176 EUR in 2004), a city located in central Slovakia. At the time of the study, rapid economic growth and decrease of the then high unemployment rate started in that region due to huge investments in new automobile manufacturing plants near the city. The fourth group (the lowest degree of urbanisation) consisted of adolescents from several smaller towns and villages located in eastern and central Slovakia (population under 40,000; regional GDP 4,696-5,176 EUR in 2004), mostly with low income, high unemployment rates and small proportions of university-educated population (Statistical Office of Slovak Republic, 2003; Eurostat Press Office, 2007).

### **Statistical analysis**

First, we computed simple prevalence rates for the three kinds of substance use (smoking, binge drinking, cannabis use) in each of the four residential groups, split by gender. Next, age-adjusted odds ratios for all degrees of urbanisation compared to the highest group were calculated for each gender separately. The effects of gender and area and their interaction on substance use for the four levels of urbanisation were analysed using a logistic regression model, also adjusted for age. Statistical analyses were performed with SPSS 14.0.

## **Results**

### **Smoking**

The prevalence rate of smoking among girls decreased from 30% to 16% for the highest compared to the lowest degree of urbanisation, whereas among boys it was almost equal for all degrees of urbanisation – around 20% (Table 4.1). Correspondingly, among girls, significantly lower OR of smoking occurred in the low ( $p < 0.05$ ) and the lowest ( $p < 0.001$ ) urbanised areas (Table 4.2). The odds ratios (OR) of smoking by degree of urbanisation were not statistically significant among boys. These differences by gender in the association of smoking with degree of urbanisation are reflected by the OR for their interaction (Table 4.3).

## **Binge drinking**

The lower the degree of urbanisation was, the lower was the prevalence of binge drinking in the previous 4 weeks among girls. Every fourth girl in the most urbanised area reported to have been drunk at least once in the past four weeks, which was an even higher rate than among boys in those areas, while in the smallest towns and rural areas only every ninth girl reported such behaviour (Table 4.1).

Among girls, similar differences by urbanisation were found as in smoking (Table 4.2). Among boys, no such pattern by urbanisation was observed. OR were not significantly different between the least and most urbanised areas and no consistent trend was observed either. The interaction between gender and degree of urbanisation contributed to the model with statistical significance. Similarly as in smoking, the OR of this interaction was lowest for the least urbanised group, i.e. in that group prevalence rates of girls were lowest compared to boys (Table 4.3). Assessment of frequent binge drinking (3 times or more last month vs. less) showed roughly similar gradients, but with more chance variation due to the much lower frequency of this behaviour (not shown).

## **Cannabis use**

As for cannabis lifetime use, we observed differences among girls in the very same direction, e.g. the lower the degree of urbanisation, the lower the prevalence of cannabis use among girls. Only 1 out of 25 girls from the group with the lowest urbanisation had ever tried cannabis. The OR of girls from the two lowest urbanised groups was significantly smaller compared to the highest urbanised one ( $p < 0.001$  in both cases). Prevalence rates among boys are almost equal for all degrees of urbanisation, however (Tables 4.1 and 4.2). The interaction between gender and degree of urbanisation contributed to the model with statistical significance (Table 3). Significant differences were found between the most urbanised area and the two least urbanised ones. Assessment of occasional or daily cannabis smoking (3 times or more last month vs. less) showed similar gradients or less, but with more chance variation due to the much lower frequency of this behaviour (not shown).

**Table 4.1** Prevalence rates of three kinds of substance use by degree of urbanisation and gender (Slovakia, 2006).

Degree of urbanisation	Smoking		Binge drinking		Cannabis use	
	Boys	Girls	Boys	Girls	Boys	Girls
Highest	<b>21.1%</b>	<b>30.6%</b>	<b>20.6%</b>	<b>25.0%</b>	<b>21.5%</b>	<b>18.4%</b>
N	82/389	118/385	77/374	95/380	82/382	70/380
High	<b>21.6%</b>	<b>25.8%</b>	<b>22.4%</b>	<b>19.6%</b>	<b>21.0%</b>	<b>15.1%</b>
N	108/499	145/562	110/491	109/557	104/496	84/556
Low	<b>21.3%</b>	<b>19.2%</b>	<b>14.7%</b>	<b>15.2%</b>	<b>19.1%</b>	<b>6.4%</b>
N	61/287	55/287	41/278	43/283	54/283	18/283
Lowest	<b>19.7%</b>	<b>16.1%</b>	<b>17.9%</b>	<b>11.2%</b>	<b>20.0%</b>	<b>4.0%</b>
N	93/473	77/477	84/469	53/473	94/469	19/477
Total	<b>20.9%</b>	<b>23.1%</b>	<b>19.4%</b>	<b>17.7%</b>	<b>20.5%</b>	<b>11.3%</b>
N	344/1648	395/1711	312/1612	300/1693	334/1630	191/1696

N = counts

**Table 4.2** Odds ratios for substance use due to degree of urbanisation for boys and girls separately, adjusted for age (Slovakia, 2006).

Degree of urbanisation	Smoking		Binge drinking		Cannabis use	
	Boys	Girls	Boys	Girls	Boys	Girls
Highest	1 n.s.	1 ***	1 n.s.	1 ***	1 n.s.	1 ***
High	1.16 (0.83-1.62)	0.82 (0.61-1.10)	1.28 (0.91-1.80)	0.73 (0.53-1.00)	1.14 (0.81-1.60)	0.83 (0.58-1.18)
Low	1.18 (0.79-1.75)	0.62 (0.43-0.91)	0.81 (0.52-1.26)	0.63 (0.42-0.95)	1.11 (0.74-1.67)	0.38 (0.22-0.66)
Lowest	0.99 (0.69-1.40)	0.44 (0.32-0.62)	0.95 (0.66-1.36)	0.37 (0.26-0.54)	1.11 (0.78-1.58)	0.17 (0.10-0.29)

\*\*\*  $p < 0.001$ ; n.s. = no significance

**Table 4.3** The effect of gender, degree of urbanisation and interaction of gender and degree of urbanisation on HRB among adolescents, adjusted for age in odds ratios and 95% confidence intervals in parentheses (Slovakia, 2006).

	Smoking	Binge drinking	Cannabis use
Age	1.51 (1.32-1.73)***	1.66 (1.44-1.93)***	1.81 (1.55-2.11)***
Gender			
Male	1 **	1 *	1 n.s.
Female	1.76 (1.26-2.46)	1.45 (1.02-2.07)*	0.94 (0.65-1.36)
Degree of urbanisation			
Highest	1 n.s.	1 n.s.	1 n.s.
High	1.15 (0.82-1.60)	1.27 (0.91-1.78)	1.14 (0.81-1.60)
Low	1.16 (0.78-1.71)	0.80 (0.52-1.24)	1.11 (0.74-1.66)
Lowest	0.97 (0.69-1.38)	0.94 (0.65-1.35)	1.11 (0.78-1.57)
Female gender by urbanisation			
Highest	1 **	1 **	1 ***
High	0.71 (0.46-1.11)	0.58 (0.36-0.92)	0.72 (0.44-1.18)
Low	0.55 (0.32-0.94)	0.80 (0.44-1.45)	0.34 (0.17-0.68)
Lowest	0.45 (0.28-0.73)	0.40 (0.24-0.67)	0.15 (0.08-0.29)

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ ; n.s. = no significance

## Discussion

Our study showed gender disparities in smoking, binge drinking and cannabis use that differed by degree of urbanisation. Among boys, no significant differences by urbanisation were found regarding the prevalence of substance use. Among them, prevalence rates were very similar for all urbanisation levels and for every kind of substance use, about 20%, the only exception being binge drinking in the low urbanised area where this rate was 14.7%. Among girls, a continuous decrease in substance use prevalence was found by decreasing degree of urbanisation. Interestingly, the prevalence of smoking and binge drinking among girls from the highest urbanisation level was even greater than among the boys from the same urbanisation level. The decreasing trend held for all three kinds of substance use that were examined. In particular, among girls, differences between the group with the highest degree of urbanisation and the two groups with the lowest degree of urbanisation were statistically significant for all three types of HRB.

The prevalence rate of smoking among Slovak adolescents is currently increasing (Hibell et al. 2004; King et al. 1996; Currie et al. 2000). The results of our study indicate that perhaps the process of diffusion of smoking from more urbanised to less urbanised areas occurred some time ago among boys but not among girls. According to Rogers (1962) and Rogers and Shoemaker (1971), new practices tend to be taken up first by communities with relative advantage in socioeconomic status, educational level, and upward social mobility. This is usually the case in

more urbanised areas rather than in the less urbanised ones. Additionally, according to Lopez et al. (1994) and Graham (1996), in many previous studies among adults from several European countries, smoking was generally first taken up by males when introduced. Therefore it can be assumed that it takes a longer time till trends in substance use are adopted by females, especially by those in areas with a lower degree of urbanisation. Possibly, current substance use in Slovakia is in a stage in which the new trends were already adopted by boys, regardless of degree of urbanisation, but until now only by those girls who live in the most urbanised areas. This also may explain why cannabis had the most steep gradient of gender differences by degree of urbanisation. Further research is needed to assess whether the approach of Rogers (1962) and Rogers and Shoemaker (1971) indeed applies to adolescents in the current globalized world and whether the findings of Lopez et al. (1994) and Graham (1996) regarding the smoking epidemic may indeed be applied on other kinds of substance use. International cross-sectional studies in time series on several kinds of adolescent substance according to degree of urbanisation use are required to confirm this.

Another possible explanation is that the diffusion of substance use already occurred but for some reasons the behaviours were not adopted by girls in the areas with lower degrees of urbanisation. Perhaps the social attitude towards female substance use is simply more conservative in areas with low degree of urbanisations or it is a consequence of a more general traditional patriarchal socialisation patterns regarding gender roles. According to the power-control theory verified by Grasmick et al. (1996) on American adolescents, girls from more patriarchal families showed a lower taste for risk, globally defined, than boys. In less patriarchal families, no such a gender difference occurred. Similarly, Emslie et al. (2002) found that the personal trait of masculinity rather than actual gender was positively associated with smoking and heavy drinking. Unfortunately, our data did not allow us to include family socialisation patterns or masculinity in the analysis.

### **Strengths and limitations**

The validity of our study is supported by its high response rate, which largely limits the likelihood of selection bias. Due to the anonymous character of the study and the fact that data were collected by trained social workers instead of teachers, social desirability and selective responding were prevented to a high extent. Moreover, the wording of the questions was as clear and short as possible, being derived from questions on the HBSC studies (Currie et al. 2004), which were tested for both internal and external validity several times before.

However, the cross-sectional design of the study limits its potential for causal inferences and for the assessment of trends in time. A repeated



cross-sectional design may enable the latter, in particular to test our hypothesis on picking up trends in girls.

### **Implications**

Our study shows that the likelihood of adolescent health endangering behaviours is higher in highly urbanised areas, in particular among girls. Its findings suggest that health policy makers should pay attention to this unequal distribution and should adapt prevention programs accordingly. Girls in big cities seem to deserve special attention. Secondary prevention efforts should thus specifically be targeted on this group. However, studies on trends from Western countries (Daponte-Codina et al. 2009) indicate that the smoking epidemic is going to occur among females in low urbanised areas as well, only with a certain delay. Thus, regional disparities might diminish in the future due to rising substance use prevalence among rural girls. Policymaking for regions where the prevalence rates of smoking among girls are still low should focus on preventing the probable impending smoking epidemic through primary prevention activities.

Future studies which evaluate the factors associated with smoking, binge drinking and cannabis use for both genders are needed to gain deeper insights into the explanation of the present results. Besides, future repeated surveys will be needed to confirm whether our findings are indeed due to gender differences in the timing of behavioural changes by urbanisation. This may add to the prevention of adverse health behaviours as well as the retention of healthy ones.

# Gender differences in the relationship between religiosity and health-related behaviour among adolescents

Lukas Pitel, Andrea Madarasova Geckova, Peter Kolarcik,  
Peter Halama, Sijmen A. Reijneveld, Jitse P. van Dijk

*Published: Journal of Epidemiology and Community Health, 2012,  
66:1122-28.*

## Abstract

**Background:** An inverse relationship between religiosity and adolescent health-related behaviour has been repeatedly documented, but evidence regarding gender is scarce. The aim of our study is to assess the association between a wide range of adolescent health-related behaviours and religiosity as well as gender differences in these associations.

**Methods:** Data were collected in 2010 in Slovakia on 3674 adolescents, mean age 14.9 years (response: 79.5%). Odds ratios for levels of religiosity, measured by religious attendance and by religious salience, were calculated for 15 behaviours such as the use of various substances, nutritional behaviour and violent behaviour. We then assessed the interactions of religiosity and gender on these behaviours.

**Results:** Religiosity was inversely associated with health-risk behaviour in smoking, drunkenness, cannabis use, having breakfast, soft drinks consumption, screen-based activities and sexual intercourse among both genders and in truancy among girls only. This association was significantly stronger among girls than among boys in smoking, drunkenness and cannabis use. Religiosity was unrelated to the consumption of fruits, vegetables and sweets, physical inactivity, tooth brushing, fighting and bullying others in both genders.

**Conclusion:** An inverse relationship between religiosity and health-risk behaviour was found in several behaviours (especially use of substances), but not for other behaviours (violent behaviours in particular). Gender seems to moderate this relationship in smoking, drunkenness and cannabis use. Further research is needed on the mechanisms leading to an

association between religiosity and health behaviour and on the strength of this association in other countries and cultures.

## Introduction

An inverse association between adolescent health-related behaviour (HRB) and religiosity has been found in several studies. In a meta-analysis of 40 studies dealing with the relationship between religiosity and constructive and destructive behaviours among adolescents, Cheung and Yeung (2011) reported a weak overall association ( $Zr = .173$ ), with less unhealthy and anti-social behaviour among more religious adolescents. Associations with private measures of religiosity (for example praying or religious salience) were slightly stronger than with public measures of religiosity (for example religious attendance).

While findings on the inverse association of religiosity with substance use and sexual behaviour are mostly consistent, those on its relationship with delinquent behaviour are more ambiguous. A meta-analysis by Baier & Wright (2001) showed a small effect across 60 studies, the majority of which concerned an inverse relationship between a measure of religion and some form of unlawful behaviour. Controversy remains concerning the degree to which this relationship is causal, or whether it is the result of other factors such as personality traits leading to both more religiousness and less delinquency (Cochran et al. 1904; Benda 1995; Benda et al. 2006).

The association of religiosity with other health behaviours, such as nutritional behaviour, sedentary behaviour and physical inactivity, has been only rarely explored among adolescents. Wallace and Forman (1998) found a composite measure of healthy nutritional behaviours and exercise to be positively related to both religious salience and religious attendance, even after controlling for socio-demographic factors. Moreover, evidence is lacking on gender differences in the religiosity-HRB link among adolescents. Gender has been shown to be an important moderator of the associations of several other social factors with HRB, such as socioeconomic position or degree of urbanisation (Pitel et al. 2010, 2011a). Zaleski and Schiaffino assessed the effect of gender on the association between religiosity and sexual intercourse among adolescents (Zaleski and Schiaffino 2000). They found no statistically significant gender differences regarding this association. Several other studies assessed the association between religiosity and HRB for boys and girls separately but did not test the statistical significance of gender differences in this association, prohibiting further inferences (Rosenbaum and Kandel 1990; Steinman KJ, Zimmermann 2004; van den Bree et al. 2004).

Finally, a vast majority of the studies dealing with the association of religiosity and HRB among adolescents were conducted in the United

States. Only a few covered Western Europe, and, to our knowledge, only two took place in Central Europe. Regarding Central Europe, Piko and Fitzpatrick (2004) found a negative relationship in Hungary between smoking, binge drinking and marijuana use and several indicators of religiosity among boys. Among girls, this relationship was found only between religious attendance and marijuana use. In a subsequent similar study (Kovacs et al. 2011), an association was only found between religious attendance and smoking among boys. Among girls, perceiving oneself as a “religious person” was related to smoking, binge drinking and marijuana use, and religious attendance was related with binge drinking only. However, these studies worked with non-nationally representative samples, focused on substance use only and did not assess the magnitude of the gender differences specifically.

The aim of our study is to fill these gaps by assessing the relationship between HRB and religiosity, as measured by religious behaviour and beliefs, in a broad range of behaviours among a nationally representative sample of Slovak adolescents and by assessing the degree to which gender affects this association.

## **Methods**

### **Sample and procedure**

Data were collected in May and June 2010 in Slovakia as a part of the Health Behaviour in School-aged Children research project. Based on a list of schools from the Slovak Institute of Information and Prognosis for Education, 134 schools were chosen randomly after the selection was stratified according to region, type of school (elementary vs. grammar) and size of the schools in order to create a nationally representative sample. Of the 108 schools contacted, 106 took part in the survey, representing a 98.1% school response rate. One class per grade from each school was chosen randomly and sampled. The original sample consisted of 8491 adolescents from the 5th to the 9th grade of elementary schools and corresponding grades from grammar schools across Slovakia (response: 79.5%). The most important reasons for non-response were illness (10.3%) and parental disapproval of the participation of their children (7.4%).

Our study was restricted to adolescents from the 8th and 9th grades due to the higher prevalence rates in several behaviours among them. Therefore, analyses were performed on a sample consisting of 3674 adolescents (mean age 14.98 years; SD  $\pm$ 0.66 years; 48.7% boys). Questions on marijuana use and sexual intercourse were included only in the 9th grade questionnaires. Therefore, in the case of these variables, analyses were performed on a smaller sample (1784 adolescents; mean age 15.48 years; SD  $\pm$ 0.45 years; 48.0% boys).

The questionnaire was completed in the respondents' classrooms during regular class time under the guidance of trained field workers and on a voluntary and anonymous basis in the absence of teachers. Parents were informed about the study by the school administration and could opt out in case of disagreement. No explicit incentives were provided for participation.

## Measures

*Sociodemographic measures* included gender, age and five indicators of family and social background: parental divorce, parental education, the composite score of Family Affluence Scale II (Boyce et al. 2006), the degree of urbanisation categorised according to the latest HBSC School Level Questionnaire (Mager et al. 2010), and the language spoken at home as a proxy measure for ethnicity.

*Religiosity* was measured by two separate indicators: frequency of attending church or religious sessions (religious attendance) and self-rated importance of religious faith to one's own life (religious salience). For religious attendance, the wording of the question was: "How often do you go to church or to religious sessions?" with possible answers: several times a week / approximately once a week / approximately once a month / a few times a year / never. Those who reported attending religious sessions at least once a week were considered as attending. For religious salience, the wording of the question was: "How important would you say your religious faith is for your life?" with a scale from 1 to 7, where 1 was defined as "not important at all", 4 as "neither important nor unimportant" and 7 as "absolutely important". The remaining options of the scale (2, 3, 5 and 6) were not defined by words. Those who scored at least 5 were considered as persons with high religious salience.

Following the aforementioned cut-offs, about 40% of boys and 50% of girls were classified as religious by both religious attendance and religious salience (Table 5.1). In about 25% of all adolescents, their religiosity according to these dichotomisations was not consistent: they either attended but reported low religious salience or vice versa (data not presented). Therefore, the two measures were also combined, resulting in four groups: 1. not attending and with low religious salience (the least religious group); 2. attending but with low religious salience; 3. not attending but with high religious salience; 4. attending and with high religious salience (the most religious group).

*HRB* concerned unhealthy or antisocial behaviour: recent smoking and drunkenness, lifetime cannabis use, no regular breakfast, no regular consumption of fruits and vegetables, consumption of sweets and soft drinks, physical inactivity, screen-based activities, insufficient tooth brushing, sexual intercourse, truancy, fighting and bullying others. These

behaviours were dichotomised according to the cut-offs in the latest Health Behaviour in School-aged Children International Report (Currie et al. 2008), if available. In cigarette smoking and drunkenness, the indicator for unhealthy behaviour was recent use, i.e., at least once during the last 30 days. In cannabis use and sexual intercourse, the indicator was having had the experience of sexual intercourse at least one time. For the remaining behaviours, cut-offs concerned regular occurrence: having breakfast less than on every school day ('no regular breakfast'), fruits consumption less than daily ('no regular fruits consumption'), vegetables consumption less than daily ('no regular vegetables consumption'), sweets consumption at least daily ('sweets consumption'), soft drinks consumption at least daily ('soft drinks consumption'), 60 minutes of moderate-to-vigorous physical activity less than daily during the last 7 days ('physical inactivity'), at least 6 hours of screen-based activities (the sum of TV-watching, electronic games and other PC-activities) altogether per weekday ('screen-based activities'), tooth brushing less than twice a day ('insufficient tooth brushing'), skipping at least a whole school day at least 3 times in the last 12 months without a proper justification ('truancy'), at least 3 physical fights in the last 12 months ('fighting') and bullying others at least 2 or 3 times a month for ('bullying others').

### **Statistical analyses**

We first computed prevalence rates for the 15 behaviours, both overall and by category of religiosity. As we intended to explore gender differences in the relationship between HRB and religiosity, we also computed these prevalence rates for boys and girls separately. Next, we computed age-adjusted odds ratios (ORs) and 95% confidence intervals (CI's) for religiosity groups, using the least religious group – 'not attending and with low religious salience' – as reference group for each gender. In order to control for the effects of potential confounders, we repeated the analyses while adjusting not only for age, but also for parental divorce, parental education, family affluence, degree of urbanisation and ethnicity. In these analyses, we used the composite categorical measure of religiosity. In addition, we repeated this with the inclusion of the two non-dichotomized measures of religiosity to assess whether findings were similar for continuous-level measures of religiosity. Finally, we analysed the interactions of the effects of gender and religiosity on HBR for the 4 levels of religiosity using a logistic regression model, also adjusted for age. Statistical analyses were performed using SPSS 16.0.

## Results

Frequencies and percentages for both measures and the combined groups, for both genders separately, are presented in Table 1. The prevalence rates for the behaviours varied widely: from 5.4% for truancy (among girls) to 87.8% for physical inactivity (also among girls).

The results of further analyses are presented in Table 5.2. In most behaviours, the prevalence rates in the most religious group were considerably lower than those in the least religious group, and the prevalence rates in the partly religious groups were mostly similar to those in the least religious group.

The differences concerned recent smoking, recent drunkenness, lifetime cannabis use, no regular breakfast, soft drinks consumption, screen-based activities, sexual intercourse and truancy. The biggest relative differences were found for sexual intercourse (OR 0.29). Lifetime cannabis use and sweets consumption were the only behaviours where the odds ratio was significantly higher in one of the more religious groups compared to the least religious group. The overall logistic model was not statistically significant in sweets consumption.

Almost all of these associations persisted in the most religious group after additional adjustment for parental divorce, parental education, family affluence, degree of urbanisation and ethnicity, without important changes in estimates of the strength of the association. Associations concerned drunkenness (OR 0.74; CI 0.52-1.06), cannabis use (OR 0.56; CI 0.39-1.10), soft drinks consumption (OR 0.83; CI 0.63-1.10) and sexual intercourse (OR 0.59; CI 0.31-1.11), all of them only among boys. When the two non-dichotomized measures of religiosity were used, the associations between HRB and religiosity were mostly similar to those in the original analyses with the combined categorised measure (not shown). The only exception concerned substance use among boys: the examined association was only found if both measures of religiosity were included, indicating a possible interaction between them. After controlling for possible mediators and confounders, the changes in the association between religiosity and HRB were marginal (not shown).

The odds ratios of the interaction of gender and religiosity on HRB were only statistically significant in recent smoking, recent drunkenness, lifetime cannabis use and in truancy, where the overall interaction model was not statistically significant (Table 5.3). In all of these behaviours, the association between HRB and religiosity was stronger among girls than among boys.

**Table 5.1** Frequencies and percentages for both measures of religiosity and the combined groups, and for health-related behaviour, for both genders separately.

	Boys		Girls		p-values
	n	Valid %	n	Valid %	
Religious attendance					<0.001
Not attending (less than once a week or never)	1012	58.7	942	51.1	
Attending (at least once a week)	713	41.3	902	48.9	
Missing	65	-	40	-	
Religious salience (scale 1-7)					<0.001
Low religious salience (score 1-4)	1032	60.3	948	51.6	
High religious salience (score 5-7)	679	39.7	890	48.4	
Missing	79	-	46	-	
Attendance & salience combined					<0.001
Not attending + low religious salience	819	48.0	707	38.5	
Attending + low religious salience	210	12.3	239	13.0	
Not attending + high religious salience	188	11.0	231	12.6	
Attending + high religious salience	491	28.7	658	35.9	
Missing	82	-	49	-	
Health-related behaviour					
Recent smoking	540/1783	30.3	501/1881	26.6	0.024
Recent drunkenness	362/1782	20.3	305/1877	16.2	0.006
Lifetime cannabis use (9th grade only)	189/909	20.8	124/968	12.8	<0.001
No regular breakfast	851/1761	48.3	1084/1865	58.1	<0.001
No regular fruits consumption	1300/1761	73.8	1280/1868	68.5	<0.001
No regular vegetables consumption	1362/1747	78.0	1386/1859	74.6	0.015
Sweets consumption	713/1753	40.7	862/1864	46.2	0.001
Soft drinks consumption	745/1760	42.3	681/1865	36.5	<0.001
Physical inactivity	1284/1761	72.9	1639/1866	87.8	<0.001
Screen-based activities	1005/1638	61.4	874/1793	48.7	<0.001
Insufficient tooth brushing	916/1784	51.3	560/1882	29.8	<0.001
Sexual intercourse (9th grade only)	135/881	15.3	100/966	10.4	0.004
Truancy	122/1781	6.9	101/1882	5.4	<0.001
Fighting	354/1752	20.2	113/1863	6.1	0.122
Bullying others	334/1760	19.0	201/1875	10.7	<0.001
Total counts	1790	-	1884	-	



**Table 5.2** Prevalence rates for several types of health-related behaviour by religiosity, overall and by gender, associated age-adjusted odds ratios (OR) and 95% confidence intervals (95% CI) and interaction of gender and religiosity regarding the association with health-related behaviour. (The Table continues on the next pages.)

	Total sample			Boys			Girls			Interaction gender x religiosity
	N	%	OR (95% CI)	n	%	OR (95% CI)	n	%	OR (95% CI)	
Recent smoking	504/1523	33.1	<b>1***</b>	251/817	30.7	<b>1*</b>	253/706	35.8	<b>1***</b>	***
Not attending + low religious salience	141/448	31.5	0.95 (0.76-1.19)	72/210	34.3	1.19 (0.96-1.64)	69/238	29.0	0.75 (0.55-1.04)	
Attending + low religious salience	116/418	27.8	<b>0.77 (0.60-0.97)*</b>	60/187	32.1	1.06 (0.75-1.50)	60/231	24.2	<b>0.56 (0.40-0.79)**</b>	
Attending + high religious salience	230/1145	20.1	<b>0.51 (0.42-0.61)***</b>	119/488	24.4	<b>0.73 (0.56-0.94)*</b>	111/657	16.9	<b>0.36 (0.28-0.46)***</b>	
Recent drunkenness	315/1521	20.7	<b>1***</b>	164/815	20.1	<b>1**</b>	151/706	21.4	<b>1***</b>	**
Not attending + low religious salience	100/448	22.3	1.12 (0.94-1.45)	53/210	25.2	1.35 (0.94-1.94)	47/238	19.7	0.93 (0.65-1.35)	
Attending + low religious salience	81/417	19.4	0.90 (0.69-1.19)	48/188	25.5	1.33 (0.92-1.94)	33/229	14.4	<b>0.60 (0.39-0.90)**</b>	
Not attending + high religious salience	141/1145	12.3	<b>0.53 (0.43-0.66)***</b>	75/489	15.3	<b>0.71 (0.53-0.96)*</b>	66/656	10.1	<b>0.41 (0.30-0.56)***</b>	
Attending + high religious salience										
Lifetime cannabis use (9th grade only)	157/788	19.9	<b>1***</b>	88/413	21.3	<b>1**</b>	69/375	18.4	<b>1***</b>	**
Not attending + low religious salience	40/209	19.1	0.95 (0.64-1.40)	26/100	26.0	1.27 (0.76-2.13)	14/109	12.8	0.66 (0.36-1.24)	
Attending + low religious salience	46/220	20.9	1.07 (0.74-1.54)	33/102	32.4	<b>1.78 (1.10-2.87)*</b>	13/118	11.0	0.55 (0.29-1.04)	
Not attending + high religious salience	58/595	9.7	<b>0.44 (0.32-0.60)***</b>	33/248	13.3	<b>0.57 (0.37-0.86)*</b>	25/347	7.2	<b>0.34 (0.21-0.56)***</b>	
Attending + high religious salience										
No regular breakfast	886/1505	58.9	<b>1***</b>	434/805	53.9	<b>1***</b>	452/700	64.6	<b>1***</b>	n.s.
Not attending + low religious salience	227/442	51.4	<b>0.73 (0.59-0.91)**</b>	90/206	43.7	<b>0.66 (0.48-0.90)**</b>	137/236	58.1	0.76 (0.56-1.02)	
Attending + low religious salience	220/412	53.4	<b>0.79 (0.64-0.99)*</b>	85/184	46.2	<b>0.71 (0.51-0.98)*</b>	135/228	59.2	0.80 (0.59-1.09)	
Not attending + high religious salience	543/1141	47.6	<b>0.63 (0.54-0.73)***</b>	206/487	42.3	<b>0.62 (0.50-0.78)***</b>	337/654	51.5	<b>0.58 (0.46-0.72)***</b>	
Attending + high religious salience										
No regular fruits consumption	1063/1513	70.3	<b>1</b>	590/811	72.7	<b>1</b>	473/702	67.4	<b>1</b>	n.s.
Not attending + low religious salience	319/444	71.8	1.09 (0.86-1.38)	151/206	73.3	1.04 (0.73-1.46)	168/238	70.6	1.18 (0.85-1.62)	
Attending + low religious salience	292/412	70.9	1.04 (0.82-1.32)	135/183	73.8	1.08 (0.75-1.57)	157/229	68.6	1.05 (0.76-1.45)	
Not attending + high religious salience	814/1134	71.8	1.09 (0.92-1.29)	364/482	75.5	1.18 (0.91-1.53)	450/652	69.0	1.08 (0.86-1.36)	
Attending + high religious salience										
No regular vegetables consumption	1171/1505	77.8	<b>1</b>	640/804	79.6	<b>1</b>	531/701	75.7	<b>1</b>	n.s.
Not attending + low religious salience	332/436	76.1	0.91 (0.71-1.17)	157/201	78.1	0.92 (0.63-1.34)	175/235	74.5	0.93 (0.66-1.31)	
Attending + low religious salience	308/411	74.9	0.84 (0.65-1.09)	140/183	76.5	0.81 (0.55-1.19)	168/228	73.7	0.90 (0.64-1.26)	
Not attending + high religious salience	850/1133	75.0	0.87 (0.72-1.04)	367/483	76.0	0.83 (0.63-1.08)	483/650	74.3	0.94 (0.73-1.20)	
Attending + high religious salience										
Sweets consumption	633/1506	42.0	<b>1</b>	311/806	38.6	<b>1</b>	322/700	46.0	<b>1</b>	n.s.
Not attending + low religious salience	211/442	47.7	<b>1.26 (1.02-1.56)*</b>	91/206	44.2	1.28 (0.94-1.75)	120/236	50.8	1.20 (0.89-1.61)	
Attending + low religious salience	184/411	44.8	1.13 (0.91-1.41)	78/182	42.9	1.23 (0.88-1.70)	106/229	46.3	1.00 (0.74-1.36)	
Not attending + high religious salience	485/1135	42.7	1.02 (0.88-1.20)	197/483	40.8	1.10 (0.88-1.39)	288/652	44.2	0.92 (0.74-1.14)	
Attending + high religious salience										

**Table 5.2 (continued)** Prevalence rates for several types of health-related behaviour by religiosity, overall and by gender, associated age-adjusted odds ratios (OR) and 95% confidence intervals (95%CI) and interaction of gender and religiosity regarding the association with health-related behaviour.

	Total sample			Boys			Girls			Interaction gender x religiosity
	N	%	OR (95% CI)	n	%	OR (95% CI)	n	%	OR (95% CI)	
<b>Soft drinks consumption</b>										
Not attending + low religious salience	648/1515	42.8	1***	366/812	45.1	1	282/703	40.1	1**	n.s.
Attending + low religious salience	180/441	40.8	0.92 (0.74-1.14)	83/204	40.7	0.83 (0.60-1.13)	97/237	40.9	1.04 (0.77-1.40)	
Not attending + high religious salience	15/412	38.1	0.81 (0.65-1.01)	75/183	41.0	0.83 (0.60-1.15)	82/229	35.8	0.82 (0.60-1.12)	
Attending + high religious salience	385/1131	34.0	0.69 (0.58-0.81)**	180/482	37.3	0.73 (0.58-0.92)**	205/649	31.6	0.68 (0.54-0.85)**	
<b>Physical inactivity</b>										
Not attending + low religious salience	1206/1507	80.0	1	589/807	73.0	1	617/700	88.1	1	n.s.
Attending + low religious salience	368/445	82.7	1.20 (0.91-1.58)	150/207	72.5	0.98 (0.70-1.39)	218/238	91.6	1.47 (0.88-2.46)	
Not attending + high religious salience	327/413	79.2	0.94 (0.72-1.23)	131/184	71.2	0.89 (0.62-1.27)	196/229	85.6	0.80 (0.52-1.23)	
Attending + high religious salience	927/1137	81.5	1.12 (0.92-1.36)	358/486	73.7	1.06 (0.82-1.36)	569/651	87.4	0.94 (0.68-1.31)	
<b>Screen-based activities</b>										
Not attending + low religious salience	892/1457	61.2	1***	514/772	66.6	1***	378/885	55.2	1***	n.s.
Attending + low religious salience	238/429	55.5	0.78 (0.63-0.98)**	126/197	64.0	0.88 (0.63-1.22)	112/232	48.3	0.76 (0.56-1.02)	
Not attending + high religious salience	219/411	53.3	0.73 (0.59-0.91)**	106/183	57.9	0.71 (0.51-0.99)*	113/228	49.6	0.81 (0.60-1.09)	
Attending + high religious salience	516/1106	46.7	0.55 (0.47-0.65)***	249/468	53.2	0.57 (0.45-0.72)**	267/638	41.8	0.59 (0.47-0.73)***	
<b>Insufficient tooth brushing</b>										
Not attending + low religious salience	624/1524	40.9	1	428/818	52.3	1	196/706	27.8	1	n.s.
Attending + low religious salience	181/448	40.4	0.97 (0.78-1.21)	109/210	51.9	0.97 (0.72-1.32)	72/238	30.3	1.12 (0.81-1.55)	
Not attending + high religious salience	166/418	39.7	0.95 (0.76-1.18)	91/187	48.7	0.87 (0.63-1.19)	75/231	32.5	1.25 (0.91-1.73)	
Attending + high religious salience	442/1149	38.5	0.91 (0.78-1.06)	239/491	48.7	0.87 (0.69-1.08)	203/658	30.9	1.17 (0.92-1.47)	
<b>Sexual intercourse (9th grade only)</b>										
Not attending + low religious salience	136/782	17.4	1***	72/406	17.7	1**	64/376	17.0	1***	n.s.
Attending + low religious salience	21/205	10.2	0.57 (0.35-0.94)*	13/96	13.5	0.76 (0.40-1.45)	8/109	7.3	0.41 (0.19-0.89)*	
Not attending + high religious salience	37/214	15.0	0.81 (0.53-1.24)	19/97	19.6	1.11 (0.63-1.96)	15/117	11.1	0.58 (0.30-1.12)	
Attending + high religious salience	33/567	5.6	0.29 (0.19-0.43)***	19/242	7.9	0.41 (0.24-0.70)**	14/345	4.1	0.19 (0.11-0.36)***	
<b>Tariffs</b>										
Not attending + low religious salience	115/1522	7.6	1***	62/816	7.6	1	53/706	7.5	1***	n.s.1
Attending + low religious salience	37/447	7.2	1.01 (0.67-1.52)	15/207	7.2	0.85 (0.56-1.80)	17/239	7.1	1.02 (0.57-1.80)	
Not attending + high religious salience	25/418	6.0	0.75 (0.48-1.17)	13/188	7.0	0.85 (0.46-1.60)	17/233	5.2	0.67 (0.35-1.29)	
Attending + high religious salience	40/1147	3.5	0.45 (0.31-0.65)***	20/490	5.3	0.70 (0.44-1.12)	14/657	2.1	0.26 (0.14-0.46)***	
<b>Fighting</b>										
Not attending + low religious salience	210/1517	13.8	1	161/814	19.8	1	49/703	7.0	1	n.s.
Attending + low religious salience	69/434	14.2	1.02 (0.75-1.38)	49/207	23.9	1.20 (0.83-1.74)	15/270	6.3	0.90 (0.50-1.64)	
Not attending + high religious salience	46/412	11.2	0.77 (0.53-1.09)	39/185	17.3	0.84 (0.58-1.25)	17/227	6.2	0.88 (0.48-1.62)	
Attending + high religious salience	134/1132	11.8	0.84 (0.66-1.06)	101/483	20.9	1.07 (0.81-1.42)	33/649	5.1	0.72 (0.46-1.13)	
<b>Bullying others</b>										
Not attending + low religious salience	239/1516	15.8	1	158/810	19.5	1	81/706	11.5	1	n.s.
Attending + low religious salience	64/441	14.6	0.89 (0.66-1.20)	49/205	20.0	1.01 (0.68-1.48)	23/236	9.7	0.82 (0.50-1.34)	
Not attending + high religious salience	67/418	16.0	1.02 (0.66-1.57)	36/188	20.2	1.05 (0.61-1.57)	29/230	12.6	0.98 (0.48-1.62)	
Attending + high religious salience	148/1139	13.0	0.80 (0.64-1.00)*	87/485	17.9	0.90 (0.67-1.20)	67/654	9.3	0.80 (0.56-1.13)	

Differences and overall models which are statistically significant ( $p < 0.05$ ) are in bold. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ , n.s. = not statistically significant at level  $p < 0.05$ . 1 = statistically significant interaction in the most religious group only ( $p < 0.001$ )

**Table 5.3** The association of gender, religiosity and the interaction of gender and religiosity with HRB among adolescents, adjusted for age: odds ratios and 95% confidence intervals in parentheses (selected behaviours).

	Recent smoking	Recent drunkenness	Lifetime cannabis use (9th grade only)	Truancy
Age	<b>1.29 (1.15-1.45)***</b>	<b>1.50 (1.31-1.71)***</b>	<b>1.17 (0.88-1.56)</b>	<b>1.96 (1.59-2.42)***</b>
Gender				
Male	1	1	1	1
Female	<b>1.28 (1.03-1.58)*</b>	1.11 (0.87-1.43)	0.84 (0.59-1.20)	1.03 (0.70-1.51)
Religiosity				
Not attending + low religious salience	<b>1 *</b>	<b>1 **</b>	<b>1 **</b>	1
Attending + low religious salience	1.20 (0.87-1.66)	1.35 (0.94-1.93)	1.28 (0.77-2.15)	1.01 (0.56-1.83)
Not attending + high religious salience	1.05 (0.75-1.48)	1.33 (0.92-1.94)	<b>1.77 (1.10-2.86)*</b>	0.83 (0.44-1.56)
Attending + high religious salience	<b>0.73 (0.57-0.94)*</b>	<b>0.71 (0.53-0.96)*</b>	<b>0.57 (0.37-0.89)*</b>	0.70 (0.44-1.13)
Female gender by religiosity				
Not attending + low religious salience	<b>1 ***</b>	<b>1 **</b>	<b>1 **</b>	1
Attending + low religious salience	<b>0.62 (0.40-0.98)*</b>	0.69 (0.41-1.16)	0.51 (0.23-1.14)	0.99 (0.44-2.25)
Not attending + high religious salience	<b>0.53 (0.33-0.87)**</b>	<b>0.45 (0.26-0.78)**</b>	<b>0.31 (0.14-0.69)**</b>	0.81 (0.33-1.99)
Attending + high religious salience	<b>0.49 (0.34-0.71)***</b>	<b>0.57 (0.37-0.89)**</b>	0.60 (0.31-1.15)	<b>0.38 (0.18-0.81)*</b>

Differences and overall models which are statistically significant ( $p < 0.05$ ) are in bold.

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

## Discussion

The aim of this study was to assess the relationship between health-related behaviour and religiosity, as well as gender differences in this relationship. In most behaviours the most religious group of adolescents behaved less riskily and less unhealthily than the least religious group. However, the groups of adolescents which were either attending or with high religious salience (but not both) did not differ from the least religious group in most behaviours. Moreover, some behaviours were unrelated to religiosity. Regarding the strength and gender pattern of the association with religiosity, three distinct groups of behaviours can be identified.

1. Behaviours associated with religiosity in both genders, but stronger among girls: smoking, drunkenness, cannabis use, sexual intercourse and truancy (though not statistically significant among boys). In these behaviours, the difference between the non-religious and the most religious group is clearly visible in the total sample. In smoking, drunkenness and cannabis use, these differences are bigger among girls. In cannabis use, the interaction odds ratio is statistically

significant in the group “not attending but with high religious salience”. In sexual intercourse, the interaction odds ratios are even lower than in smoking and drunkenness, but not statistically significant. This may be due to the smaller sample size, because these items were included in the questionnaires for the 9th school grade only, and to the low prevalence rates.

2. Behaviours relatively weakly albeit significantly associated with religiosity: no regular breakfast, soft drinks consumption and screen-based activities. In these behaviours, the association was found in both genders equally. However, among boys, the association became non-significant in soft drinks after controlling for family and social indicators.

3. Behaviours not associated with religiosity: no regular fruits consumption, physical inactivity, insufficient tooth brushing and fighting. Vegetables consumption, sweets consumption and bullying others might be included in this group as well, because their association with religiosity was only very weak and the overall model was not statistically significant. The interaction of gender and religiosity on these seven behaviours was not statistically significant either.

Regarding the use of substances, the results of our study are in accordance with previous studies: the association with religiosity is relatively stronger than for most other behaviours (Wallace and Forman 1998; Abbott-Chapman and Denholm 2001). The inverse association with sexual behaviour is also in accordance with most previous studies (Abbott-Chapman and Denholm 2001; Jones et al. 2005; Laflin et al. 2008). However, unlike Zaleski and Schiaffino (2000), we found an inverse association of religiosity with sexual intercourse that was stronger among girls than among boys. The overall strong inverse association of religiosity with drunkenness and cannabis use among girls in our study is in line with the results of Kovacs et al. (2011). However, our findings contradict their hypothesis that gender differences in the association between religiosity and HRB may be due to the religiosity of girls being more church-oriented. In our study, the inverse association between religiosity and smoking, drunkenness and cannabis use is substantially stronger among girls than among boys also in the group of adolescents who have high religious salience but who do not attend regularly.

The inconsistency of the association with religiosity in nutritional behaviours is surprising. No regular fruits and vegetables consumption and sweets consumption failed to show an inverse association with religion, unlike soft drinks consumptions and regular breakfast. Similarly, the association of religiosity with physical inactivity differs according to our findings from the association with screen-based activities (as an indicator of sedentary behaviour). Nutritional behaviours and sedentary behaviour are known to stem from childhood (Richter 2009) and to be influenced heavily by parents and family background (Richter 2009; Xie

et al. 2003; Wardle et al. 2003; Hancock and Poulton 2006). However, the adjustment for family and social background indicators had mostly only little impact on the associations of having breakfast, soft drinks consumption and screen-based activities with religiosity. This suggests that the association between religiosity and nutritional and sedentary behaviour is independent from other factors associated with these behaviours. This hypothesis needs further confirmation and testing regarding intrapersonal factors such as values, attitudes on leisure time use, adherence to daily rituals etc.

It may appear surprising that religiosity, a phenomenon strongly connected with value systems and rules prescribing proper interpersonal conduct, proved to be unrelated or only weakly related to interpersonal violence. These results provide partial support for the hypothesis of Cochran et al. (1994) that among adolescents, religiosity reduces “ascetic” behaviours such as substance use but has little impact on delinquent behaviours. However, this does not hold for truancy among girls.

All in all, the results of our study confirm that certain health-related behaviours are indeed inversely associated with religiosity, especially when it is both public (attendance) and internalised (religious salience) at the same time. However, this association does not hold for all health-related behaviours in general. The association is significantly stronger among girls than among boys in smoking, drunkenness, cannabis use and truancy. Although we are not able to explain the reason for these gender differences, it is worth noting that they only occur in behaviours that are illegal or are considered inappropriate in adolescence, while they are absent in behaviours which are unhealthy but usually more tolerated among adolescents by their adult supervisors.

### **Strengths and limitations**

This nationally representative study with a high response rate, covering a broad range of behaviours, presents a unique contribution to the research of religiosity and HRB. Most of the previous research among adolescents in this topic explores only a limited number of particular behaviours (Cheung and Yeung 2011). A limitation of our study is that its design is only cross-sectional, which limits the potential for making causal inferences.

### **Implications**

The results of our study indicate that high religiosity is indeed connected to less unhealthy behaviour, especially in substance use and less premature sexual activity and is especially so among girls. The reasons for these gender differences deserve further study. Moreover, further research is needed on the potential causal mechanisms in this relationship, such

as social support within religious groups, structured activities, adult supervision, sense of purpose, the system of external rules, prayer as coping mechanism and others. It would also be interesting to replicate this study in other countries and with additional information on the particular religious affiliation of the subjects.



# Socioeconomic gradient shifts in health-related behaviour among Slovak adolescents between 1998 and 2006

Lukas Pitel, Andrea Madarasova Geckova,  
Jitse P. van Dijk, Sijmen A. Reijneveld

*Published: International Journal of Health, 2013, 58:171-76.*

## Abstract

**Objectives:** We aimed to assess the development of the socioeconomic gradient in health-related behaviour among Slovak adolescents between 1998 and 2006.

**Methods:** Data were collected in 1998 (N=2616; 14.9±0.6yrs) and in 2006 (N=1081;14.3±0.6yrs). ORs of socioeconomic differences – as measured by parental education – were calculated for each cohort in smoking, alcohol consumption and physical inactivity, and the interactions of socioeconomic position and the time period on these behaviours were calculated.

**Results:** The higher odds of smoking in the low socioeconomic group compared to the high socioeconomic group decreased among boys (interaction OR 0.54) but became evident among girls (interaction OR 1.96). In alcohol consumption, no socioeconomic differences were found among boys, but the higher odds among girls from high socioeconomic position compared with those from low socioeconomic position disappeared in 2006. In physical inactivity, socioeconomic differences increased among boys but not among girls.

**Conclusion:** During this period, socioeconomic differences in health-related behaviour developed in a different way among boys than among girls. Prevalence rates in substance use increased especially among girls from the low socioeconomic group. This group should be particularly targeted by prevention programs.



## Introduction

Socioeconomic (SE) differences in adulthood in health-related behaviour (HRB) have been documented in several studies (Cavelaars et al. 1997; Tyroler 1999; Droomers et al. 1999; Wardle et al. 2003). Usually, the “traditional gradient” is found, i.e. persons with a lower socioeconomic position (SEP) behave less healthily than those with a higher SEP. However, adolescence constitutes a special stage of life during which these differences are absent, smaller or less consistent than in other stages of life (West 1997; Hanson and Chen 2007). In their review of studies on HRB among Western adolescents, Hanson and Chen (2007) found that smoking and especially insufficient physical activity and unhealthy nutritional behaviour, were mostly associated with lower SEP, but alcohol consumption and marijuana consumption mostly yielded no associations with SEP. Moreover, socioeconomic differences in HRB may also be changing over time. Several studies have documented such shifts among the adult population (Luoto et al. 1998; Graham 1996). This has been attributed to such factors as macroeconomic development of the particular societies and aggressive marketing by tobacco corporations (Puska 1997), different stages of the smoking epidemic (Lopez et al. 1994), changes in the prices of the substances (Helakorpi et al. 2010) and other factors.

However, there is a lack of information about trends in adolescent SE differences in HRB, with the exception of smoking. Since 2000, the Health Behaviour in School-Aged Children (HBSC) reports (Currie et al. 2000, 2004 and 2008) have been informing briefly about differences in a range of health behaviours according to family affluence, but the information contained did not allow for a trend comparison.

In time trends regarding HRB among adolescents, gender also seems to play an important role. Pitel et al. (2010) found that between 1998 and 2006, smoking prevalence rates decreased among boys but increased among girls. Kuntsche et al. (2011) found that during the same time period, in most former Communist European countries mean frequency of drunkenness increased among both genders, but much more among girls than among boys. Moreover, there is some evidence from Western countries that gender also may play a role in time trends regarding SE differences in HRB among adolescents. However, the findings are inconclusive. Richter and Leppin (2007) reported a weak positive relationship between parental affluence and smoking among West German boys in 1994 which could not be replicated in 1998 and in 2002, while prevalence rates increased in all SE groups. Among girls, this positive relationship was found only in the 1998 cohort. According to Doku et al. (2010), a positive relationship between parental education and smoking among Finnish adolescents

persisted between 1977 and 2007 in both genders. Rasmussen et al. (2009) reported an overall decrease in smoking in Denmark from 1991 to 2006. SE differences fluctuated over time and were different for boys and girls. In Australia an overall decrease in smoking occurred between 1996 and 2005, and its magnitude did not differ across socioeconomic groups (White et al. 2008).

To our knowledge, no studies from Central Europe exist that explore the relationship between SEP and adolescent HRB over time. The countries of Central Europe underwent a rapid social and economic transition in the 1990s which could have affected the SE gap in HRB, since lower SE groups may have reacted more sensitively to sudden social transitions, as is usual in the case of health indicators (Kunst 1997). The aim of this study is to fill this gap by exploring the development of the SE gradient in smoking, alcohol consumption and physical inactivity among Slovak adolescents between 1998 and 2006. As previous research has indicated that these patterns might be different for boys and girls, each gender will be analysed separately.

## **Methods**

### **Sample and procedure**

Two cross-sectional surveys on adolescents were performed in Kosice (235,000 inhabitants, Eastern part of Slovakia) in 1998 and in 2006, using a similar methodology. In 1998, data were collected among first year students at secondary schools. The sample was stratified according to the type of school: the proportion of the five educational tracks of the regular Slovak school system was maintained. Individual schools were selected at random. Approximately 20% of the schools did not wish to participate in the data collection. In the 31 schools which did agree to take part, data were collected in all available classes. A total of 2616 questionnaires were returned (age range: 13.75-17.50 years; mean: 14.86 years; SD: 0.62; 52.4% boys).

In 2006, due to changes in the educational system (the introduction of a 9-year elementary education instead of an 8-year one), 8th and 9th year students were approached at randomly chosen elementary schools. In all, 1081 questionnaires were returned in which gender was specified (age range: 13.09-16.83 years; mean: 14.33 years; SD: 0.62; 47.0% boys).

In both cases, respondents completed the questionnaire at school, in their classrooms and under the guidance of field workers. The response rates of the students of the schools that participated were 96.3% in 1998 and 93.0% in 2006. Non-response was due to illness and other types of absence. Participation in the studies was voluntary and anonymous.

## Measures

*Sociodemographic measures* included gender, age and the highest educational level of parents, which was dichotomized into two levels of education: 1) low SEP - elementary school and apprenticeship or secondary completed with school leaving examinations (boys: 74.5% in 1998 and 53.3% in 2006; girls: 77.3% in 1998 and 61.0% in 2006) high SEP - university education (boys: 25.5% in 1998 and 46.7% in 2006; girls: 22.7% in 1998 and 39.0% in 2006).

*Health-related behaviour* included the use of alcohol, smoking and physical inactivity. Respondents were asked how many times they had drunk alcohol in the past 4 weeks (none; 1-2 times; 3-5 times; 6-10 times; 10 times and more), if they had ever smoked a cigarette (no; never; already tried; I smoke from time to time but not daily; I smoke daily now) and how many days per week they performed physical activity. Those who had drunk alcohol 3 times or more in the past 4 weeks, smoked daily or occasionally and performed physical activity less than 2 days per week were considered to be engaged in risk behaviour.

## Statistical analysis

Prevalence rates according to gender, year and SEP and high SEP/low SEP odds ratios for the behaviours were calculated. The main effect of SEP, the time period of the study and the interaction of SEP and the time period on health-related behaviour (each type and each gender separately) were analysed using a logistic regression model adjusted for age. Data were analysed with SPSS 16.0.

## Results

Among boys, the overall prevalence rates of smoking decreased (Table 6.1). The prevalence rates increased marginally among boys from the high SE group, but they decreased considerably among their counterparts from the low SE group. While in 1998 boys from the low SE group had statistically significant higher odds compared to those from the high SE group (OR 1.66), this difference had disappeared in 2006. This shift in SE gradient was statistically significant (SEP x period: OR=0.54). Among girls, the overall smoking prevalence increased (Table 6.2). This was mainly due to a sharp increase in the low SE group (18.5% in 1998 vs. 29.6% in 2006), while in the high SE group a certain increase was observed, too. In 2006, the odds of girls from the low SE group were significantly higher when compared with the high SE group. This shift in SE ratio was statistically significant.

Regarding alcohol consumption, the overall prevalence rate among boys only slightly increased (Table 6.1). The prevalence rate remained

almost the same for boys from the high SE group, but in the low SE group it increased from 14.0% to 19.0%. However, neither SE differences in either cohort nor the shift in this ratio reached the level of statistical significance. Among girls, the overall prevalence rate in alcohol consumption increased, again due to an increase in the prevalence rates in the low SE group (Table 6.2). Girls from the low SE group drank significantly less often than their high SEP counterparts in 1998, but in 2006 this difference was no longer present. This shift in the SE ratio was statistically significant.

Physical inactivity prevalence rates decreased among boys from both SE groups but mainly in the high SE group (Table 6.1). We did not find any low vs. high SE group difference in physical inactivity in 1998, but it did appear in 2006. This shift in the male SE ratio was statistically significant. Among girls, a sharp decrease in physical inactivity prevalence rates occurred in both SE groups: from about 60% to about 30% (Table 2). Girls from the low SE group had slightly higher odds to be physically inactive compared to the high SE group in 1998. In 2006, this SE difference disappeared, though this shift was not statistically significant.

## Discussion

We aimed to assess the development of the socioeconomic gradient in smoking, alcohol consumption and physical inactivity among Slovak adolescents between 1998 and 2006. The results of this study reveal that SE differences in HRB among Slovak adolescents changed over time, and different patterns could be found for the different behaviours. Furthermore, different trends in SE differences were found among boys and girls for each behaviour. In smoking, the SE differences decreased among boys but increased among girls; in alcohol consumption, their absence persisted among boys while among girls SE differences disappeared; in physical inactivity, the SE differences increased among boys, but the small differences among girls disappeared, albeit this time trend was not statistically significant.

One possible explanation could be provided by the epidemical approach on substance use (Lopez et al. 1994; Pampel 2001) and by the diffusion-of-innovation theory (Graham 1996): When any trend, positive or negative, is introduced to a society or to any of its segments, such as youth, it is first picked up by males from the elites and only later spreads among females and among people with lower social position. This may explain why the substance use prevalence rates, both alcohol and smoking, barely changed among high SEP boys and girls but that they changed considerably among low SEP boys and girls. Possibly the high SEP boys and girls had already undergone the shifts before 1998, and the wave of increase and subsequent decrease of smoking prevalence rates reached the low SEP boys and girls respectively: Low SEP girls were

**Table 6.1** Changes in high socioeconomic position/low socioeconomic position ratio in health-related behaviour between 1998 and 2006 (boys).

	Prevalence in 1998		OR (95% CI) <sup>a</sup> in 1998	Prevalence in 2006		OR (95% CI) <sup>b</sup> in 2006	SEP x Cohort z OR (95% CI)
	n	%		n	%		
Smoking (daily or occasionally)							
High SEP	71/346	20.5	1 (ref)	50/232	21.6	1 (ref)	
Low SEP	314/1004	31.3	<b>1.66 (1.21-2.27)**</b>	56/262	21.4	0.88 (0.57-1.37)	<b>0.54 (0.31-0.92)*</b>
Total	385/1350	28.5		106/494	21.5		
Alcohol consumption (3x and more during last 4 weeks)							
High SEP	52/346	15.0	1 (ref)	35/228	15.4	1 (ref)	
Low SEP	141/1006	14.0	0.97 (0.66-1.41)	50/263	19.0	1.25 (0.77-2.04)	1.29 (0.70-2.38)
Total	193/1352	14.3		85/491	17.3		
Physical inactivity (less than 2x during an ordinary week)							
High SEP	91/346	26.3	1 (ref)	27/226	11.9	1 (ref)	
Low SEP	331/1008	32.8	1.31 (0.99-1.74)	72/259	27.8	<b>2.89 (1.74-4.71)***</b>	<b>2.27 (1.28-4.00)**</b>
Total	422/1354	31.2		99/485	20.4		

ORa, ORb – odds ratios adjusted for age; \* p<0.05, \*\* p<0.01, \*\*\* p<0.001; ref - Reference category  
z - This OR indicates the change in time from 1998 to 2006 for low SEP compared to high SEP.

**Table 6.2** Changes in high socioeconomic position/low socioeconomic position ratio in health-related behaviour between 1998 and 2006 (girls).

	Prevalence in 1998		OR (95% CI) <sup>a</sup> in 1998	Prevalence in 2006		OR (95% CI) <sup>b</sup> in 2006	SEP x Cohort z OR (95% CI)
	n	%		n	%		
Smoking							
High SEP	49/280	17.5	1 (ref)	45/207	21.7	1 (ref)	
Low SEP	176/953	18.5	0.87 (0.60-1.26)	99/334	29.6	<b>1.76 (1.16-2.67)**</b>	<b>1.96 (1.12-3.41)*</b>
Total	225/1233	18.2		144/541	26.6		
Alcohol consumption							
High SEP	38/280	13.6	1 (ref)	27/215	12.6	1 (ref)	
Low SEP	70/949	7.4	<b>0.44 (0.28-0.68)***</b>	44/333	13.2	1.03 (0.61-1.73)	<b>2.40 (1.21-4.75)*</b>
Total	108/1229	8.8		71/548	13.0		
Physical inactivity							
High SEP	160/280	57.1	1 (ref)	62/214	29.0	1 (ref)	
Low SEP	602/952	63.2	<b>1.35 (1.02-1.78)*</b>	111/332	33.4	1.18 (0.81-1.72)	0.87 (0.55-1.40)
Total	762/1232	61.9		173/546	31.7		

ORa, ORb – odds ratios adjusted for age; \* p<0.05, \*\* p<0.01, \*\*\* p<0.001; ref - Reference category  
z - This OR indicates the change in time from 1998 to 2006 for low SEP compared to high SEP.

only then experiencing the phase of increase in 2006 while low SEP boys were already in the phase of subsequent decrease. The general decrease in physical inactivity may be caused by improvements in the system of youth leisure time activities between 1998 and 2006. In the turmoil of the transitional era of the early 1990s, much of the leisure time system collapsed and has had to be re-established since the end of the 1990s.

One argument against the explanation by the stages of smoking epidemic in the population is that, according to Lopez et al. (1994), such a shift takes much longer – about 30 years. Thus, in our study, the epidemic approach could only be validly applied if the substance use epidemic among adolescents were to occur much faster than in society as a whole. In addition, current information technologies, enhanced electronic communication and electronic mass media may accelerate innovations in behaviours. However, the epidemic approach fails to provide a valid explanation for the changes in physical inactivity, which decreased substantially in both genders and in both groups besides the low SEP boys.

### **Strengths and limitations**

Besides the excellent response rate, this study provides information about socioeconomic shifts in adolescent health-endangering behaviour from Central Europe, where such studies have been – and still are – very rare. Unlike most previous studies in this field, which only analysed a single behaviour (usually smoking) (Richter and Leppin 2007; Doku et al. 2010; Rasmussen et al. 2009; White et al. 2008), this study included three distinct behaviours and found a different pattern in each one of them. In addition, we used established measures for all three behaviours, in that way limiting the likelihood of information bias and supporting comparisons with other findings.

A possible limitation is that parental education – the SEP indicator used in our study – may have become less sensitive during the time between the two samples due to a substantial increase of parents with university degree, which was to at least certain extent spurious, because of official requirements for employees of Slovak public services. The number of students who graduated from an external study programme (with lectures and classes once a week for students who mostly work full-time during the week) was more than 6 times higher in 2006 as in 1998 (Institute of Information and Prognoses on Education, Slovakia 2011). Anyhow, the shift is rather large. As we used a rather common indicator of SEP, i.e., parental education, this can easily be compared with future studies. Thus, our findings may even be an underestimation of the changes that occurred. Reijneveld and Gunning-Schepers (1995) provide some hints regarding how to control for demographic shifts which influence

the sensitivity of this indicator, if the shares of the various educational categories in the population change. The latter clearly occurred in Slovakia during this period.

### **Implications**

In assessing the development of the socioeconomic gradient in smoking, alcohol consumption and physical inactivity among Slovak adolescents between 1998 and 2006 we found that in smoking, the SE differences decreased among boys but increased among girls. In alcohol consumption, their absence persisted among boys but among girls SE differences disappeared. In physical inactivity, the SE differences increased among boys and the small SE differences among girls disappeared but did not shift significantly. The findings of our study need further confirmation. This could concern both repetition later over a longer period and replication in other CEE countries such as Poland, Czech Republic or Hungary. It would then also be interesting to compare trends regarding several SEP indicators – parental education, income, affluence as well as status of the adolescents themselves – as they often differ regarding their sensitivity to change (Richter and Leppin 2007). Quantitative and qualitative methods may further be used to gain insight in the processes that have led to these rather big changes.

# Gender differences in adolescent health-related behaviour diminished between 1998 and 2006

Lukas Pitel, Andrea Madarasova Geckova,  
Jitse P. van Dijk, Sijmen A. Reijneveld

*Published: International Journal of Health, 2010, 124:512-18.*

## Abstract

**Objectives:** Male teenagers used to smoke more than females, but over the past decades this male-female ratio in the prevalence of smoking has reversed in several European countries. The aim of our study was to assess whether a similar shift in gender differences in smoking and other health-related behaviours has occurred in Slovak adolescents over the last decade.

**Study design:** Cross-sectional study.

**Methods:** Data were collected in 1998 (N=2616; 47.6% females, 14.9±0.6 yrs, response 96.3%) and in 2006 (N=1081; 53.0% females, 14.3±0.6 yrs, response 93.0%). Changes in gender-specific prevalence rates for smoking, alcohol consumption and lack of physical activity were assessed for both cohorts overall and by socioeconomic group using the highest educational level of the parents.

**Results:** Statistically significant changes occurred in the male-female ratios of smoking and lack of physical exercise but not in the use of alcohol. The prevalence of smoking in males dropped below that of females, and the physical activity of females increased substantially. However, changes in gender ratios varied strongly by socioeconomic group. The greatest shift in the gender ratio of smoking occurred in the middle socioeconomic group, showing an increase in the entire sample. Changes in gender ratios over time among adolescents from the highest socioeconomic group were much smaller.

**Conclusions:** The behaviour of Slovak female adolescents has become similar to that of their male peers in smoking and physical activity. This shift in the gender ratio in Slovakia during the last decade mimics the shift in West Europe from about two decades ago.



## Introduction

Evidence on gender differences in health-related behaviour (HRB) shows that in most industrialised countries, boys engage more frequently in some kinds of risk behaviour than girls (Piko and Fitzpatrick 2007; Makela et al. 2006; Isralowitz and Rawson 2006; Geckova 2002). However, this pattern does not seem to be universal (Williams et al. 2007). It rather varies by time, place, age and socioeconomic position (SEP) (Salonna et al. 2008). Moreover, individual longitudinal changes in HRB during the coming-of-age process show different patterns, depending on SEP (Hanson and Chen 2007).

There is evidence of a decline, or even reversal in the pattern of higher prevalence rates of substance use among male adolescents in the 1980s in West Europe (Boreham and Shaw 2001; Fuller 2007). However, in Central and Eastern European countries, the gender-specific trends in prevalence rates of smoking have differed somewhat from the trends in Western Europe during the past decades. Puska (1997) found that before the transitional period toward market economies, smoking was more common among males than among females in Central and Eastern Europe. This pattern was confirmed during the subsequent transitional period in Central European adolescents as well (King 1996; Hibell et al. 1997). Similarly, regarding drinking behaviour in Central Europe, Makela et al. (2006) found a higher prevalence of drinking behaviour among males, especially in older age groups. Therefore, a similar gender shift may have occurred in drinking behaviour in the past. In the paragraphs below, evidence on the shift in the use of alcohol, smoking and physical activity and on socioeconomic gradient is provided.

*Use of alcohol* – Poelen et al. (2005) compared the use of alcohol among Dutch adolescents in 1993, 1995, 1997 and 2000 and found no consistent trend in the shift of gender differences regarding frequency of alcohol use, lifetime alcohol use, lifetime drunkenness and the frequency of drunkenness. Among English adolescents, no gender differences in weekly use of alcohol were found from 2004 to 2006, whereas previously the prevalence among boys was higher. The trend towards this gender-equalisation seems to have appeared already in previous decades (Fuller 2007). In Scotland during the 1990s, the prevalence of alcohol use during the previous week among boys was continuously somewhat higher than among girls, but in 2000, this prevalence was almost equal across genders.<sup>8</sup> Similarly, Health Behaviour in School-aged Children (HBSC) reports show evidence for a shift in gender ratio in the years from 1993-94, to 1997-98 and 2001-2002 in most of the Western European countries examined (Flemish part of Belgium, Austria, Scotland, France, Sweden, Finland and Norway): girls started to engage in more risk behaviour

(King 1996; Currie et al. 2000, 2004). The opposite development was found only in Spain. In the remaining Western European countries, the gender ratio remained stable or it changed bi-directionally. A similar trend occurs in the data regarding weekly drinking in some Western European countries from the European School Survey Project on Alcohol and Other Drugs (ESPAD) surveys in 1995, 1999 and 2003 (Hibell et al. 1997, 2000, 2004). However, Pape et al. (2008) found an overall increase in alcohol consumption among Norwegian teenagers between 1992 and 2002 while the gender ratio remained stable.

Regarding the former communist countries, Okulicz-Kozaryn and Borucka (2008) examined drinking behaviour trends in Warsaw. After a sharp decline in the percentage of adolescents with no experience with alcohol from mid-1980s to mid-1990s, the rates have remained essentially constant, but the gender proportions have been changing: male rates have been decreasing and female rates have been increasing. HBSC surveys from 1993-94 to 1997-98 and 2001-2002 behaviour (King 1996; Currie et al. 2000, 2004) reveal that the male dominance in weekly alcohol consumption gradually diminished in the Czech Republic, Latvia and Estonia. In Poland, the trend was in the opposite direction, and in Hungary and Russia it was bidirectional.

*Smoking* - In England, rates of regular smoking were similar among girls and boys at the beginning of the 1980s, but in 1986, a sudden female dominance occurred, and it has remained up to the present (Fuller 2007). In Scotland, a similar trend occurred in the 1980s and 1990s (Boreham and Shaw 2001) .

In the ESPAD studies (Hibell et al. 1997, 2000, 2004) the shift in the gender ratio in adolescent smoking is very gradual and is similar in almost all Central and East European countries. Findings from these studies indicate that these Central European countries probably only recently underwent – or are still undergoing – the same gender ratio equalisation and/or reverse which occurred in Western Europe earlier, as mentioned above. The HBSC studies (King 1996; Currie et al. 2000, 2004) reporting from data collected in 1993/94, 1997/98 and 2001/2002 also provide some evidence for an increasing tendency to weekly smoking in adolescent girls compared to boys of same age in both Central and Western Europe. However, these trends differed somewhat by country and were not fully gradual over time for several countries.

*Lack of physical activity* - Little is known about changes in the gender ratio in lack of physical activity among adolescents. According to the rates in the HBSC reports (King 1996; Currie et al. 2000, 2004) a clear and consistent increase of physical activity among girls compared to boys has occurred in Western European countries like Scotland but not in Central

Europe, where only small and often bidirectional changes in the gender ratio have occurred. In general, the development of this gender ratio was quite irregular in many countries.

*Socioeconomic position* - Apart from gender, socioeconomic position (SEP) is considered an important determinant of HRB. The lower the socioeconomic (SE) group, the less favourable is the HRB (Singh-Manoux and Marmot 2005). However, in adolescence, SEP does not seem to be such a relevant and consistent determinant of HRB as in other life periods in all kinds of behaviour (West 1997). The influence of SEP is particularly strong in smoking and weaker in physical activity during adolescence when compared to adulthood (Chen and Matthews 2002). The traditional socioeconomic gradient (the lower the SEP, the unhealthier the HRB) was mostly found to be lacking or to be statistically insignificant in adolescent use of alcohol (Hanson and Chen 2007). However, several studies have showed this traditional gradient in adolescent smoking (Boyle and Offord 1986; Lowry et al. 1996; Huurre et al. 2003) and lack of physical activity (Lowry et al. 1996; Huurre et al. 2003; Janssen et al. 2006). Wardle et al. (2003) found this traditional gradient only in smoking but not in physical exercise. Regarding differences by gender, most studies found no differences in gradient by gender in smoking (Hanson and Chen 2007), though Scragg et al. (2002) found the traditional gradient only among females in smoking among New Zealand adolescents.

Although both gender and SEP are generally considered to be important factors in predicting some kinds of adolescent HRB, relatively little attention has been paid to their interaction. Hanson and Chen (2007) compiled the results of several surveys from the USA, Canada, New Zealand and some Western European countries on the impact of SEP and HRB. In smoking, they found many more studies revealing the traditional socioeconomic gradient for both genders than no gradient or reverse gradient. However, some studies only showed the traditional gradients in girls (Scragg et al. 2002; Mittlemark et al. 1987) or in specific ethnic groups (Griesler and Kandel 1998; Goodman and Huang 2002; Georgiades et al. 2006). Although almost all of the reviewed studies included gender in their analyses, none of them explored the effect of gender in the relationship of SEP and alcohol use (Hanson and Chen 2007). Similarly, there is a lack of studies on gender differences in the association of SEP with physical activity.

Evidence is very scarce regarding the interaction of gender and SEP as predictors of HRB in Eastern and Central Europe. Geckova et al. (2002) found that among Slovak adolescents, the impact of gender on socioeconomic gradients in HRB depended on the SEP measure that was used. For example, in smoking, if SEP was measured by the education of the parents, the traditional social gradient was found only in boys. If the

SEP was measured by the occupational group of the parents or by the type of school, a traditional gradient was found in both genders.

No studies from Central Europe are available that assess the effect of gender on SE differences in several types of HRB simultaneously. The aim of our study is to fill this gap by exploring gender differences over time among Slovak adolescents in alcohol use, tobacco use and in the lack of physical activity, overall and by SEP.

## **Methods**

### **Sample**

We performed two cross-sectional surveys on adolescents in Kosice (235,000 inhabitants, Eastern part of Slovakia,) in 1998 and in 2006.

The distribution of students in the first grade of post-elementary school in Slovakia in 1998 was obtained from the Slovak Institute of Information and Prognosis of Education (1998). Based on this data, we took a random sampling of schools after stratification by type of schools (to reach equivalence with the distribution of school types in the regular Slovak school system, e.g. the proportion in grammar schools, specialized secondary schools, 4-year/ 3-year and 2-year apprentice schools). The schools were contacted and asked to cooperate. About 20% of them did not want to participate in the data collection. In those schools which did agree, data were collected in all available classes. In 1998 data were collected among the first year students of 100 classrooms in 31 secondary schools (on average 26 pupils per class and 84 pupils per school). A total of 2616 questionnaires were returned (age range: 13.75-17.50 years; mean: 14.86 years; SD: 0.62; 52.4% boys).

Using a similar methodology, we then collected data in 2006. Due to changes in the educational system (the introduction of a 9-year elementary education instead of an 8-year one), we could not stratify according to the type of school in this survey. We approached 8th and 9th year students at 15 elementary schools and 52 classrooms (on average 72 pupils per corresponding grade in the school and 21 pupils per class). In all, 1081 questionnaires were returned in which gender was specified (age range: 13.09-16.83 years; mean: 14.33 years; SD: 0.62; 47.0% boys).

In both years, participation in the study was voluntary and anonymous, and respondents completed the questionnaire at school, in their classrooms and under the guidance of field workers in the absence of the teachers. The response rates were 96.3% in 1998 and 93.0% in 2006. Non-response was fully due to illness and other types of absence.

## Measures

*Sociodemographic measures* included gender, age and the highest educational level of parents, which distinguished three levels of education: 1) low SEP - elementary school and apprenticeship; 2) middle SEP - secondary completed with school leaving examinations; and 3) high SEP - university education. This categorisation was used in order to suit the educational system in Slovakia. High school graduation is required to attend university, but it cannot be obtained at apprenticeship schools. This categorisation makes it possible to compare the results of this study with previous research on Slovakia and other Central European countries which have a similar educational system.<sup>1</sup> A similar SEP categorisation was also used, for example, by Lowry et al. (1996) by exploring HRB among adolescents in the USA.

*Health-related behaviour* included the use of alcohol, smoking and physical activity. Respondents were asked how many times they had drunk alcohol in the past 4 weeks (none; 1-2 times; 3-5 times; 6-10 times; 10 times and more), if they had ever smoked a cigarette (no; never; already tried; I smoke from time to time but not daily; I smoke daily now) and how many days per week they performed physical activity. Those who had drunk alcohol 3 times or more in the past 4 weeks, smoked daily or occasionally and performed physical activity less than 2 days per week were considered to be engaging in risk behaviour. The wording of the questions regarding HRB was partly derived from the questions in the HBSC and ESPAD studies (Currie et al. 2004; Hibell et al. 2004) to enable a comparison with the findings in those studies and with other similar studies (Fuller 2007; Hibell et al. 2000, 2004; (King 1996; Currie et al. 2000, 2004; Boyle and Offord 1986; Griesler and Kandel 1998). A similar categorisation was also used in other studies (Rodondi et al. 2000; Charilaou et al. 2009; Kalaboka et al. 2008; Limstrand and Rehrer 2008). Dichotomisations were set in order to differentiate behaviours with potential health consequences, to discriminate the population in a suitable way and to suit the different scales of the two samples.

## Statistical analysis

The main effect of gender, the time period of the study and their interaction with health-related behaviour (each type separately) were analysed using a logistic regression model adjusted for age. In the first analysis, we assessed this interaction between gender and time period for the entire combined 1998 and 2006 samples, after adjustment for the (small) differences in age-distribution between the two samples. Next, we repeated the analyses separately for each SEP group. Simple risk ratios were also calculated. For all statistical tests, the p-value was set at .05. Data were coded and analysed with SPSS 14.0.

Because the data was collected in entire school classes, a clustering of the students' outcomes per class could affect our findings. To account for such clustering, we repeated the logistic regression analyses on the 2006 data by using MLwiN 2.02 (<http://www.cmm.bristol.ac.uk/MLwiN/>). We could not do this for 1998 because information on classes had not been registered in that year. However, the multilevel analyses for 2006 showed a very small clustering by class and yielded identical odds ratios and 95% confidence intervals for differences by gender, the maximum differences being 0.02. As a result, we further performed all analyses using ordinary logistic regressions using SPSS version 14.

## Results

We did not perform a power analysis *ex ante*. We performed a post hoc power analyses on time trends in the differences by gender in smoking percentages between 1998 and 2006 to get an impression of the minimally measurable trends that could still be detected (Demidenko 2008). This post hoc power analysis showed that an odds ratio of 0.59 could still be assessed with a power of 90% at a p-value of 0.05. The actual value as found was 0.46. Similar power considerations hold for the other outcomes.

For the use of alcohol, the age-controlled gender ratio decreased from 1.69 in 1998 to 1.26 in 2006 (see Table 7.1). This change in the gender ratio was not statistically significant, however. Overall, the prevalence of alcohol use increased from 11.5 to 15.0% for both genders, but in girls somewhat more than in boys.

For smoking, a statistically significant change in the gender ratio did occur. In 1998, the adjusted odds ratio was 1.70, against 0.80 in 2006, i.e. smoking became relatively more prevalent in girls. Interestingly, the overall smoking rate hardly changed at all (23.7% vs. 23.8%). The prevalence of smoking increased among girls, however, and decreased among boys.

For lack of physical activity, the gender ratio changed significantly as well. During the 8-year period, the adjusted odds ratio of students who are physically inactive shifted from 0.29 to 0.58. The overall rate of lacking regular physical exercise decreased from 45.7% to 26.3%. The sedentary lifestyle decreased considerably in both genders: in boys, from 31.2 to 20.9% and in girls, from 61.7 to 31.2%.

**Table 7.1** Changes in male/female ratio in HRB between 1998 and 2006 (entire sample)

	Prevalence in 1998		OR1 in 1998	Prevalence in 2006		OR2 in 2006	Gender x Cohort z OR (95% CI)
	n	%		n	%		
<b>Alcohol consumption</b>							
Female	109	8.8	1 (ref) <b>1.69***</b>	73	13.1	1 (ref) 1.26	0.76 (0.49-1.17)
Male	194	14.2		85	17.1		
Total	303	11.6		158	15.0		
<b>Smoking daily or occasionally</b>							
Female	230	18.5	1 (ref) <b>1.70***</b>	145	25.8	1 (ref) 0.80	<b>0.46***</b> (0.33-0.66)
Male	388	28.5		108	21.6		
Total	618	23.7		253	23.8		
<b>Lack of physical exercise</b>							
Female	768	61.7	1 (ref) <b>0.29***</b>	173	31.2	1 (ref) <b>0.58***</b>	<b>2.05***</b> (1.47-2.86)
Male	426	31.2		102	20.9		
Total	1194	45.7		275	26.3		

OR<sup>1</sup>, OR<sup>2</sup> - odds ratios adjusted for age; \* p≤0.05, \*\* p≤0.01, \*\*\* p≤0.001; ref - Reference category  
Z - This OR indicates the change in time from 1998 to 2006 for males compared to females.

Analyses for separate SE groups showed that the gender ratio changed significantly in the middle SE group for smoking and lack of physical activity (see Table 7.2). In the low SE group, the ratio only changed in the latter. The direction was always the same for these changes: frequent use of alcohol and smoking in boys, but also lack of physical activity in girls, either diminished or the prevalence even reversed significantly (smoking by girls in the middle SE group). In the high SE group, no significant gender ratio shift occurred. For alcohol consumption in this group, the gender ratio even moved in the opposite direction: in 2006, more boys and fewer girls behaved riskily as compared to 1998, albeit the gender ratio shift was not significant.

**Table 7.2** Changes in male/female ratio in HRB between 1998 and 2006 within socioeconomic groups of adolescents.

	Low SE group			Middle SE group			High SE group		
	prevalence 1998 (in %)	prevalence 2006 (in %)	OR (CI) change Gender x cohort z	prevalence 1998 (in %)	prevalence 2006 (in %)	OR (CI) change Gender x cohort z	prevalence 1998 (in %)	prevalence 2006 (in %)	OR (CI) change Gender x cohort z
Alcohol									
male	10.7	25.0	1.91 (0.52-6.99)	15.7	17.7	0.54 (0.29-1.01)	15.0	15.4	1.22 (0.59-2.53)
female	7.1	8.6		7.5	14.2		13.6	12.6	
Smoking									
male	31.2	25.0	0.62 (0.22-1.72)	31.4	20.6	<b>0.26***</b> (0.16-1.43)	20.5	21.6	1.09 (0.58-2.05)
female	18.9	20.7		18.2	31.5		17.5	20.7	
Lack of physical activity									
male	35.0	42.2	<b>3.05**</b> (1.28-7.23)	31.7	24.8	<b>2.72***</b> (1.70-4.36)	26.3	11.9	1.11 (0.60-2.04)
female	66.2	45.8		61.7	30.8		57.1	29.0	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001



In all SE groups, the prevalence of smoking among girls increased, while it decreased (low and middle SE group) or did not change (high SE group) among boys. Only in males from the low SE group did the prevalence of sedentary behaviour increase.

## Discussion

Our study revealed some important changes in adolescent HRB between 1998 and 2006. For the entire sample, we found a general decrease in the male-female ratio due to an increased prevalence of risk behaviour among girls in substance use and due to an even steeper decrease in their sedentary behaviour. Contrary to recent developments in Western Europe and in neighbouring countries in Central Europe, the gender ratio in alcohol consumption gender ratio of Slovak adolescents has not changed significantly. However, the increasing rate of alcohol use, which is occurring in both genders, is in accordance with other studies all across Europe (King 1996; Currie et al. 2000, 2004). Although the overall smoking rate remained constant, the gender ratio has changed enormously: smoking rates have increased in girls and decreased in boys. Sedentary behaviour decreased first and foremost in girls and to a lesser extent in boys. This unequal decrease could be partly explained by the fact that the rates of sedentary behaviour among boys were already low in 1998 so the potential for a further decrease was smaller among boys than among girls more than two-thirds of whom reported sedentary behaviour in 1998.

In the lowest SE group, there was a shift only in the gender ratio regarding lack of physical activity, and in the middle SE group the gender ratio changed in lack of physical activity as well. In both cases, females started to behave less risky as the sedentary lifestyle among females decreased compared to males. There was also a significant reverse in the gender ratio of smoking in the direction of females in the middle SE group. As for the highest SE group, no strong and consistent changes were confirmed for any of the three types of HRB observed. One possible explanation could be that trends in the high SE group anticipate changes in the whole society, and in this case, much of the shift in the gender ratio among this SE group had already happened prior to 1998. The very low gender ratios in all three observed kinds of HRB in 1998 compared with both other SE groups might support this assumption. Nevertheless, there is a considerable decrease of sedentary behaviour in the high SE group among both genders.

This anticipating trend in the high SE compared to the low SE group seems to apply for HRB in general. At the early stage of a smoking epidemic, smoking is most prevalent among males from the high SE group. Later, this group is also the first one in which the smoking rates

start to decline (Cavalaars et al. 2000; Graham 1996). But in our study, in most cases neither gender nor the low SE group or the middle SEP group behaviours really copied the 1998 situation of the high SE group. In addition, this epidemic pattern is supposed to be valid in virtually every innovation or trend in the society (Graham 1996), including increasing and decreasing of other HRB types. But the prevalence rates in the high SE group of our first sample and consequent prevalence rates in 2006 do not seem to show this type of trend.

A deep and uneasy societal transition from a socialist system to a market-oriented one took place during the 1990s in Slovakia, a fact which may explain some of our findings. This period was marked by a worsening of health and HRB. However, the transition and the concurrent worsening of health and HRB were by far not as drastic as, for example, in Russia and some other countries of the former Soviet Union (Marmot and Bobak 2005). Specifically, for youth, one of the consequences was that the system of state-provided leisure time activities collapsed at the beginning of the 1990s. This may have also contributed to a worse HRB among the adolescents, in particular to the lack of physical activity (besides the unemployment of parents and other factors). As can be seen from our study, the situation has improved in both genders (in particular in girls), regarding physical activity. One reason may be the introduction of a new system of leisure time activities for youth, including the offer of new communal, private and other non-governmental providers.

The causes for the shift in the smoking gender ratio remain unclear. Perhaps advertising (Puska 1997) and the influence of Western culture through the media (television, Internet) have led to a copying of Western European trends. At the same time, social turmoil during the period of economic transition and increased mobility may have facilitated the erosion of traditional patriarchal gender roles, characterized by a higher prevalence of risk taking among males compared to females. As masculinity is associated with higher smoking rates among both males and females (Emslie et al. 2002), its increase among Slovak adolescent girls may have caused higher smoking rates among them.

A clear shift in the gender-specific HRB patterns in the direction of those of Western European countries could be observed. Our findings are in accordance with the already mentioned ESPAD surveys, which leaves little opportunity for doubt about the direction of this process. It would be useful to have more verified information about the causes of this shift and also information about the presence of these causes in both Western Europe and Central Europe to be able to uncover the background of this process.

In recent years, both positive and negative shifts in HRB have occurred. HBSC reports (King 1996; Currie et al. 2000, 2004) have showed more or less the same basic trends in most European countries. Surely the

most positive trend of this survey is the dramatic decrease of sedentary behaviour in girls. However, in further research, it will also be important to observe the relationship between physical exercise and nutrition (due to possible psychological body image distortions and eating disorders). It also would be useful to perform longitudinal surveys to find out if this positive adolescent trend remains in effect at subsequent stages of life.

A strength of this study is that it concerns two very similarly designed samples on the same age-group from the same city in a Central European country in 1998 and 8 years later; both cohorts had excellent response rates. It allows us to compare the HRB from both years. The data not only provide information about adolescent substance use but also about their lack of physical activity. Very few cross-sectional studies from this field focused explicitly on gender differences shift by SEP in HRB. The gender distributions in both samples were similar to the entire Slovak population of that age. The overall proportion of boys in the 1998 sample was 52.4%, compared to 50.1% in the entire Slovak population in the first year of secondary schools (Ustav informacii a prognoz skolstva 1998). In the 2006 sample, the proportion of boys was 47.0%, compared to 51.2% in the entire Slovak population in grades 8 and 9 (Ustav informacii a prognoz skolstva 2006).

The measures used are to our knowledge not gender biased, and it seems unlikely that reporting bias influenced our findings. Our measures allowed for a valid assessment of gender differences and also a comparison with many other studies (King 1996; Currie et al. 2000, 2004).

A limitation of the study is that we only obtained self-reported data which could cause bias due to underreporting of risky behaviour (Adam et al. 2008). However, questionnaires were completed on a voluntary and anonymous basis, making reporting bias less likely. Another limitation might be, besides the cross-sectional design of the study, that due to changes in the educational system, the 2006 sample concerned primary school whereas the 1998 sample concerned secondary school, though both groups were of the same age-bracket. One might assume that in secondary school, health behaviour may be somewhat less favourable, in particular for substance use. However, our data show that substance use is still higher in 2006. Moreover, an effect of school type, if any, would affect both genders, implying a very limited effect on our findings.

Our results are the first on the shift of HRB gender patterns in Central Europe over time and thus need confirmation. Preferably, such a confirmatory study should also provide information on the pathways that have led to such a shift. For now, designers of health promotion programs should pay attention to changes in the gender behavioural pattern and to the SEP of parents of adolescents to be able to intervene more efficiently. There is in particular an urgent need to adapt intervention programs to currently high risks in female adolescents.

# Discussion

This thesis focused on the role of gender as a moderator of the relationship between several social determinants and HRB among adolescents. Trends in SE differences and gender differences in HRB among adolescents between 1998 and 2006 were also explored. This final chapter provides a summary of the main findings of this thesis and a discussion of these main findings in the context of the available evidence on this topic. The strengths and limitations of the study are also discussed. Finally, implications for future research and for public health practice are indicated.

## 8.1 Main findings

### Research question 1:

*Is SEP related to HRB among adolescents and does gender moderate the relationship between SEP and HRB among adolescents? (Chapter 3)*

Lower SE groups tended to have higher odds of unhealthy behaviours than the highest SE group. However, these differences were statistically significant only for some behaviours and mostly in only one gender. Moreover, SE differences were relatively small, even though statistically significant. In daily breakfast and physical inactivity, SE differences were found among both genders. In sweets consumption, SE differences were found only among boys. In fruits consumption, vegetables consumption and smoking, SE differences were found only among girls. In drunkenness, alcohol consumption and cannabis use, no SE differences were found. Among boys, SE differences were found only between the highest and the lowest SE group. SE differences significantly differed statistically in magnitude by gender only in fruits consumption and in vegetables consumption, where the SE differences were bigger among girls.

### Research question 2:

*Is the degree of urbanisation (DoU) related to HRB among adolescents and does gender moderate the relationship between the DoU and HRB among adolescents? (Chapter 4)*

The DoU was related to HRB only among girls. The prevalence rates of substance use among girls increased with an increasing DoU, while the prevalence rates of substance use among boys remained constant. Gender, DoU and their interaction had statistically significant associations with

all three behaviours that were analysed: smoking, binge drinking and cannabis use.

**Research question 3:**

*Is religiosity related to HRB among adolescents and does gender moderate the relationship between religiosity and HRB among adolescents? (Chapter 5)*

Religiosity was inversely associated with unhealthy behaviour regarding smoking, drunkenness, cannabis use, having breakfast, soft drinks consumption, screen-based activities, sexual intercourse (all: both genders) and truancy (girls only). Associations were significantly stronger among girls than among boys regarding smoking, drunkenness and cannabis use. Religiosity was unrelated to consumption of fruits, vegetables and sweets, physical inactivity, tooth brushing, fighting and bullying others in both genders.

**Research question 4:**

*Have shifts taken place in the relationship between SEP and HRB among Slovak adolescents between 1998 and 2006 and did time shifts in the relationship SEP and HRB differ by gender? (Chapter 6)*

The higher odds of smoking in the low SE group compared with the high SE group decreased between 1998 and 2006 among boys (OR for interaction of time and SEP: 0.54), but this SE gradient became evident among girls (OR for interaction: 1.96). In alcohol consumption, no SE differences were found among boys in both years, and SE differences disappeared among girls in 2006. In physical inactivity, SE differences increased among boys but not among girls. Overall, SE differences in HRB developed in a different way for boys and girls between 1998 and 2006. Prevalence rates in substance use increased especially among girls with a low SEP.

**Research question 5:**

*Have the gender differences in HRB changed between 1998 and 2006 among Slovak adolescents and did the shift in gender differences in HRB differ by SEP? (Chapter 7)*

In 1998, gender differences were found for all three of the behaviours that were explored: boys had higher prevalence rates of smoking and alcohol and lower prevalence rates of physical inactivity than girls. In 2006 the only remaining gender difference concerned physical inactivity, but this was substantially smaller than in 1998. These shifts in the boys-girls ratios were statistically significant in smoking and physical inactivity but not in use of alcohol. The prevalence of alcohol use increased among both genders; the prevalence of smoking in boys dropped below that of girls; and the physical activity of girls increased substantially. The changes in gender ratios varied strongly by SE group. The greatest shifts in the

gender ratio of smoking occurred in the middle SE group, both among boys (decrease) and girls (increase). Changes in gender ratios over time among adolescents from the highest SE group were much smaller.

## **8.2 Discussion of the main findings**

The main findings will be discussed within the framework of the general aims formulated in Chapter 1. Firstly, we will focus on our findings regarding the relationships between adolescent HRB and SEP, DoU and religiosity, and on the moderating effect of gender on these relationships. Secondly, we will deal with the shift of the SE gradient in HRB among Slovak adolescents between 1998 and 2006 and discuss the role of gender in this shift. Finally, we will turn our attention to what we found regarding the shift of gender differences in their HRB from 1998 to 2006 – in the overall sample as well as by SE group.

### **8.2.1 The association between socioeconomic position and health-related behaviour and its moderation by gender**

Our findings confirm those of similar studies from Western Europe, i.e. that SE differences are generally only small during adolescence (Tuinstra et al. 1998; West et al. 1999). Among boys, no differences between the high and the middle SE groups were found in any behaviour, and only slight differences were found between the high and the low group in breakfast consumption, sweets consumption and physical inactivity. Among girls, differences were found between the high and the middle SE groups (for fruits and vegetables consumption and smoking), and between the high and the low SE groups (for breakfast, fruits consumption and physical inactivity).

These findings support the theory of Richter (2009) that parental SEP (which was used as the indicator of adolescents' SEP in this thesis) hardly affects adolescent substance use. This may be because these behaviours have a later onset and are more influenced by peers than by family background. Although nutritional behaviour and physical inactivity can be altered during adolescence, they stem from childhood, making them more subject to parental influence (Johansen et al. 2006). The same process may also explain the SE differences in physical inactivity among both genders.

The sizes of the SE differences were similar among both genders in substance use, physical inactivity and in breakfast skipping and sweets consumption. SE gradients differed significantly by gender only for fruits and vegetables consumption. The SEP was inversely related with these behaviours among girls, whereas among boys, no such association was found.

The gender differences by SE gradient regarding fruits and vegetables consumption deserve further study. An explanation may be that social pressure for thinness is stronger among females than males, particularly among high SEP women, with associated nutritional behaviour (Thurston et al. 2005; Sobal and Stunkard 1989; Jeffrey and French 1996). Until now, this evidence mostly concerned adults, however. It is also possible that parental education may play a more important role in the consumption of fruits and vegetables among girls than among boys, perhaps because boys lag behind girls in health literacy. Interestingly, the latest HBSC international report (Currie et al. 2012), using the Family Affluence Scale II as the SE indicator, reports a similar traditional SE gradient in fruits consumption among Slovak boys and girls. This would suggest that perhaps gender moderates the impact of social capital or health literacy, but not of material conditions, on fruits consumption.

### **8.2.2 The association between degree of urbanisation (DoU) and health-related behaviour and its moderation by gender**

The results of our study indicate that in 2006 the DoU was unrelated to substance use among Slovak boys but was positively related to substance use among girls (i.e., higher DoU was associated with more substance use). This would indicate that perhaps the process of diffusion of substance use from more urbanised to less urbanised areas occurred some time ago among boys but not among girls. According to Rogers (1962) and Rogers and Shoemaker (1971), new practices tend to be taken up first by communities with relative advantage in socioeconomic status, educational level and upward social mobility. This is usually the case in the more urbanised areas rather than in the less urbanised ones. Additionally, according to Lopez et al. (1994) and Graham (1996), in many previous studies among adults from several European countries, smoking was generally first taken up by males upon being introduced. Therefore, it can be assumed that it takes a longer time till trends in substance use are adopted by females, especially by those in areas with a lower DoU. Current substance use in Slovakia is possibly in a stage in which the new trends have already been adopted by boys, regardless of the DoU, but until now only by girls living in the most urbanised areas. This may also explain why cannabis had the steepest gradient of gender differences by DoU. Further research is needed to assess whether the approach of Rogers (1962) and Rogers and Shoemaker (1971) indeed applies to adolescents in the current globalised world and whether the findings of Lopez et al. (1994) and Graham (1996) regarding the smoking epidemic may indeed be applied to other kinds of substance use. International cross-sectional studies over time on several kinds of adolescent substance use according to the DoU are required to confirm this.

Another possible explanation is that the diffusion of substance use has already occurred but for some reasons the behaviours were not adopted by girls in areas with a lower DoU. Perhaps the social attitude towards female substance use is simply more conservative in areas with a lower DoU or it is a consequence of a more general traditional patriarchal socialisation pattern regarding gender roles. According to the power-control theory verified by Grasmick et al. (1996) on American adolescents, girls from more patriarchal families showed a lower taste for risk, globally defined, than boys. In less patriarchal families, no such a gender difference occurred. Similarly, Emslie et al. (2002) found that the personal trait of masculinity rather than actual gender was positively associated with smoking and heavy drinking. Unfortunately, our data did not allow us to include family socialisation patterns or masculinity in the analysis. However, a study of adult populations in 16 Western and Southern European nations between 1988 and 1995 (Pampel 2001) indicates that smoking among men and women became more similar in nations that have the longest history of cigarette use rather than the greatest gender equality. These findings seem to support the diffusion-of-innovation theory rather than the explanations concerning gender equality or masculinity.

Findings from abroad indicate that this strong DoU-HRB association among Slovak girls in 2006 might have been only temporary. A US cross-sectional study found that between 1976 and 1992, urban-rural differences in adolescent substance use decreased among both genders (Cronk and Sarvela 1997). At the end of 1970s, a positive relationship between residence size and illicit drugs consumption among adolescents was found. However, these differences between large metropolitan areas, small metropolitan areas and rural areas in illicit drugs consumption among adolescents disappeared during the 1980s. During the 1990s, the prevalence of unhealthy behaviours was even higher among rural youth than among urban youth regarding the consumption of cigarettes, alcohol, marijuana and several other illicit substances (National Center on Addiction and Substance Abuse at Columbia University 2000). This basic pattern seems to have continued into the beginning of the 21<sup>st</sup> century.

A similar later performed but preliminary analysis of representative Slovak data collected for the HBSC study in 2010 (Pitel et al. 2011b) indeed showed no more differences among girls in binge drinking according to the DoU and much smaller differences in smoking and cannabis use than in our 2006 study. The interaction of gender and the DoU on substance use was statistically significant in smoking, but the trend in the direction and magnitude of gender differences in this relationship was not continuous. The striking differences in the findings of the two studies may be either due to shifts in the substance use patterns according to gender and the DoU between 2006 and 2010 due to different sample characteristics, or



due to a different DoU categorisation in 2010, according to the latest HBSC school questionnaire (Mager et al. 2010). Further research is needed to find explanations for these discrepancies. However, both studies indicate that the prevalence rates of cannabis use, a relatively new substance in Slovakia, are still significantly lower among girls from the areas with the lowest DoU, compared with those with the highest DoU. Prevention programs and policies should be adjusted accordingly.

### **8.2.3 The association between religiosity and health-related behaviour and its moderation by gender**

Religiosity was found to be strongly associated inversely with substance use and early sexual intercourse, moderately associated with some kinds of nutritional behaviour and with screen-based activities, but only weakly or not at all associated with fruits and vegetables consumption and with violent behaviour. In general, these findings are in line with previous research, overwhelmingly from the USA, which also showed a relatively consistent inverse association between religiosity and substance use as well as with sexual intercourse among adolescents (Cheung and Yeung 2011), and only a moderate (albeit significant) overall effect size regarding delinquency (Baier and Wright 2001). This suggests a more universally applicable pattern, but evidently this needs confirmation by further research. As research on the relationship between nutritional behaviours and religiosity is scarce among adolescents, our findings are quite unique and difficult to compare with other studies.

Our study also revealed that the inverse association between religiosity and unhealthy behaviour is significantly stronger among girls in substance use and truancy. Gender differences in these associations are still to be explained. To our knowledge, our study is the first one on gender differences in the religiosity-HRB link among adolescents. Further research in other cultural contexts and time periods is needed in order to confirm our findings.

Slovakia and Poland, two of the most religious countries in the EU (European Commission 2012), had the lowest prevalence rates of sexual debut of all the countries that participated in the recent HBSC study (Currie et al. 2012). Our findings suggest that to a considerable extent this may be attributed to the strong inverse association between religiosity and premature sexual debut, especially among females. Not only religious salience, but also attendance seems to substantially decrease the probability of early sexual debut. Participation of adolescents in organised religious activities, particularly if combined with their high religious salience, seems to have a protective effect regarding several HRBs. This concerns especially premature sexual activity and substance use.

## 8.2.4 The associations between social determinants and health-related behaviour: a summary of the moderation by gender of associations for particular behaviours

We reported quite a lot of findings on the associations of SEP, DoU and religiosity with HRB. Below we summarise the main findings for boys and girls separately (Table 8.1). Where associations between social determinants and HRB by gender were found, they were almost always in the same direction: higher SEP, lower DoU and higher religiosity were associated with healthier behaviour. The only exception was cannabis consumption, with ambivalent findings regarding the association with religiosity among boys (see footnotes to Table 8.1 for more details).

**Table 8.1** Associations between social determinants and HRB by gender and by particular behaviour, adjusted for age.

Behaviour	Statistically significant association?					
	Higher SEP = healthier behaviour (2006 sample)		Lower DoU = healthier behaviour (2006 sample)		Higher religiosity = healthier behaviour (2010 sample)	
	Boys	Girls	Boys	Girls	Boys	Girls
Smoking*	no	yes <sup>2</sup>	no	yes	yes	yes
Use of alcohol	no	no	-	-	-	-
Drunkenness	no	no	no	yes	yes	yes
Cannabis use* <sup>1</sup>	no	no	no	yes	yes <sup>3</sup>	yes
Physical inactivity*	yes	yes	-	-	no	no
No breakfast*	yes <sup>2</sup>	yes	-	-	yes	yes
No daily fruits	no	yes	-	-	no	no
No daily vegetables	no	yes	-	-	no	no
Daily sweets	yes <sup>2</sup>	no	-	-	no	no
Daily soft drinks	-	-	-	-	yes <sup>2</sup>	yes
Screen-based activities	-	-	-	-	yes	yes
Insufficient tooth brushing	-	-	-	-	no	no
Sexual intercourse <sup>1</sup>	-	-	-	-	yes	yes
Truancy	-	-	-	-	no	yes
Fighting	-	-	-	-	no	no
Bullying others	-	-	-	-	no	no

- = Not assessed in the study.

\* = Different cut-offs throughout the studies.

<sup>1</sup> = In the religiosity study, only the 9<sup>th</sup> school grade was included. Both the 8<sup>th</sup> and 9<sup>th</sup> grades were included in all other studies and behaviours.

<sup>2</sup> = Statistically significant interaction in one of the groups only. However, p-value of the improvement of the fit of the model by adding the sociocultural variable to the model was >0.05.

<sup>3</sup> = Ambivalent findings: compared with the group “not attending and low religious salience”, the group “not attending and high religious salience” had significantly higher odds of smoking cannabis, but the group “attending and high religious salience” had significantly lower odds.

In Table 8.2 below, the moderation effect on the associations of SEP, DoU and religiosity with HRB is displayed. Whenever a moderation effect of gender was found, this was always stronger among girls than boys.

**Table 8.2** Associations between social determinants and HRB: moderation by gender by particular behaviour, adjusted for age.

Behaviour	Moderation by gender?		
	Higher SEP = healthier behaviour (2006 sample)	Lower DoU = healthier behaviour (2006 sample)	Higher religiosity = healthier behaviour (2010 sample)
Smoking*	no	yes	yes
Use of alcohol	no	-	-
Drunkenness	no	yes	yes
Cannabis use* <sup>1</sup>	no	yes	yes
Physical inactivity*	no	-	no
No breakfast*	no	-	no
No daily fruits	yes	-	no
No daily vegetables	yes	-	no
Daily sweets	no	-	no
Daily soft drinks	-	-	no
Screen-based activities	-	-	no
Insufficient tooth brushing	-	-	no
Sexual intercourse <sup>1</sup>	-	-	no <sup>2</sup>
Truancy	-	-	yes <sup>3</sup>
Fighting	-	-	no
Bullying others	-	-	no

- = Not assessed in the study;

\* = Different cut-offs used in the studies.

<sup>1</sup> = In the religiosity study, only the 9th school grade was included. Both the 8th and 9th grades were included in all other studies and behaviours.

<sup>2</sup> = The interaction ORs were even lower than in smoking and drunkenness but not statistically significant. This may be due to the smaller sample size (only 9th school grade included) and to the low prevalence rates.

<sup>3</sup> = Statistically significant interaction in the most religious group only.

Our summary shows that associations between sociocultural factors and HRB were more often found among girls than among boys. When they were found in both genders (particularly in religiosity), these associations were often significantly stronger among girls than among boys. If a causal relationship between sociocultural factors and HRB is assumed, it would mean that the sociocultural factors have a stronger influence on HRB among girls than among boys. However, this moderating effect of gender did not manifest itself in all explored sociocultural factors and in all behaviours alike. A clear pattern could be observed in substance use: the moderation by gender affected the associations with the DoU and with religiosity, but not those with SEP. Conversely, the moderation affected the associations of fruits and vegetables with SEP, but not those

with religiosity. Additional studies are needed to gain a deeper insight into possible causes and mechanisms of the different gender effects on these associations. It would be useful to include biological, intrapersonal and interpersonal variables in this research as well.

### **8.2.5. Time trends in health-related behaviour by gender and socioeconomic position**

In Slovakia, gender differences decreased significantly in smoking and physical inactivity between 1998 and 2006. This was mainly due to a substantial increase of prevalence rates of smoking and a substantial decrease of physical inactivity among females. In alcohol use, the male/female ratio decreased somewhat too, but this decrease was not statistically significant. These trends were particularly strong among adolescents with low SEP (i.e., those whose parents were without a university education).

From our findings regarding time trends in relation to SE differences in three HRBs, we can conclude that different patterns of change occurred for smoking, use of alcohol and physical inactivity and did so in each gender. In smoking, the SE differences decreased among boys but increased among girls; in alcohol consumption, their absence persisted among boys, while among girls SE differences disappeared; in physical inactivity, the SE differences increased among boys, but the small differences among girls disappeared, albeit this time trend was not statistically significant. Prevalence rates in substance use increased especially among girls from the low SE group. The decrease of overall gender differences could be interpreted within the context of a general cultural trend of gender convergence, meaning the masculinisation of female behaviour and feminisation of male behaviour. As masculinity is associated with a higher rate of smoking among both males and females (Emslie et al. 2002), the higher rates of smoking may be caused by an increase in masculinity among Slovak girls.

Alternatively, the changes could also be induced by a shift in gender-specific socialisation patterns. According to the power-control theory, more egalitarian gender socialisation results in higher risk preference among females. The study of Grasmick et al. (1996) seems to provide some support for this theory. However, their measure of risk preference was globally defined, and it is not clear whether their findings can be also applied, e.g., for smoking or alcohol use. Moreover, this theory fails to provide a valid explanation for our findings regarding trends in the high SE group: while the socialisation in high-educated families is usually more egalitarian than in the lower-educated ones (Crompton and Lyonette 2005), we actually found lower smoking prevalence rates among high SEP girls than among low SEP girls in 2006.

Another possible explanation is provided by the epidemical approach to substance use (Lopez et al. 1994; Pampel 2001) and by the

diffusion-of-innovation theory (Graham 1996). When any trend, positive or negative, is introduced into a society or to any of its segments, such as youth, it is first picked up by males from the elites and only later spreads among females and among people with lower SEP. This may explain why the substance use prevalence rates, both alcohol and smoking, barely changed among high SEP boys and girls, but that they changed considerably among low SEP boys and girls. Possibly, the high SEP boys and girls had already undergone the shifts before 1998, and the wave of increase and subsequent decrease of smoking prevalence rates reached the low SEP boys and girls, respectively. Low SEP girls were only then experiencing the phase of increase in 2006, while low SEP boys were already in the phase of subsequent decrease. One argument against the explanation by the stages of smoking epidemic in the population is that, according to Lopez et al. (1994), such a shift takes much longer - about 30 years. Thus, in our study, the epidemic approach could be validly applied only if the substance use epidemic among adolescents were to occur much faster than in the society as a whole. In addition, current information technologies, enhanced electronic communication and electronic mass media may accelerate innovations in behaviour. However, the epidemic approach fails to provide a valid explanation for the changes in physical inactivity, which decreased substantially in both genders and in both groups besides the low SEP boys.

The general decrease in physical inactivity may be caused by improvements in the system of youth leisure time activities between 1998 and 2006. In the turmoil of the transitional era of the early 1990s, much of the leisure time system collapsed but it has been re-established since the end of the 1990s. This trend may be also attributed to a general stabilizing trend of the society and improvement on the Slovakia labour market during the late 1990s and early 2000s, after the social turmoil of the early and mid-1990s due to the collapse of the communist system and the subsequent transformation toward democracy and market economy. Also, Salonna (2012) explains his very recent findings of decreased SE differences among Slovak adolescents during this period on the basis of this theory. However, our findings of different time trends for various HRBs, depending on the particular behaviour, SEP and gender indicate that this "salutary societal stabilisation hypothesis" cannot be applied as easily for all behavioural outcomes, especially not for substance use. To sum up, none of the mentioned theories is able to provide a convincing explanation of the time trends in all three behaviours that were explored in our study.

### 8.3 Strengths and limitations of the study

#### *Strengths*

This study has several strengths. One of them is that the data provide information about a broad range of adolescent HRBs, while other studies often focus only on a single behaviour. Cross-sectional studies from this field focusing explicitly on gender differences in the associations between sociocultural determinants and HRB are scarce. This study provides information about socioeconomic shifts in adolescent health-endangering behaviour from Central Europe, where such studies have been – and still are – even more scarce.

In this thesis, three samples were used, each of them of relatively large size. The validity of our study is supported by the high response rates of all samples, which largely limits the likelihood of selection bias. The wording of the questions was as clear and short as possible, being mostly derived from questions on the HBSC studies (Currie et al. 2000) which had been tested for both internal and external validity several times before. These measures allowed for a valid assessment of gender differences and also a comparison with many other studies (Levin et al. 2012; Deschamps et al. 2010). Due to the anonymous character of the study and the fact that data were collected by trained social workers instead of teachers, social desirability and selective responding were prevented to a great extent. Moreover, the sample collected in 2010 was nationally representative. All logistic regression analyses in this study were adjusted for age. Additionally, the analyses regarding the association between religiosity and HRB and the differences in this association by gender (Chapter 7) were controlled for the most relevant potential confounders available (DoU, language spoken at home as a proxy measure for ethnicity, parental education, parental divorce and family affluence).

#### *Limitations*

This study also has several limitations that need to be addressed. One of them is the use of self-report data. This might have caused bias due to under-reporting of risk behaviours (Adams et al. 2008). Under-reporting may be more likely for use of substances which are either illicit (cannabis) or illicit for youth under 18 years of age in Slovakia (tobacco and alcohol). However, self-report data has been shown to be rather valid, at least regarding the use of alcohol (Brenner et al. 2003; Del Boca and Noll 2000). Moreover, the questionnaires were completed voluntarily and anonymously, making reporting bias less likely (Del Boca and Noll 2000).

Another limitation of this study is its cross-sectional design, which limits its potential for making causal inferences.

We used parental educational level as a measure of SEP, which is only one of the available measures for SEP. If different measures of SEP (such as

family income, parental occupations or household assets) or combinations of them had been applied, the SE gradient for these behaviours might have also been different. Moreover, information on the educational level of parents was obtained from the adolescents, who might not know the exact level of their parents' education. However, parental educational level has been used to assess the SEP of young people in many studies (Salonna et al. 2008; Veselska et al. 2011; Tomcikova et al. 2011). In our study, among those who returned the questionnaires the response rate was 96.9% and 94.1% for the questions on the education of the mother and the father, respectively, despite the fact that the adolescents may not always have accurate knowledge regarding the responses (Currie et al. 1997). However, according to Lien et al. (2001), the strengths of agreements between adolescents' and parents' reports of parental education were fair (kappa coefficients of 0.30 and 0.38 for fathers' and mothers' education, respectively).

Another limitation might be that due to changes in the educational system, the 2006 sample concerned primary schools whereas the 1998 sample concerned secondary schools, though both groups were of the same age-bracket. One might assume that in the secondary school, health behaviour may be somewhat less favourable, in particular for substance use. However, our data show that substance use is still higher in 2006. Moreover, an effect of school type, if any, would affect both genders, implying a very limited effect on our findings.

There was a considerable disproportion between the prevalence rate of parents with university degree regarding the 1998 and 2006 samples. One reason for this may be the fact that the 1998 sample concerned secondary schools while the 2006 sample concerned elementary schools, as mentioned above. Therefore, only about 60% of the 1998 sample was made up of inhabitants of the city of Kosice. The remaining participants of this sample came from rural residences in the wider district of Kosice (30%) or from other districts (10%) (Geckova 2002). In comparison, 98.2% of the 2006 sample consisted of inhabitants of the city of Kosice. Since urban populations tend to achieve higher educational degrees than rural populations (Ompad et al. 2007), the disproportion between the two samples regarding the permanent residence of the students may be reflected in the disproportion regarding their parental education. Thus, the shifts in gender differences in HRB and the shifts in SE gradient by gender that were found between 1998 and 2006 should be interpreted carefully. It is possible that the differences can be partly attributed to the differences in the proportion of respondents with rural backgrounds rather than to the time trends. This may be due to the fact that in areas with a low DoU, gender differences in HRB were greater than in areas with a higher DoU (see Chapter 4).

Another factor possibly contributing to the disproportion between the 1998 and 2006 samples regarding the level of parental education is

that parental education – the SEP indicator used in our study – may have become a less sensitive indicator of SEP during the time concerned. This may be due to an increase in the proportion of parents with a university degree. This increase was to at least a certain extent spurious, because of official requirements for employees of Slovak public services to achieve a university degree, which made the criteria for obtaining it more lax. The number of students who graduated from an external study programme (with lectures and classes once a week for students who mostly work full-time during the week) was more than 6 times higher in 2006 than in 1998 (Institute of Information and Prognoses of Education, Slovakia 2011). However, in spite of the expectations, the magnitude of the shifts is large. Thus, our findings may even be an underestimation of the changes that occurred. Reijneveld and Gunning-Schepers (1995) provide some hints regarding how to control for demographic shifts which influence the sensitivity of this indicator.

## **8.4 Implications**

In the following section, the implications of our findings for practice and further research will be outlined.

### **8.4.1 Implications for practice**

According to our findings, the associations between the sociocultural determinants and HRB are particularly strong among girls. Regarding adolescent girls, their social and cultural environment requires special attention focusing on their health habits. This should be taken into consideration in further research as well as in prevention activities and public health policies.

Among girls, the most vulnerable groups concern those from highly urbanised areas, of low SE background and who are non-religious. These adolescents deserve special attention in preventive and health promotion activities. Among boys, some of these factors play a less important role in certain behaviours, yet they are not entirely meaningless (SEP in physical inactivity, religiosity in substance use and sexual debut). In other behaviours, these factors seem to be irrelevant for HRB among boys (DoU and parental education in substance use, religiosity in delinquent behaviours).

A very high proportion of adolescents of both genders and in all SE groups did not eat vegetables daily. This implies that all adolescents should be targeted by prevention activities aiming to increase regular vegetables consumption. However, girls from middle and low SE groups and boys from the lowest group deserve special attention, because the prevalence rates of other unhealthy nutritional behaviours are high among



them, along with a high prevalence rate of physical inactivity. The results may be interpreted such that among girls parents play a more important role in the consumption of fruits and a regular breakfast than in other kinds of HRB. This implies that parents in particular should be included in the promotion of these healthy nutritional habits.

Although research from Western Europe indicates that some HRBs tend to cluster together among adolescents (van Nieuwenhuijzen et al. 2009), time trends in the adolescent population do not necessarily develop in the same way for each behaviour; e.g. among Slovak low SEP boys, smoking prevalence rates decreased, but their physical inactivity prevalence rates remained stable between 1998 and 2006. Conversely, among low SEP girls, smoking prevalence rates increased, but at the same time their physical inactivity prevalence rates decreased. This implies that we should also consider a differential, not only integrative approach in health promotion and prevention activities.

In the decades to follow, equalisation trends in substance use towards those in Western European countries can be expected among adolescents from Central European countries. This would imply a further increase in binge drinking among females and an increase in cannabis consumption among both genders, but particularly among females and adolescents from low urbanised areas. These assumptions are likely based on the findings presented in our thesis, other research (Pitel et al. 2011; Kuntsche et al. 2011; Currie et al. 2004, 2008 and 2012) and on the HRB epidemic theory (Lopez et al., 1994; Pampel et al. 2001). Prevention and law-enforcement activities should be tailored accordingly.

#### **8.4.2 Implications for further research**

##### *General implications for further research*

As already mentioned in the limitations section, the cross-sectional design of our study does not allow for causal inferences. Studies with longitudinal design are needed to assess potential contributing factors and mechanisms. The model of HRB proposed by Petraitis, Flay and Miller (1995) may offer a framework for studying determinants of HRB from different domains (sociocultural, interpersonal and intrapersonal) and different levels of influence (proximal, distal, ultimate). More light has to be shed on the potential connections and influences of the mentioned domains and levels of influence, on the pathway mechanisms and on possible mediating and moderating effects (Veselska 2010). It would be very helpful in further research to include intrapersonal, interpersonal and biological variables as well (genetic, prenatal history, hormonal) in order to gain a more complete understanding regarding the relationship between gender/sex and various determinants of HRB.

It would also be useful to explore childhood factors and settings, including the role of parenting. Moreover, further research should

track changes by age in the explored relationships from childhood and adolescence till adulthood in order to conclude the nature of these relationships in lifetime periods other than adolescence and how these relationships possibly change with age.

More attention should also be paid to the clustering (co-occurrence) of HRB. It should be examined in more depth which behaviours cluster together and may be influenced by similar factors, such as family conditions. The findings from such studies would enable the designing of more efficient prevention programmes focused on several HRBs at the same time instead of separate prevention programmes for each of them (Veselska 2010; van Nieuwenhuijzen et al. 2009).

#### *Specific implications for further research*

Due to the possibility of international comparison, we used the same cut-offs for fruits and vegetables consumption as the HBSC studies (Currie et al. 2000). Thus, consumption of fruits or vegetables (measured separately) less frequent than seven days per week was considered unhealthy. However, this cut-off seems very strict as only very few respondents ate fresh fruits or fresh vegetables daily. But it is possible that a substantial portion of adolescents do not eat both fruits and vegetables daily, but do have a regular intake of fibre and vitamin C, since they may switch between fruits and vegetables each day. An additional combined measure could be more valid regarding this kind of nutritional behaviour. It would be useful to perform a study similar to ours, including also alternative SEP measures such as parental occupation and family affluence.

Since respondents in some countries may over-report church attendance (Brenner 2012) and a bias in reported sexual behaviour cannot be ruled out (Kalina et al. 2011), it would be useful to repeat our study with either adjustment for social desirability or with other methods of data collection, such as peer-reporting.

## **8.5 Conclusion**

We learned that in Slovakia, a Central European country, the associations between most adolescent HRBs and SEP and religiosity are similar to those found among adolescents in other industrialised countries (Cheung and Yeung 2011). In SEP, inverse but only weak associations were found. In religiosity, these associations were strong regarding substance use, moderate regarding some nutritional behaviours and weak or missing regarding violent behaviour.

We learned that in 2006, substance use was increasing with increasing DoU among Slovak girls, but that among boys substance use

and DoU were unrelated. This is in contrast with recent findings from the USA (Greggo et al. 2005; National Center on Addiction and Substance Abuse at Columbia University 2000) which indicated higher substance use in rural areas than in urban areas.

We also learned that gender *does* matter in several behaviours regarding the associations between HRB and all three sociocultural determinants explored. Where gender differences in the associations between HRB and a sociocultural determinant were found, the associations were always stronger among girls than among boys. If the relationships between the sociocultural determinants and HRB found in our study are of a causal nature, our findings suggest that girls are more prone to the influence by these determinants than boys regarding HRB – they are more protected by protective factors but also more vulnerable in unfavourable social conditions. However, we also learned that this moderating effect of gender differs by substance and sociocultural determinant. Regarding SE differences in HRB, gender differences were found in fruits and vegetables consumption but not in substance use. Regarding the differences in HRB by DoU and religiosity, gender differences were found in substance use.

Finally, we conclude that the magnitude of gender differences in HRB among Slovak adolescents is not static, but rather it changes over time, similarly as in other industrialised countries (Kuntsche et al. 2011; Boreham and Shaw 2001). Gender differences in HRB decreased between 1998 and 2006 mainly due to the increase in smoking and alcohol consumption among girls and due to the decrease in physical inactivity among them. We learned that time shifts in HRB among adolescents depend on gender but also on SEP. Moreover, we learned that SE differences in HRB among adolescents also develop in a different way among boys and among girls, depending on particular behaviours.

# References

- Abbott-Chapman J, Denholm C (2001) Adolescents' risk activities, risk hierarchies and the influence of religiosity. *Journal of Youth Studies*, 4:279-97.
- Abbott-Chapman J, Denholm C, Wyld C (2008) Gender differences in adolescent risk taking: are they diminishing? An Australian intergenerational study. *Youth & Society*, 40:131-54.
- Abraham M (1999) Illicit drug use, urbanization, and lifestyle in the Netherlands. *Journal of Drug Issues*, 29:565-85.
- Adams J, Parkinson L, Sanson-Fisher RW, Walsh RA (2008) Enhancing self-report of adolescent smoking: the effects of bogus pipeline and anonymity. *Addict Behav*, 33:1291-96.
- Baier CJ, Wright RE (2001) If you love me, keep my commandments: A meta-analysis of the effect of religion on crime. *Journal of Research in Crime and Delinquency*, 38:3-21.
- Baska T, Warren CW, Baskova M, Jones NR (2009) Prevalence of youth cigarette smoking and selected social factors in 25 European countries: findings from the Global Youth Tobacco Survey. *International Journal of Public Health*, 54:439-45.
- Befinoana M, Razanamihaja N (2011) Prevalence of tobacco use and associated factors among teenage pupils in Madagascar. *Sante Publique*, 23:465-74.
- Benda BB (1995) The effect of religion on adolescent delinquency revisited. *Journal of Research in Crime and Delinquency*, 32:446-66.
- Benda BB, Pope SK, Kelleher KJ (2006) Church attendance or religiousness. *Alcoholism Treatment Quarterly*, 24:75-87.
- Bergman MM, Scott J (2001) Young adolescents' wellbeing and health-risk behaviours. *Journal of Adolescence*, 24:183-97.
- Bjarnason D (2007) Concept Analysis of Religiosity. *Home Health Care Management & Practice*, 19:350-55.
- Boreham R, Shaw A (eds.) (2001) Smoking, drinking and drug use among young people in Scotland in 2000. Edinburgh: The Stationery Office.
- Boyce W, Torsheim T, Currie C, Zambon A (2006) The Family Affluence Scale as a measure of national wealth: validation of an adolescent self-report measure. *Social Indicators Research*, 78:473-87.
- Boyle MH, Offord DR (1986) Smoking, drinking and use of illicit drugs among adolescents in Ontario: prevalence, patterns of use and sociodemographic correlates. *Canadian Medical Association Journal*, 135:1113-21.
- Brener ND, Billy JOG, Grady WR (2003) Assessment of factors affecting the validity of self-reported health-risk behavior among adolescents:

- Evidence from the scientific literature. *Journal of Adolescent Health*, 33:436-57.
- Brenner PS (2012) Investigating the Effect of Bias in Survey Measures of Church Attendance. *Sociology of Religion*, 73:361-83.
- Cavelaars AE, Kunst AE, Geurts JJ, Crialesi R, Grotvedt L, Helmer U, et al. (2000) Educational differences in smoking: international comparison. *BMJ*, 320:1102-07.
- Cavelaars AE, Kunst AE, Mackenbach JP (1997) Socio-economic differences in risk factors for morbidity and mortality in the European community. *Journal of Health Psychology*, 3:353-72.
- Charilaou M, Karekla M, Constantinou M, Price S (2009) Relationship between physical activity and type of smoking behavior among adolescents and young adults in Cyprus. *Nicotine & Tobacco Research*, 11:969-76.
- Chassin L, Presson CC, Rose JS, Sherman SJ (1996) The natural history of cigarette smoking from adolescence to adulthood: Predictors of continuity and change. *Health Psychology*, 15:478-84.
- Chen E, Matthews KA (2002) Socioeconomic differences in children's health: how and why do these relationships change with age?. *Psychological Bulletin*, 128:295-329.
- Chen K, Kandel DB (1995) The natural history of drug use from adolescence to the mid-thirties in a general population sample. *American Journal of Public Health*, 85:41-47.
- Cheung CK, Yeung JWK (2011) Meta-analysis of relationships between religiosity and constructive and destructive behaviors among adolescents. *Children and Youth Services Review*, 33:376-85.
- Cochran JK, Wood PB, Arneklev BJ (1994) Is the religiosity-delinquency relationship spurious? A test of arousal and social control theories. *Journal of Research in Crime and Delinquency*, 31:92-123.
- Cohen RY, Brownell KD, Felix MRJ (1990) Age and sex differences in health habits and beliefs of schoolchildren. *Health Psychology*, 9:208-24.
- Crompton R, Lyonette C (2005) The new gender essentialism - domestic and family 'choices' and their relation to attitudes. *British Journal of Sociology*, 56:601-20.
- Cronk CE, Sarvela PD (1997) Alcohol, tobacco, and other drug use among rural small town and urban youth: A secondary analysis of the monitoring the future data set. *American Journal of Public Health*, 87:760-64.
- Currie C, Hurrelmann K, Settertobulte W, Smith R, Todd J (eds.) (2000) *Health and Health Behaviour among Young People*. Copenhagen: World Health Organization Regional Office for Europe.
- Currie C, Nic Gabhainn S, Godeau E, Roberts C, Smith R, Currie D et al. (eds.) (2008) *Inequalities in young people's health. Health behaviour in school-aged children international report from the 2005/2006 survey*. Copenhagen: WHO Regional Office for Europe.

- Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samdal O et al. (eds.) (2004) Young people's health in context. Health Behaviour in School-aged Children (HBSC) study: international report from the 2001/2002 survey. Copenhagen. World Health Organization Regional Office for Europe.
- Currie C, Zanotti C, Morgan A, Currie D, de Looze M, Roberts C et al. (eds.) (2012) Social determinants of health and well-being among young people. Health behaviour in school-aged children (HBSC) study: International report from the 2009/2010 survey. Copenhagen: WHO Regional Office for Europe.
- Currie CE, Elton RA, Todd J, Platt S (1997) Indicators of socioeconomic status for adolescents: the WHO Health Behaviour in School-aged Children Survey. *Health Education Research*, 12:385-97.
- Daponte-Codina A, Bolivar-Munoz J, Ocana-Riola R, Toro-Cardenas S, Mayoral-Cortes J (2009) Patterns of smoking according to individual social position, and to socio-economic environment in municipal areas, Spain 1987-2001. *Health & Place*, 15:709-16.
- Del Boca FK, Noll JA (2000) Truth or consequences: the validity of self-report data in health services research on addictions. *Addiction*, 95(Suppl.):S347-60.
- Demidenko E (2008) Sample size and optimal design for logistic regression with binary interaction. *Statistics in Medicine*, 27:36-46.
- Deschamps V, Salanave B, Vernay M, Guignon N, Castetbon K (2010) Facteurs socioéconomiques associés aux habitudes alimentaires et à l'activité physique des adolescents en classe de troisième en France (2003-2004) – Cycle triennal d'enquêtes en milieu scolaire. *Bulletin Epidemiologique Hebdomadaire*, 28:113-117.
- Doku D, Koivusilta L, Rainio S, Rimpela A (2010) Socioeconomic differences in smoking among Finnish adolescents from 1977 to 2007. *Journal of Adolescent Health*, 47:479-87.
- Droomers M, Schrijvers CTM, Stronks K, van de Mheen D, Mackenbach JP (1999) Educational differences in excessive alcohol consumption: the role of psychosocial and material stressors. *Preventive Medicine*, 29:1-10.
- Durkheim E (1915) *The elementary forms of the religious life, a study in religious sociology*. London: G. Allen & Unwin.
- Emslie C, Hunt K, MacIntyre S (2002) How similar are the smoking and drinking habits of men and women in non-manual jobs?. *European Journal of Public Health*, 12:22-28.
- European Commission (2012) Eurobarometer 66.3 (11-12 2006). Brussels: TNS Opinion & Social and Cologne: GESIS Data Archive. doi:10.4232/1.10982
- Eurostat News Release STAT/07/23 (2007). Eurostat Press Office, Luxembourg.

- Fishbach A, Friedman RS, Kruglanski AW (2003) Leading us not into temptation: Momentary allurements elicit overriding goal activation. *Journal of Personality and Social Psychology*, 84:296-309.
- Fuller E (ed.) (2007) *Smoking, Drinking and Drug Use among Young People in England in 2006*. The Information Centre, Lifestyles Statistics.
- Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G (2006) Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health*, 60:7-12.
- Geckova A (2002) *Inequality in health among Slovak adolescents [dissertation]*. Groningen: University of Groningen. <http://dissertations.ub.rug.nl/faculties/medicine/2002/a.geckova/>
- Geckova A, van Dijk JP, Groothoff JW, Post D (2002) Socio-economic differences in health risk behaviour and attitudes towards health risk behaviour among Slovak adolescents. *Sozial- und Präventivmedizin*, 47:233-39.
- Georgiades K, Boyle MH, Duku E, Racine Y (2006) Tobacco use among immigrant and nonimmigrant adolescents: individual and family level influences. *Journal of Adolescent Health*, 38:e1-e7.
- Ghouri N, Atcha M, Sheikh A (2006) Public health - influence of islam on smoking among muslims. *BMJ*, 332:291-94.
- Gibbs JP (1966) Measures of Urbanization. *Social Forces*, 45:170-77.
- Goodman E, Huang B (2002) Socioeconomic status, depressive symptoms, and adolescent substance use. *Archives of Pediatrics & Adolescent Medicine*, 156:448-53.
- Graham H. Smoking prevalence among women in the European community 1950-1990 (1996) *Social Science & Medicine*, 43:243-54.
- Grasmick HG, Hagan J, Blackwell BS, Arneklev BJ (1996) Risk preferences and patriarchy: extending power-control theory. *Social Forces*, 75:178-99.
- Greggo J, Jones SE, Kann L (2005) Population density and alcohol-related risk behaviors among US high school students. *American Journal of Health Education*, 36:148-54.
- Griesler PC, Kandel DB (1998) Ethnic differences in correlates of adolescent cigarette smoking. *Journal of Adolescent Health*, 23:167-80.
- Hafeiz HB (1995) Sociodemographic correlates and pattern of drug-abuse in eastern Saudi-Arabia. *Drug and Alcohol Dependence*, 38:255-59.
- Hancock JR, Poulton R (2006) Watching television is associated with childhood obesity: but is it clinically important?. *Int J Obes (Lond)*, 30:171-75.
- Hanson MD, Chen E (2007) Socioeconomic status and health behaviors in adolescence: A review of the literature. *Journal of Behavioral Medicine*, 30:263-85.
- Helakorpi S, Mäkelä P, Uutela A (2010) Alcohol consumption before and after a significant reduction of alcohol prices in 2004 in Finland:

- were the effects different across population subgroups?. *Alcohol and Alcoholism*, 45:286-92.
- Hibell B, Andersson B, Ahlstrom S, Balakireva O, Bjarnason T, Kokkevi A et al. (2000) The 1999 ESPAD Report. Alcohol and other drug use among students in 30 European countries. Stockholm: Swedish Council for Information on Alcohol and Other Drugs.
- Hibell B, Andersson B, Bjarnason T, Ahlstrom S, Balakireva O, Kokkevi A et al. (2004) The ESPAD Report 2003. Alcohol and other drug use among students in 35 European countries. Stockholm: Swedish Council for Information on Alcohol and Other Drugs and the Pompidou Group at the Council of Europe.
- Hibell B, Andersson B, Bjarnason T, Kokkevi A, Morgan M, Narusk A (1997) The 1995 ESPAD Report. Alcohol and other drug use among students in 26 European countries. Stockholm: Swedish Council for Information on Alcohol and Other Drugs.
- Holdcroft B (2006) What is religiosity?. *Catholic Education: A Journal of Inquiry and Practice*, 10:89-103.
- Holmbeck GN (2002) A Developmental perspective on adolescent health and illness. *Journal of Pediatric Psychology*, 27:409-15.
- Hurre T, Aro H, Rahkonen O. Well-being and health behaviour by parental socioeconomic status e a follow-up study of adolescents aged 16 until age 32 years. *Social Psychiatry and Psychiatric Epidemiology*, 38:249-55.
- Idris BI, Giskes K, Borrell C, Benach J, Costa G, Federico B, Helakorpi S, Helmert U, Lahelma E, Moussa KM, Ostergren PO, Prattala R, Rasmussen NK, Mackenbach JP, Kunst AE (2007) Higher smoking prevalence in urban compared to non-urban areas: Time trends in six, European countries. *Health & Place*, 13:702-12.
- Ikeda N, Inoue M, Iso H, Ikeda S, Satoh T, Noda M et al. (2012) Adult mortality attributable to preventable risk factors for non-communicable diseases and injuries in Japan: A comparative risk assessment. *PLoS Medicine*, 9:e1001160.
- Ilhan IO, Yildirim F, Demirbas H, Dogan YB (2009) Prevalence and sociodemographic correlates of substance use in a university-student sample in Turkey. *International Journal of Public Health*, 54:40-44.
- Institute of Information and Prognoses on Education, Slovakia (2011) <http://www.uips.sk>. Accessed 13 Apr 2011.
- Isralowitz R, Rawson R (2006) Gender differences in prevalence of drug use among high risk adolescents in Israel. *Addictive Behaviors*, 31:355-58.
- Janssen I, Boyce WF, Simpson K, Pickett W (2006) Influence of individual- and area-level measures of socioeconomic status on obesity, unhealthy eating, and physical inactivity in Canadian adolescents. *American Journal of Clinical Nutrition*, 83:139-45.



- Jeffery RW, French SA (1996) Socioeconomic status and weight control practices among 20- to 45-year-old women. *American Journal of Public Health*, 86:1005-10.
- Johansen A, Rasmussen S, Madsen M (2006) Health behaviour among adolescents in Denmark: Influence of school class and individual risk factors. *Scandinavian Journal of Public Health*, 34:32-40.
- Jones RK, Darroch JE, Singh S. Religious differentials in the sexual and reproductive behaviors of young women in the United States. *Journal of Adolescent Health*, 36:279-88.
- Kalaboka S, Piau JP, King G, Moreau D, Choquet M, Annesi-Maesano I (2008) Sex and gender differences in tobacco smoking among adolescents in French secondary schools. *Monaldi Archives for Chest Disease*, 69:142-51.
- Kalina O, Madarasova Geckova A, Klein D, Jarcuska P, Orosova O, van Dijk JP et al. (2011) Psychosocial factors associated with sexual behaviour in early adolescence. *European Journal of Contraception and Reproductive Health Care*, 16:298-306.
- Kasl SV, Cobb S (1966) Health behavior, illness behavior, and sick role behavior. *Archives of Environmental Health*, 12:246-66.
- King A, Wold B, Tudor-Smith C, Harel Y (1996) *The health of youth: a cross-national survey*. Copenhagen: WHO Regional Publications.
- Kolarcik P, Madarasová Gecková A, Orosova O, van Dijk JP, Reijneveld SA (2009) To what extent does SES explain differences in health between Roma and non-Roma adolescents in Slovakia? *Social Science & Medicine*, 68:1279-84.
- Kovacs E, Piko BF, Fitzpatrick KM. Religiosity as a protective factor against substance use among Hungarian high school Students. *Substance Use & Misuse*, 46:1346-57.
- Kristjansdottir G, Vilhjalmsón R (2001) Sociodemographic differences in patterns of sedentary and physically active behavior in older children and adolescents. *Acta Paediatrica*, 90:429-35.
- Kunst AE (1997) *Cross-national comparisons of socio-economic differences in mortality [dissertation]*. Rotterdam: Erasmus University Rotterdam.
- Kunst AE, Mackenbach JP (1995) *Measuring socioeconomic inequalities in health*. Copenhagen: World Health Organisation.
- Kuntsche E, Kuntsche S, Knibbe R, Simmons-Morton B, Farhat T, Hublet A et al. (2001) Cultural and gender convergence in adolescent drunkenness: Evidence from 23 European and North American countries. *Archives of Pediatrics & Adolescent Medicine*, 165:152-58.
- Laflin MT, Wang J, Barry M (2008) A longitudinal study of adolescent transition from virgin to nonvirgin status. *Journal of Adolescent Health*, 42:228-36.
- Lammers C, Ireland M, Resnick M, Blum R (2000) Influences on adolescents' decision to postpone onset of sexual intercourse:

a survival analysis of virginity among youths aged 13 to 18 years. *Journal of Adolescent Health*, 26:42-48.

Levin KA, Kirby JLM, Currie C (2012) Family structure and breakfast consumption of 11-15 year old boys and girls in Scotland, 1994-2010: a repeated cross-sectional study. *BMC Public Health*, 12:228.

Liberatos P, Link BG, Kelsey JL (1988) The measurement of social class in epidemiology. *Epidemiologic Reviews*, 10:87-121.

Lien N, Friestad C, Klepp K-I (2001) Adolescents' proxy reports of parents' socioeconomic status: How valid are they?. *Journal of Epidemiology and Community Health*, 55:731-37.

Limstrand T, Rehrer NJ (2008) Young people's use of sports facilities: a Norwegian study on physical activity. *Scandinavian Journal of Public Health*, 36:452-59.

Liu Y, Wang M, Villberg J, Torsheim T, Tynjälä J, Lv Y et al. (2012) Reliability and Validity of Family Affluence Scale (FAS II) among Adolescents in Beijing, China. *Child Indicators Research*, 5:235-51.

Lopez AD, Collishaw NE, Piha T (1994) A descriptive model of the cigarette epidemic in developed countries. *Tobacco Control*, 3:242-47.

Lopez AD, Collishaw NE, Piha T (1994) A descriptive model of the cigarette epidemic in developed countries. *Tobacco Control*, 3:242-47.

Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL (2006) Global and regional burden of disease and risk factors, 2001: Systematic analysis of population health data. *Lancet* 367:1747-57.

Lowry R, Kann L, Collins JL, Kolbe LJ (1996) The effect of socioeconomic status on chronic disease risk behaviors among US adolescents. *Journal of American Medical Association*, 276:792-97.

Luoto R, Poikolainenb K, Uutela A (1998) Unemployment, sociodemographic background and consumption of alcohol before and during the economic recession of the 1990s in Finland. *International Journal of Epidemiology*, 27:623-29.

Madarasová Gecková A, Stewart R, van Dijk JP, Orosová O, Groothoff JW, Post D (2005) Influence of socio-economic status, parents and peers on smoking behaviour of adolescents. *European Addiction Research*, 11:204-09.

Mager U, Griebler R, Dur W, Samdal O, Maes L, Haug E et al. (2010) School-level questionnaire. HBSC Research Protocol for the 2009/2010 Survey (80-88). Edinburgh: CAHRU & Vienna: LBIHPR.

Makela P, Gmel G, Grittner U, Kuendig H, Kuntsche S, Bloomfield K et al. (2006) Drinking patterns and their gender differences in Europe. *Alcohol and Alcoholism*, 41:18-18.

Marmot M, Bobak M (2005) Social and economic changes and health in Europe East and West. *European Review*, 13:15-31.

Matheson J, Summerfield C (eds.) (2000) *Social Trends 30: 2000 Edn.* London: Office for National Statistics.

McCullough ME, Willoughby BLB (2009) Religion, self-regulation, and self-control: Associations, explanations, and implications. *Psychological Bulletin*, 135:69-93.

McGinnis JM; Foege WH (1993) Actual causes of death in the United States. *Journal of American Medical Association*, 270:2207-12.

Mittlemark MB, Murray DM, Luepker RV, Pechacek TF, Pirie PL, Pallonen UE (1987) Predicting experimentation with cigarettes: the Childhood Antecedents of Smoking Study (CASS). *American Journal of Public Health*, 77:206-08.

Nam JM (1987) A Simple approximation for calculating sample sizes for detecting linear trend in proportions. *Biometrics*, 43:701-05.

National Center on Addiction and Substance Abuse at Columbia University (2000) *No place to hide: Substance abuse in mid-size cities and rural America.* New York: National Center on Addiction and Substance Abuse.

Nocon M, Keil T, Willich SN (2007) Education, income, occupational status and health risk behaviour. *Journal of Public Health*, 15:401-05.

Okulicz-Kozaryn K, Borucka A (2008) Warsaw adolescent alcohol use in a period of social change in Poland: cluster analyses of five consecutive surveys, 1988 to 2004. *Addictive Behaviors*, 33:439-50.

Ompad DC, Galea S, Caiaffa WT, Vlahov D (2007) Social determinants of the health of urban populations: Methodologic considerations. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 84(Suppl.1):42-53.

Ortiz-Hernández L, Gómez-Tello BL (2008) Food consumption in Mexican adolescents. *Pan American Journal of Public Health*, 24:127-35.

Pampel FC (2001) Cigarette diffusion and sex differences in smoking. *Journal of Health and Social Behavior*, 42:388-404.

Pape H, Rossow I, Storvoll EE (2008) Wetter and better? Changes in associations between drunkenness and other problem behaviors among Norwegian youth. *European Addiction Research*, 14:61-70.

Pedersen CB, Mortensen PB (2006) Urbanization and traffic related exposures as risk factors for Schizophrenia. *BMC Psychiatry* 2006, 6.

Petratis J, Flay BR, Miller TQ (1995). Reviewing theories of adolescent substance use: Organizing pieces in the puzzle. *Psychological Bulletin*, 117:67-86.

Piko BF, Fitzpatrick KM (2004) Substance use, religiosity, and other protective factors among Hungarian adolescents. *Addictive Behaviors*, 29:1095-107.

Piko BF, Fitzpatrick KM (2007) Socioeconomic status, psychosocial health and health behaviours among Hungarian adolescents. *European Journal of Public Health*, 17:353-60.

Pitel L, Madarasová Gecková A, van Dijk JP, Reijneveld SA (2010) Gender differences in adolescent health-related behaviour diminished between 1998 and 2006. *Public Health*, 124:512-18.

Pitel L, Madarasova Geckova A, van Dijk JP, Reijneveld SA (2011a) Degree of urbanization and gender differences in substance use among Slovak adolescents. *International Journal of Public Health*, 56:645-51.

Pitel L, Madarasova Geckova A, Reijneveld SA, van Dijk JP (2011b) Degree of urbanization and substance use among Slovak adolescent boys and girls in 2010. *European Journal of Public Health*, 21(Suppl.1):32-33.

Poelen EAP, Scholte RHJ, Engels RCME, Boomsma DI, Willemsen G (2005) Prevalence and trends of alcohol use and misuse among adolescents and young adults in the Netherlands from 1993 to 2000. *Drug and Alcohol Dependence*, 79:413-21.

Pomerleau J, Gilmore A, Mckee M, Rose R, Haerper CW (2004) Determinants of smoking in eight countries of the former Soviet Union: results from the living conditions, lifestyles and health study. *Addiction*, 99:1577-85.

Puska P (1997) Smoking in Central and Eastern Europe. In: Waller M, Lipponen S, Finnish C (eds.) *Smokefree Europe: A forum for networks* (138-45). Jyväskylä: Gummerus Printing.

Raithel J (2004) *Gesundheitsrelevantes Verhalten und Lebensstile Jugendlicher*. Lengerich: Pabst.

Rasmussen M, Due P, Damsgard MT, Holstein BE (2009) Social inequality in adolescent daily smoking: has it changed over time?. *Scandinavian Journal of Public Health*, 37:287-94.

Reijneveld SA, Gunning-Schepers LJ (1995) Age, health and the measurement of the socio-economic status of individuals. *European Journal of Public Health*, 5:187-92.

Richter M (2009) *Risk behaviour in adolescence: Patterns, determinants and consequences [habilitation]*. Bielefeld: University of Bielefeld.

Richter M, Leppin A (2007) Trends in socio-economic differences in tobacco smoking among German schoolchildren, 1994-2002. *European Journal of Public Health*, 17:565-71.

Rodondi PY, Narring F, Michaud PA (2000) Drinking behaviour among teenagers in Switzerland and correlation with lifestyles. *European Journal of Pediatrics*, 159:602-07.

Rogers E (1962) *Diffusion of innovations*. London: Macmillan.

Rogers E, Shoemaker F (1971) *Communication of Innovations: A cross-cultural approach*. London: Macmillan.

Rose BM, Holmbeck GN, Coakley RM, Franks EA (2004) Mediator and moderator effects in developmental and behavioral pediatric research. *Developmental and Behavioral Pediatrics*, 25:58-67.

Rosenbaum E, Kandel DB (1990) Early onset of adolescent sexual behavior and drug involvement. *Journal of Marriage and the Family*, 52:783-98.

Saarento O, Oiesvold T, Göstas G, Christiansen LW, Lindhardt A, Lönnerberg O et al. (1996) The Nordic comparative study on sectorized psychiatry. III.: Accessibility of psychiatric services, degree of urbanization and treated incidence. *Social Psychiatry and Psychiatric Epidemiology*, 31:259-65.

Salonna F (2012) Health inequalities among Slovak adolescents over time [dissertation]. Groningen: University of Groningen. <http://dissertations.uib.rug.nl/faculties/medicine/2012/f.salonna/>

Salonna F, van Dijk JP, Madarasová Gecková A, Sleskova M, Groothoff JW, Reijneveld SA (2008) Social inequalities in changes in health-related behaviour among Slovak adolescents aged between 15 and 19: A longitudinal study. *BMC Public Health*, 8:57.

Sandercock G, Angus C, Barton, J (2010) Physical activity levels of children living in different built environments. *Preventive Medicine*, 50:193-98.

Scragg R, Laugesen M, Robinson E (2002) Cigarette smoking, pocket money and socioeconomic status: results from a national survey of 4th form students in 2000. *New Zealand Medical Journal* 115:1158.

Singh-Manoux A, Marmot M (2005) Role of socialization in explaining social inequalities in health. *Social Science & Medicine*, 60:2129-33.

Sobal J, Stunkard AJ (1989) Socioeconomic status and obesity: a review of the literature. *Psychological Bulletin*, 105:260-75.

Statistical Office of Slovak Republic (2003) Sčítanie obyvateľov, domov a bytov 2001—Definitívne výsledky za SR, NUTS2, kraje, okresy a obce (Census of population, houses and flats 2001—Final results for the Slovak Republic, NUTS2, regions, districts and communities). Statistical Office of Slovak Republic, Bratislava.

Steinman KJ, Zimmermann MA (2004) Religious activity and risk behavior among African American adolescents: concurrent and developmental effects. *American Journal of Community Psychology*, 33:151-61.

Stringhini S, Dugravot A, Shipley M, Goldberg M, Zins M, Kivimäki M et al. (2011) Health behaviours, socioeconomic status, and mortality: further analyses of the British Whitehall II and the French GAZEL prospective cohorts. *PLOS Medicine*, 8:e1000419.

Sujoldzić A, De Lucia A (2007) A cross-cultural study of adolescents - BMI, body image and psychological well-being. *Collegium Antropologicum*, 31:123-30.

Sundquist K, Frank G (2004) Urbanization and hospital admission rates for alcohol and drug abuse: a follow-up study of 4.5 million women and men in Sweden. *Addiction*, 99:1298-1305.

Sutton S (2004) Determinants of health-related behaviours: Theoretical and methodological issues. In: Sutton S, Baum A, Johnston M (eds.). *The Sage Handbook of Health Psychology* (94-126). London: Sage Publications.

Sutton S (2004) determinants of health-related behaviours: Theoretical and methodological issues. In: Sutton S, Baum A, Johnston M (eds.). *The Sage Handbook of Health Psychology* (94-126). London: Sage Publications.

Thurston RC, Kubzansky LD, Kawachi I, Berkman LF (2005) Is the Association between Socioeconomic Position and Coronary Heart Disease Stronger in Women than in Men?. *American Journal of Epidemiology*, 162:57-65.

Tomcikova Z, Madarasová Gecková A, Orosova O, van Dijk JP, Reijneveld SA (2009) Parental divorce and adolescent drunkenness: Role of socioeconomic position, psychological well-being and social support. *European Addiction Research*, 15:202-08.

Tomcikova Z, Madarasová Gecková A, van Dijk JP, Reijneveld SA. Characteristics of adolescent excessive drinkers compared with consumers and abstainers. *Drug and Alcohol Review*. 2011;30:157-65.

Tuinstra J, Groothoff JW, van den Heuvel WJA, Post D (1998) Socio-economic differences in health risk behaviour in adolescence. Do they exist?. *Social Science & Medicine*, 47:67-74.

Tyroler HA (1999) The influence of socio-economic factors on cardiovascular disease risk factor development. *Preventive Medicine*, 29:36-40.

Upchurch DM, Aneshensel CS, Sucoff CA, Levy-Storms L (1999) Neighborhood and family contexts of adolescent sexual activity. *Journal of Marriage and Family*, 61:920-33.

Urberg KA, Değirmencioğlu SM, Pilgrim C (1997) Close friend and group influence on adolescent cigarette smoking and alcohol use. *Developmental Psychopathology*, 33:834-44.

Ustav informacii a prognoz školstva. *Statisticka rocenka 1998* (1998) Bratislava: Ustav informacii a prognoz školstva.

Ustav informacii a prognoz školstva. *Statisticka rocenka 2006* (2006) Bratislava: Ustav informacii a prognoz školstva.

van den Bree MB, Whitmer MD, Pickworth WB (2004) Predictors of smoking development in a population based sample of adolescents: a prospective study. *Journal of Adolescent Health*, 35:172-81.

Van Gundy K, Schieman S, Kelley MS, Rebellon CJ (2005) Gender role orientations and alcohol use among Moscow and Toronto adults. *Social Science & Medicine*, 61:2317-30.

van Nieuwenhuijzen M, Junger M, Klein Velderman M, Wiefferink KH, Paulussen TWGM, Hox J, et al. (2009) Clustering of health-compromising behavior and delinquency in adolescence and adults in Dutch population. *Preventive Medicine*, 48:572-78.

Veselska Z (2010) Intrapersonal factors, social context and health-related behavior in adolescence [dissertation]. Groningen: University of Groningen. <http://dissertations.ub.rug.nl/faculties/medicine/2010/z.vaselska/>

Wallace JM, Forman TA (1998) Religion's role in promoting health and reducing risk among American youth. *Health Education & Behavior*, 25:721-41.

Wardle J, Jarvis MJ, Steggles N, Sutton S, Williamson S, Farrimond H et al. (2003) Socioeconomic disparities in cancer-risk behaviors in adolescence: baseline results from the Health and Behaviour in Teenagers Study (HABITS). *Preventive Medicine*, 36:721-30.

West P (1997) Health inequalities in the early years: is there equalisation in youth?. *Social Science & Medicine*, 44:833-58.

West P, Sweeting H, Russel E (1999) Family and friends' influences on the uptake of regular smoking from mid-adolescence to early adulthood. *Addiction*, 94:1397-411.

White VM, Hayman J, Hill DJ (2008) Can population-based tobacco control policies change smoking behaviors of adolescents from all socio-economic groups? Findings from Australia: 1987-2005. *Cancer Causes & Control*, 19:631-40.

Williams JH, Van Dorn RA, Ayers CD, Bright CL, Abbott RD, Hawkins JD (2007) Understanding race and gender differences in delinquent acts and alcohol and marijuana use: A developmental analysis of initiation. *Social Work Research*, 31:71-81.

Williams PG, Holmbeck GN, Greenley RN (2002) Adolescent Health Psychology. *Journal of Consulting and Clinical Psychology*, 70:828-42.

World Health Organization (2010) Sex, gender and influenza. Geneva: WHO Press.

Wu AD, Zumbo BD (2008) Understanding and using mediators and moderators. *Social Indicators Research*, 87:367-92.

Xie B, Gilliland FD, Li YF, Rockett HR (2003) Effects of ethnicity, family income, and education on dietary intake among adolescents. *Preventive Medicine*, 36:30-40.

Zaleski EH, Schiaffino KM (2000) Religiosity and sexual risk-taking behavior during the transition to college. *Journal of Adolescence*, 23:223-27.

# Summary

Thus far, research on the relationships between health-related behaviour (HRB) and sociocultural determinants among adolescents has been scarce regarding the countries of Central Europe. This holds true even more so for research on the role of gender in these relationships. The aim of this thesis is to contribute to a better understanding of the relationship between various HRBs of adolescents and their socioeconomic position, the degree of urbanisation of their environment and their religiosity. Furthermore, we explored trends in socioeconomic differences and gender differences in HRB among adolescents between 1998 and 2006, as social and economic circumstances changed greatly during that period. This may have a certain impact on the mentioned relationships and on the role of gender.

Chapter 1 provides general information on the key variables explored in this thesis: adolescent HRB (smoking, drunkenness, cannabis use and others), selected social determinants (socioeconomic position, degree of urbanisation and religiosity) and time trends regarding gender differences and socioeconomic differences in adolescent HRB. A model of assumed associations between the studied variables is also presented.

Chapter 2 contains a description of the three research samples used in this thesis. It also provides information on the measures and statistical analyses that were used.

Chapter 3 provides information on the association between socioeconomic position and a broad range of HRBs among adolescents, and does so for boys and girls separately. Furthermore, it explores gender differences in this association. Lower socioeconomic groups tended to participate in unhealthy behaviours more frequently than the highest socioeconomic group, but the differences were relatively small and frequently not statistically significant or were for only one gender. In daily breakfast and physical inactivity, socioeconomic differences were found among both genders. In sweets consumption, socioeconomic differences were found only among boys. In fruits consumption, vegetables consumption and smoking, socioeconomic differences were found only among girls. In drunkenness, alcohol consumption and cannabis use, no socioeconomic differences were found. Among boys, socioeconomic differences were found only between the highest and the lowest socioeconomic group. Socioeconomic differences significantly differed statistically in magnitude by gender only in fruits consumption and in vegetables consumption, where the socioeconomic differences were larger among girls.



Chapter 4 provides information on the association between the degree of urbanisation and adolescent smoking, drunkenness and cannabis use, again for boys and girls separately. Furthermore, gender differences in this association were explored. The degree of urbanisation was related to HRB only among girls. The prevalence rates of substance use among girls increased with an increasing degree of urbanisation, while the prevalence rates of substance use among boys remained constant. Gender, degree of urbanisation and their interaction had statistically significant associations with all three of the analysed behaviours: smoking, binge drinking and cannabis use.

Chapter 5 provides information on the association between religiosity and a broad range of HRBs among adolescents, both for the whole sample and for boys and girls separately. Furthermore, gender differences in this association are explored. Religiosity was inversely associated with unhealthy behaviour regarding smoking, drunkenness, cannabis use, having breakfast, soft drinks consumption, screen-based activities and sexual intercourse (all: both genders) and regarding truancy (girls only). Associations were significantly stronger among girls than among boys regarding smoking, drunkenness and cannabis use. Religiosity was unrelated to consumption of fruits, vegetables and sweets, physical inactivity, tooth brushing, fighting and bullying others in both genders.

Chapter 6 provides information on whether any shifts took place in the association between socioeconomic position and smoking, use of alcohol and physical inactivity between 1998 and 2006 among Slovak adolescents. The higher frequency of smoking in the low socioeconomic group compared with the high socioeconomic group decreased between 1998 and 2006 among boys (OR for the interaction of time and socioeconomic position: 0.54) but this socioeconomic gradient became evident among girls (OR for the same interaction: 1.96). For alcohol consumption, no socioeconomic differences were found among boys in both years, and socioeconomic differences existing in 1998 disappeared among girls in 2006. In physical inactivity, socioeconomic differences increased among boys but not among girls. Overall, socioeconomic differences in HRB developed in a different way for boys and girls between 1998 and 2006. Prevalence rates of substance use increased especially among girls with a low socioeconomic position.

Chapter 7 provides information on the magnitude of gender differences in smoking, use of alcohol and physical inactivity among Slovak adolescents and whether shifts took place in these gender differences between 1998 and 2006. These gender differences were also assessed in three separate groups of adolescents according to their socioeconomic position. In 1998, gender differences were found for all three behaviours that were explored: boys had higher prevalence rates of smoking and

alcohol use and lower prevalence rates of physical inactivity than girls. In 2006 the only remaining gender difference concerned physical inactivity, but this difference was substantially smaller than in 1998. The shifts in the boys-girls ratios were statistically significant in smoking and physical inactivity but not in alcohol use. The prevalence of alcohol use increased among both genders, while the prevalence of smoking in boys dropped below that of girls, and the physical activity of girls increased substantially. The changes in gender ratios varied strongly by socioeconomic group. The greatest shift in the gender ratio of smoking occurred in the middle socioeconomic group, both among boys (a decrease) and girls (an increase). Changes in gender ratios over time among adolescents from the highest socioeconomic group were much smaller.

In Chapter 8, the main findings of this thesis are summarised and discussed. The changes in HRB prevalence rates and in the gender and socioeconomic patterns of HRB among Slovak adolescents between 1998 and 2006 may partly be explained by social and economic stabilisation in Slovakia during the time concerned after the difficult transition era from a planned to a market economy in the 1990s. The shifts, particularly in smoking, can also be explained as an assessment of different stages of an HRB epidemic. According to the diffusion of innovation theory, any trend introduced into a segment of society, such as youth, is first picked up by males from the elites and only later spreads among females and among people with lower socioeconomic position.

Chapter 8 also addresses the strengths and limitations of the study and its implications for further research and public health practice. The associations between the sociocultural determinants and HRB were particularly strong among girls. Their social and cultural environment requires that special attention be focused on their health habits. Among girls, the most vulnerable groups concern those from bigger cities and from a low socioeconomic background, and those who are non-religious. Among boys, these factors frequently play a less important role, though they are not entirely meaningless (socioeconomic position in physical inactivity, religiosity in substance use and sexual debut). During the decades to come, a further increase can be expected in Central European countries in binge drinking among females and an increase in cannabis consumption among both genders, particularly among adolescents from low urbanised areas. This should be taken into consideration in prevention activities and public health policies. Changes in the explored relationships from childhood and adolescence till adulthood should be further studied in order to determine the nature of these relationships before and after adolescence and how these relationships may change with age. In such further research it would be very helpful to include intrapersonal, interpersonal and biological variables too to get a more complete understanding about the relationship between gender, sex and various determinants of HRB.



# Samenvatting

Onderzoek naar de verbanden tussen gezondheidsgerelateerd gedrag (GGG) en socio-culturele determinanten bij jongeren uit landen in Centraal-Europa is tot nu toe schaars. Dit geldt nog meer voor onderzoek naar de rol van geslacht in deze verbanden. Het doel van dit proefschrift is bij te dragen aan de kennis over het verband tussen verschillende vormen van GGG van adolescenten en hun sociaal-economische positie, de mate van verstedelijking van hun woonomgeving, en hun religiositeit. Verder hebben we de trends onderzocht in sociaal-economische verschillen en geslachtsverschillen met betrekking tot GGG van adolescenten tussen 1998 en 2006, omdat de sociale en economische omstandigheden in die periode erg veranderd zijn. Dat kan een zekere invloed hebben op deze verbanden en op de rol van geslacht.

In Hoofdstuk 1 wordt algemene informatie over de belangrijkste variabelen in dit proefschrift gegeven: GGG onder jongeren (roken, dronkenschap, gebruik van cannabis en andere middelen), bepaalde sociale kenmerken (sociaal-economische positie, de mate van verstedelijking en religiositeit), en trends door de tijd wat betreft geslachtsverschillen en sociaal-economische verschillen in GGG bij adolescenten. De veronderstelde verbanden tussen de bestudeerde variabelen worden in een model gepresenteerd.

Hoofdstuk 2 bevat een beschrijving van de drie steekproeven die zijn gebruikt in dit proefschrift. Het levert ook informatie over de meetinstrumenten en de statistische analyses die zijn gebruikt.

In Hoofdstuk 3 wordt ingegaan op het verband tussen de sociaal-economische positie en een breed scala aan vormen van GGG bij adolescenten, voor jongens en meisjes afzonderlijk. Verder worden geslachtsverschillen tussen deze verbanden onderzocht. Lagere sociaal-economische groepen hebben vaker ongezond GGG dan de hoogste sociaal-economische groep, maar de verschillen waren relatief klein en vaak niet statistisch significant of slechts voor één geslacht. Sociaal-economische verschillen in het overslaan van het dagelijks ontbijt en lichamelijke inactiviteit werden gevonden tussen beide geslachten. Dergelijke verschillen in snoepen werden alleen gevonden bij jongens. Sociaal-economische verschillen in het eten van fruit en van groenten en van roken werden alleen gevonden bij meisjes. Geen sociaal-economische verschillen werden gevonden bij dronkenschap, alcohol- en cannabisgebruik. Bij jongens werden sociaal-economische verschillen alleen gevonden tussen de hoogste en de laagste sociaal-economische groep. Er bestonden statistisch significante socio-economische verschillen

met betrekking tot de omvang naar geslacht alleen bij de fruit- en groentenconsumptie waarbij de sociaal-economische verschillen groter waren bij de meisjes.

In Hoofdstuk 4 wordt ingegaan op het verband tussen de mate van verstedelijking en rookgedrag, dronkenschap en cannabisgebruik, voor jongens en meisjes afzonderlijk. Verder werden geslachtsverschillen tussen deze verbanden onderzocht. De mate van verstedelijking was alleen bij meisjes gerelateerd aan hun GGG. De prevalentie van middelengebruik bij meisjes nam toe met een toenemende mate van verstedelijking, terwijl de prevalentie van middelengebruik onder jongens constant bleef. Geslacht, de mate van verstedelijking en hun interactie hadden een statistisch significant verband met alle drie de onderzochte gedragingen, te weten roken, dronkenschap en cannabisgebruik.

In Hoofdstuk 5 staat het verband tussen religiositeit en een breed scala aan vormen van GGG bij adolescenten centraal, zowel voor de gehele steekproef als voor jongens en meisjes apart. Verder werden geslachtsverschillen in deze verbanden onderzocht. Religiositeit hing omgekeerd samen met ongezond gedrag ten aanzien van roken, dronkenschap, cannabisgebruik, het ontbijt, de consumptie van frisdranken, beeldschermactiviteiten en geslachtsgemeenschap (wat betreft alle gedragingen: zowel jongens als meisjes) en met spijbelen (alleen meisjes). Deze verbanden waren significant sterker bij meisjes dan bij jongens wat betreft roken, dronkenschap en cannabisgebruik. Religiositeit was in beide geslachten niet gerelateerd aan de consumptie van fruit, groenten en snoep, lichamelijke inactiviteit, tandenpoetsen, vechten en het pesten van anderen.

Hoofdstuk 6 richt zich op de vraag of er onder de Slowaakse adolescenten tussen 1998 en 2006 verschuivingen hebben plaatsgevonden in het verband tussen sociaal-economische positie en roken, het gebruik van alcohol en de mate van lichamelijke inactiviteit. Het vaker roken in de lage sociaal-economische groep in vergelijking met de hoge sociaal-economische groep nam af tussen 1998 en 2006 bij jongens (odds ratio, OR, voor de interactie van de tijd en de sociaal-economische positie: 0,54), maar deze sociaal-economische gradiënt werd nog duidelijker bij meisjes (OR voor dezelfde interactie: 1,96). Voor alcoholgebruik werden er in beide jaren geen sociaal-economische verschillen gevonden bij jongens en de in 1998 bestaande sociaal-economische verschillen bij meisjes waren in 2006 verdwenen. Met betrekking tot fysieke inactiviteit namen de sociaal-economische verschillen toe bij jongens, maar niet bij meisjes. Al met al ontwikkelden sociaal-economische verschillen in GGG zich op een verschillende manier bij jongens en meisjes tussen 1998 en 2006. De prevalentie van middelengebruik nam vooral toe onder meisjes met een lage sociaal-economische positie.

In Hoofdstuk 7 wordt ingegaan op de omvang van de geslachtsverschillen in roken, alcoholgebruik en lichamelijke inactiviteit onder Slowaakse adolescenten en of er verschuivingen plaatsvonden in deze geslachtsverschillen tussen 1998 en 2006. Deze geslachtsverschillen werden ook onderzocht onder drie afzonderlijke groepen van jongeren ingedeeld aan de hand van hun sociaal-economische positie. In 1998 werden geslachtsverschillen gevonden voor alle drie de onderzochte gedragingen: jongens hadden een hogere prevalentie van roken en alcoholgebruik en een lagere prevalentie van lichamelijke inactiviteit dan meisjes. In 2006 betreft het enige overgebleven geslachtsverschil lichamelijke inactiviteit, maar dit verschil was aanzienlijk kleiner is dan in 1998. De verschuivingen in de ratio's tussen jongens en meisjes waren statistisch significant wat betreft roken en lichamelijke inactiviteit, maar niet wat betreft alcoholgebruik. De prevalentie van alcoholgebruik was toegenomen onder zowel jongens als meisjes, de prevalentie van roken was bij jongens gedaald tot onder die van de meisjes, en de lichamelijke activiteit van meisjes was aanzienlijk toegenomen. De veranderingen in geslachtsverhoudingen variëerden sterk per sociaal-economische groep. De grootste verschuiving in de verhouding tussen jongens en meisjes met betrekking tot roken deed zich voor in de middelste sociaal-economische groep, zowel bij jongens (afname) en meisjes (toename). Wijzigingen in de geslachtsverhoudingen over de tijd bij jongeren uit de hoogste sociaal-economische groep waren veel kleiner.

In Hoofdstuk 8 worden de belangrijkste bevindingen van dit proefschrift samengevat en bediscussieerd. De veranderingen in de prevalentie van GGG en in de geslachts- en sociaal-economische patronen van GGG onder Slowaakse adolescenten tussen 1998 en 2006 kunnen deels worden verklaard door de sociale en economische stabiliteit in Slowakije tijdens deze periode, na de moeilijke overgang van een tijdperk met een planeconomie naar een markteconomie in de jaren 1990. De verschuivingen, in het bijzonder bij roken, kunnen verder worden verklaard met behulp van de verschillende stadia van de GGG epidemie. Ook kan de diffusie van innovaties een rol spelen. Volgens deze theorie wordt een trend die geïntroduceerd is in een bepaald segment van de samenleving, zoals onder jongeren, het eerst opgepikt door mannen uit de elite en verspreidt zich pas later onder vrouwen en onder mensen met een lagere sociaal-economische positie.

Hoofdstuk 8 gaat ook in op de sterke punten en beperkingen van het onderzoek en de implicaties voor verder onderzoek en de volksgezondheidspraktijk. De verbanden tussen de sociaal-culturele determinanten en GGG waren bijzonder sterk bij meisjes. Hun sociale en culturele omgeving vereist speciale aandacht waar het gaat op hun gezondheidsgewoonten. De meest kwetsbare groepen bij meisjes komen uit grotere steden, hebben een lage sociaal-economische achtergrond,

en zijn niet-religieus. Bij jongens spelen deze factoren vaak een minder belangrijke rol, maar ze zijn niet helemaal zonder betekenis (sociaal-economische positie bij lichamelijke inactiviteit, religiositeit bij middelengebruik en seksueel debuut). Tijdens de komende decennia kan in Centraal-Europese landen een verdere toename worden verwacht van dronkenschap bij meisjes en van het cannabisgebruik bij zowel jongens als meisjes, maar vooral bij jongeren uit weinig verstedelijkte gebieden. Hiermee moet rekening worden gehouden bij preventie-activiteiten en het volksgezondheidsbeleid. Veranderingen in de onderzochte verbanden in de periode van kindertijd en adolescentie tot volwassenheid moeten verder worden onderzocht om beter zicht te krijgen op de aard van deze verbanden voor en na de adolescentie en hoe deze verbanden kunnen veranderen met de leeftijd. In een dergelijk verder onderzoek zou het zeer nuttig zijn om intrapersoonlijke, interpersoonlijke en biologische variabelen op te nemen om een meer volledig begrip te krijgen van de verbanden tussen geslacht en de verschillende determinanten van GGG.

# Zhrnutie

Výskum v oblasti vzťahov medzi správaním súvisiacim so zdravím (SSZ) a sociokultúrnymi determinantmi u adolescentov bol v krajinách strednej a východnej Európy doteraz zriedkavý. Ešte zriedkavejší je výskum ohľadne úlohy rodu v uvedených vzťahoch. Účelom tejto dizertačnej práce je prispieť k lepšiemu porozumeniu vzťahu medzi rôznymi SSZ u adolescentov a ich socioekonomickou pozíciou, stupňom urbanizácie ich prostredia a ich religiozitou. Ďalej sme skúmali trendy v socioekonomických rozdieloch a rodové rozdiely v SSZ u adolescentov medzi rokmi 1998 a 2006, nakoľko v danom období došlo k výrazným sociálnym a ekonomickým zmenám. Tie mohli mať istý vplyv na spomenuté vzťahy a na úlohu rodu.

V Kapitole 1 sú prezentované všeobecné informácie ohľadom kľúčových premenných, ktoré boli v tejto práci skúmané: SSZ u adolescentov (fajčenie, opitosť, užívanie kanabisu a iné), vybrané sociokultúrne premenné (socioekonomická pozícia, stupeň urbanizácie a religiozita) a časové trendy v oblasti rodových rozdielov a socioekonomických rozdielov v adolescentnom SSZ. Prezentovaný je tiež model predpokladaných asociácií skúmaných premenných.

Kapitola 2 obsahuje opis troch výskumných vzoriek použitých v tejto práci. Obsahuje tiež informácie o meracích nástrojoch a štatistických analýzách, ktoré boli použité.

Kapitola 3 sa zameriava na asociáciu medzi socioekonomickou pozíciou a rôznymi druhmi SSZ u adolescentov, osobitne u chlapcov a u dievčat. Boli skúmané tiež rodové rozdiely v tejto asociácii. Nižšie socioekonomické skupiny vykazovali tendenciu k nezdravému správaniu častejšie než najvyššia socioekonomická skupina, ale rozdiely boli relatívne malé a často štatisticky nevýznamné, resp. štatisticky významné len pre jeden z rodov. V každodennom raňajkovaní a fyzickej neaktivite boli zistené socioekonomické rozdiely u oboch rodov. V konzumácii sladkostí boli socioekonomické rozdiely zistené len u chlapcov. V konzumácii ovocia, konzumácii zeleniny a v užívaní kanabisu boli socioekonomické rozdiely zistené len u dievčat. V opitosti, užívaní alkoholu a užívaní kanabisu neboli zistené socioekonomické rozdiely. U chlapcov boli socioekonomické rozdiely zistené len medzi najvyššou a najnižšou socioekonomickou skupinou. Socioekonomické rozdiely sa štatisticky významne líšili veľkosťou podľa rodu len v konzumácii ovocia a konzumácii zeleniny, pričom socioekonomické rozdiely boli výraznejšie u dievčat.



Kapitola 4 sa zameriava na asociáciu medzi stupňom urbanizácie a užívaním psychoaktívnych látok (fajčenie, opitosť a užívanie kanabisu) u adolescentov, osobitne u chlapcov a u dievčat. Boli tiež zisťované rodové rozdiely v tejto asociácii. Stupeň urbanizácie bol vo vzťahu so SSZ iba u dievčat. Výskyt užívania psychoaktívnych látok u dievčat narastal so zvyšovaním stupňa urbanizácie, zatiaľ čo u chlapcov užívanie psychoaktívnych látok ostalo konštantné. Rod, stupeň urbanizácie a ich interakcia boli v štatisticky významnom vzťahu so všetkými tromi druhmi správania, ktoré boli analyzované, čiže s fajčením, opitosťou a užívaním kanabisu.

Kapitola 5 obsahuje informácie ohľadom asociácie medzi religiozitou a širokou škálou rôznych SSZ u adolescentov v rámci celej vzorky aj osobitne u chlapcov a u dievčat. Taktiež boli skúmané rodové rozdiely v tejto asociácii. Religiozita bola inverzne asociovaná s nezdravým správaním, čo sa týka fajčenia, opitosti, užívania kanabisu, raňajkovania, konzumácie sladkých nápojov, počítačových a televíznych aktivít a pohlavného styku (u všetkých uvedených správanií v oboch rodoch) a čo sa týka záškoláctva (len u dievčat). Asociácie boli významne silnejšie u dievčat než u chlapcov vo fajčení, opitosti a užívaní kanabisu. Religiozita nemala vzťah ku konzumácii ovocia, zeleniny a sladkostí, fyzickej neaktivity a šikanovaniu iných u oboch rodov.

Kapitola 6 prezentuje výsledky výskumu ohľadom zmien v asociácii medzi socioekonomickou pozíciou a fajčením, užívaním alkoholu a fyzickou neaktivitou medzi rokmi 1998 a 2006 u slovenských adolescentov. Vysoký výskyt fajčenia v nízkej socioeconomickej skupine v porovnaní k vysokej socioeconomickej skupine klesol medzi rokmi 1998 a 2006 u chlapcov (pomer šancí pre interakciu času a socioeconomickej pozície: 0.54), ale tento socioekonomický gradient sa objavil u dievčat (pomer šancí pre tú istú interakciu: 1.96). V užívaní alkoholu neboli u chlapcov zistené socioekonomické rozdiely v roku 1998 ani v roku 2006, a u dievčat socioekonomické rozdiely existujúce v roku 1998 zmizli v roku 2006. Vo fyzickej neaktivite narástli socioekonomické rozdiely u chlapcov, ale nie u dievčat. Celkovo sa socioekonomické rozdiely v SSZ medzi rokmi 1998 a 2006 vyvinuli iným spôsobom u chlapcov než u dievčat. Výskyt užívania alkoholu a fajčenia vzrástol najmä u dievčat s nízkou socioekonomickou pozíciou.

Kapitola 7 obsahuje informácie ohľadom veľkosti rodových rozdielov vo fajčení, užívaní alkoholu a fyzickej neaktivite u slovenských adolescentov a zmien, ktoré v týchto rodových rozdieloch nastali medzi rokmi 1998 a 2006. Tieto rodové rozdiely boli merané v troch rozdielnych skupinách adolescentov podľa ich socioeconomickej pozície. V roku 1998 boli nájdené rodové rozdiely vo všetkých troch skúmaných druhoch správania: u chlapcov bol nižší výskyt fajčenia a užívania alkoholu a nižší výskyt fyzickej neaktivity než u dievčat. V roku 2006 bol zistený rodový

rozdiel jedine vo fyzickej neaktivite, lenže tento rozdiel bol podstatne menší oproti roku 1998. Zmeny v týchto pomeroch chlapcov voči dievčatám boli štatisticky významné vo fajčení a fyzickej neaktivite, ale nie v užívaní alkoholu. Výskyt užívania alkoholu stúpol u oboch rodov, výskyt fajčenia u chlapcov sa stal nižším než u dievčat, a fyzická aktivita u dievčat výrazne stúpla. Zmeny v pomeroch rodov silne variovali v závislosti od socioekonomickej skupiny. Najväčšia zmena v pomere rodov vo fajčení sa udiala v strednej socioekonomickej skupine, a to u chlapcov (pokles) aj u dievčat (nárast). Zmeny v pomeroch rodov u adolescentov z najvyššej socioekonomickej skupiny boli oveľa menšie.

V kapitole 8 sú sumarizované a diskutované hlavné zistenia tejto práce. Zmeny vo výskyte SSZ a v rodových a socioekonomických vzorcoch SSZ u slovenských adolescentov medzi rokmi 1998 a 2006 sa možno dajú čiastočne vysvetliť sociálnou a ekonomickou stabilizáciou Slovenska počas daného obdobia, po ťažkej ére prechodu z plánovaného hospodárstva na trhové hospodárstvo behom 90-tych rokov 20. storočia. Zmeny, obzvlášť vo fajčení, možno tiež vysvetliť ako zachytenie rôznych fáz epidémií SSZ. Podľa teórie difúzie inovácií každý nový trend uvedený do istého segmentu spoločnosti, ako napr. mládež, si najprv osvoja mužskí predstavitelia elit a až neskôr sa rozšíri u žien a u ľudí s nižšou socioekonomickou pozíciou.

V kapitole 8 sú ďalej rozoberané silné stránky a obmedzenia štúdie a jej implikácie pre ďalší výskum a prax vo verejnom zdravotníctve. Asociácie medzi sociokultúrnymi determinantmi a SSZ boli obzvlášť silné u dievčat. Ich sociálne a kultúrne prostredie potrebuje špeciálnu pozornosť zameranú na ich zdravotné návyky. U dievčat možno ako najzraniteľnejšie skupiny identifikovať tie pochádzajúce z väčších miest, z prostredia s nízkou socioekonomickou pozíciou a tie, ktoré sú nereligioznejšie. U chlapcov tieto faktory často hrajú v SSZ menej dôležitú rolu, avšak nie celkom bezvýznamnú (socioekonomická pozícia vo fyzickej neaktivite, religiozita v užívaní psychoaktívnych látok a iniciácii pohlavného styku). V nasledujúcich desaťročiach možno v krajinách strednej Európy očakávať ďalší nárast opitosti u dievčat a nárast užívania kanabisu u oboch rodov, ale obzvlášť u adolescentov z oblastí s nízkym stupňom urbanizácie. Tieto skutočnosti treba zohľadniť v preventívnych aktivitách a v politických krokoch v oblasti verejného zdravotníctva. Odporúčame ďalej študovať zmeny v skúmaných vzťahoch od detstva a adolescencie po dospelosť, aby bolo možné bližšie určiť povahu týchto vzťahov pred a po adolescencii a to, akým spôsobom sa dané vzťahy potenciálne menia v závislosti od veku. V takomto ďalšom výskume by bolo prínosné zahrnúť aj intrapersonálne, interpersonálne a biologické premenné, aby bolo možné nadobudnúť komplexnejšie porozumenie vzťahov medzi rodom, pohlavím a rôznymi determinantami SSZ.



# Acknowledgements

I am grateful to God for all the good people He sent my way during the process of writing this thesis. Without them, this thesis would not exist. I would like to express my gratitude to:

- Prof. Sijmen A. Reijneveld for sharing his admirable knowledge and writing skills, for his accessibility, for staying up late so many times because of my drafts and for teaching me that sometimes less is more;
- Assoc. Prof. Jitse P. van Dijk for encouraging me in the work, starting and managing the KISH project and for believing in international cooperation;
- all present and past members of the Department of Social Medicine at the University Medical Center of Groningen for their pleasant company and help with both the important and the small things, especially Prof. Johan Groothoff, Roy Stewart and Anna Muijzer.

In Slovakia, I would like to thank:

- Assoc. Prof. Andrea Madarasová Gecková for her huge help and patience over the years – simply for being a great supervisor;
- Martina Sukeníková, Jarmila Frištková, Nicol Hendrichovská, Ivana Borysová, Zuzana Rišková and Janka Mattová for their administration backup, i.e. for relieving me from much of the annoying yet necessary bureaucracy and for the pleasant atmosphere they created every day at the workplace;
- David McLean and Andy Billingham for the language corrections of my work, including this whole thesis;
- Ivan Žežula and Daniel Klein for helping me out with the many statistical riddles;
- Peter Halama, especially for helping us out with the measures of religiosity;
- my past colleagues at the University of P.J. Šafárik, namely Peter Kolarčík, Zuzana Černotová (Tomčíková), Lucia Príhodová, Barbora Šilarová, Martina Behanová, Radka Šufliarska, Peter Koncz, Daniela Bobáková, Mária Sarková, Zuzana Dankulincová (Veselská), Martina Mergeščíková, Jaroslava Kopčáková (Rondošová), Pavol Mikula, Ferdinand Salonna, Jozef Benka, Ondrej Kalina, Zuzana Škodová, Jaroslav Rosenberger, Martina Chylová (Krokavcová), Ingrid Babinská, Matej Škorvánek,

Zuzana Katreniaková, Natália Sedlák Vendelová, Iveta Rajničová and others, for their friendship and collegiality. Many of them also helped me a great deal in the research, struggling in various ways;

- pani Valika for keeping our floor clean and for her nice smile;
- school directors, teachers and other school administrative persons for agreeing with the data collection, field workers for the data collection, and our respondents for answering the questions;
- my wonderful wife Majka, my mother and father, my sisters Monika and Klárka and all the remaining members of our extended Pitel and Lapko families for their love and support. A big “thank you” to Klárka also for designing the nice cover.

This thesis is dedicated to our son Benedikt, and to the memory of my grandfathers Michal Kazík and Jozef Pitel, Sr. These two men will always remain my personal role models and heroes.

Ad maiorem Dei gloriam.

Bratislava, 2013

## About the author



Lukáš Pitel was born on 24 August 1983 in Bratislava, Slovakia. After finishing the bilingual Slovak-German secondary school Bilíkova in Bratislava, he studied at Trnava University in Trnava. He also attended two semesters at the Faculty of Social and Behavioural Sciences at Heidelberg University, Germany. In 2007 he graduated in Psychology from Trnava University. His master thesis dealt with approaches to diagnostics of foreign language learning aptitude. After his university studies, he started working as a researcher at PJ Safarik University in Košice, Slovakia. At the same time he started his PhD studies at the University of Groningen, The Netherlands. His research interest focused on the role of gender and other sociocultural determinants regarding the health-related behaviour of adolescents. In addition, he participated in the education process at the St. Elizabeth College of Health and Social Work, where he delivered lectures in Introduction to Social and Personality Psychology, along with occasional teaching duties at the Medical Faculty of the PJ Safarik University. He also supervised a student's bachelor thesis at the Faculty of Arts of PJ Safarik University. Between 2009 and 2011, he participated in the Health Behaviour in School-aged Children (HBSC) study, a multinational project conducted in collaboration with the World Health Organization. At present he is working as a researcher at the Slovak Academy of Sciences, Institute of Experimental Psychology, in Bratislava. In addition, in 2012 and 2013 he taught Psychology at Gymnázium Jura Hronca in Bratislava as a part of the International Baccalaureate Diploma Programme curriculum. His current professional interest focuses on the relationship between personality characteristics, emotional factors and decision-making in professionals.



# Graduate School Kosice Institute for Society and Health (KISH) and previous dissertations

The Graduate School Kosice Institute for Society and Health (KISH) was established in 2004. The Graduate School KISH is hosted by the Medical Faculty of Pavol Jozef Safarik University in Kosice (Slovakia). KISH researchers originate from the Medical Faculty, the University Hospital and other hospitals, and the Faculty of Arts. Its research concentrates on public health, health psychology, epidemiology and medical sociology. The interdisciplinary research programs focus on Youth and Health and on Chronic Disease.

The Graduate School KISH is collaborating closely with the Department of Community and Occupational Health, University Medical Center Groningen, University of Groningen, The Netherlands.

Previous dissertations from the Graduate School KISH:

**Bobakova D (2013)** Youth subcultures and problem behaviours in Slovakia: Hip-Hop, Techno-scene, Metal, Punk, Skinheads, and Roma

SUPERVISOR: Prof. Dr. SA Reijneveld

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,  
Assoc. Prof. A Madarasova Geckova

**Rosicova K (2013)** Regional mortality in Slovakia: socioeconomic indicators and ethnicity

SUPERVISOR: Prof. Dr. JW Groothoff

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,  
Assoc. Prof. A Madarasova Geckova

**Benka J (2012)** Living with Rheumatoid Arthritis: do personal and social resources make a difference?

SUPERVISORS: Prof. Dr. JW Groothoff, Prof. Dr. JJJ van der Klink

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk, Dr. I Nagyova



**Kalina O (2012)** Sexual risky behaviour among Slovak adolescents and young adults: social and psychological factors

SUPERVISOR: Prof. Dr. SA Reijneveld

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,

Assoc. Prof. A Madarasova Geckova

**Salonna F (2012)** Health inequalities among Slovak adolescents over time

SUPERVISORS: Prof. Dr. SA Reijneveld, Prof. Dr. JW Groothoff

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,

Assoc. Prof. A Madarasova Geckova

**Kolarcik P (2012)** Self-reported health and health risky behaviour of Roma adolescents in Slovakia. A comparison with the non-Roma

SUPERVISOR: Prof. Dr. SA Reijneveld

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,

Assoc. Prof. A Madarasova Geckova

**Tomcikova Z (2011)** Parental divorce and adolescent excessive drinking: Role of parent – adolescent relationship and other social and psychosocial factors.

SUPERVISOR: Prof. Dr. SA Reijneveld

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,

Assoc. Prof. A Madarasova Geckova

**Veselska Z (2010)** Perception of self and health-related behavior in adolescence

SUPERVISOR: Prof. Dr. SA Reijneveld

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,

Assoc. Prof. A Madarasova Geckova

**Dubayova T (2010)** Parkinson's disease – psychological determinants of quality of life

SUPERVISOR: Prof. Dr. JW Groothoff

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk, Dr. I Nagyova,

Assoc. Prof. Dr. Z Gdovinova, Dr. LJ Middel

**Sarkova M (2010)** Psychological well-being and self-esteem in Slovak adolescents

SUPERVISOR: prof dr WJA van den Heuvel

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk,

Dr. Z. Katreniakova, Assoc. Prof. A Madarasova Geckova

**Krokavcova M (2009)** Perceived Health Status in Multiple Sclerosis Patients

SUPERVISOR: Prof. Dr. JW Groothoff

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk, Dr. I Nagyova, Assoc. Prof. Dr. Z Gdovina, Dr. LJ Middel

**Havlikova E (2008)** Fatigue, mood disorders and sleep problems in patients with Parkinson's disease

SUPERVISOR: Prof. Dr. JW Groothoff

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk, Dr. J Rosenberger, Assoc. Prof. Dr. Z Gdovina, Dr. LJ Middel

**Zuzana Skodova (2008)** Coronary heart disease from a psychosocial perspective: socioeconomic and ethnic inequalities among Slovak patients

SUPERVISOR: Prof. Dr. SA Reijneveld

CO-SUPERVISORS: Assoc. Prof. Dr. JP van Dijk, Dr. I Nagyova, Dr. LJ Middel, Dr. M Studencan

**Rosenberg J (2006)** Perceived health status after kidney transplantation

SUPERVISORS: Prof. Dr. JW Groothoff,

Prof. Dr. WJA van den Heuvel

CO-SUPERVISORS: Dr. JP van Dijk, Dr. R Roland

**Sleskova M (2006)** Unemployment and the health of Slovak adolescents

SUPERVISORS: Prof. Dr. SA Reijneveld, Prof. Dr. JW Groothoff

CO-SUPERVISORS: Dr. JP van Dijk, Dr. A Madarasova Geckova

**Nagyova I (2005)** Self-rated health and quality of life in Slovak rheumatoid arthritis patients

SUPERVISORS: Prof. Dr. WJA van den Heuvel

CO-SUPERVISOR: Dr. JP van Dijk

**Geckova A (2002)** Inequality in health among Slovak adolescents.

SUPERVISORS: Prof. Dr. D Post, Prof. Dr. JW Groothoff

CO-SUPERVISOR: Dr. JP van Dijk



# Research Institute SHARE

This thesis is published within the Research Institute SHARE of the Graduate School of Medical Sciences (embedded in the University Medical Center Groningen / University of Groningen).

Further information regarding the institute and its research can be obtained from our internet site: [www.rug.nl/share](http://www.rug.nl/share).

More recent theses can be found in the list below ((co-) supervisors are between brackets).

## 2013

**Siebelink MJ.** *The child as a donor; a multidisciplinary approach*  
(prof HBM van de Wiel, prof PF Roodbol)

**Sidorenkov G.** *Predictive value of treatment quality indicators on outcomes in patients with diabetes*  
(prof FM Haaijer-Ruskamp, prof D de Zeeuw)

**Vu DH.** *Clinical pharmacology of tuberculosis drugs and tuberculosis control in developing world; the involvement of private pharmacy and the individualization of treatment using dried blood spot*  
(prof JRB Brouwers, prof DRA Uges, prof VH Le, prof DH Nguyen, dr JWC Alffenaar)

**Sijtsma A.** *Physical activity and overweight in young children*  
(prof PJJ Sauer, prof RP Stolk, dr E Corpeleijn)

**Rosicova K.** *Regional mortality in Slovakia: socioeconomic indicators and ethnicity*  
(prof JW Groothoff, dr JP van Dijk, dr A Madarasova-Geckova)

**Bobakova D.** *Youth subcultures and problem behaviours in Slovakia: hip-hop, techno-scene, metal, punk, skinheads and Roma*  
(prof SA Reijneveld, dr JP van Dijk, dr A Madarasova-Geckova)

**Arends I.** *Prevention of recurrent sickness absence in workers with common mental disorders*  
(prof JJL van der Klink, prof U Bültmann)

**Theunissen MHC.** *The early detection of psychosocial problems in children aged 0 to 6 years by Dutch preventive child healthcare; professionals and their tools*  
(prof SA Reijneveld, dr AGC Vogels)

**Bragaru M.** *Sports and amputation*  
(prof JHB Geertzen, prog PU Dijkstra, dr R Dekker)

**Broesamle TC.** *Designing health care services using systems thinking; a theory, a method and their application in the Dutch community pharmacy*  
(prof JJ de Gier, prof JJ van der Werf)

**Jong J de.** *Antibiotics use in children; pharmacoepidemiological, practical and environmental perspectives in the Netherlands*  
(prof LTW de Jong-van den Berg, dr TW de Vries)

**Rettke HG & Geschwinder HM.** *Long-term outcomes in stroke rehabilitation patients and informal caregivers*  
(prof WJA van den Heuvel)

**Fortington LV.** *Enabling the elderly person with lower limb amputation through surgery, rehabilitation and long term care*  
(prof JHB Geertzen, prof PU Dijkstra, dr GM Rommers)

**Lako IM.** *Depressive symptoms in patients with schizophrenia; count symptoms that count*  
(prof K Taxis, prof D Wiersma)

**Arnardottir AH.** *Regulatory benefit-risk assessment; different perspectives*  
(prof FM Haaijer-Ruskamp, prof PA de Graeff, dr PGM Mol, SMJM Straus)

**Meijer A.** *The forest through the trees; investigating depression in patients with cancer and patients with myocardial infarction using systematic reviews and meta-analytic techniques*  
(prof P de Jonge, dr HJ Conradi, dr BD Thombs)

**Kuchenbecker WKH.** *Obesity and female infertility*  
(prof JA Land, prof BHR Wolffenbuttel, dr A Hoek, dr H Groen)

**Rozenbaum MH.** *Costs and effectiveness of extended vaccination strategies against pertussis and pneumococcal disease*  
(prof MJ Postma, prof E Hak)

**Kingma EM.** *Intelligence and functional somatic symptoms and syndromes*  
(prof JGM Rosmalen, prof J Ormel, prof P de Jonge)

**Kedde JH.** *Sexual health of people with disability and chronic illness*  
(prof HBM van de Wiel, prof WCM Weijmar Schultz)

**Horst PGJ ter.** *Clinical pharmacology of antidepressants during pregnancy*  
(prof B Wilffert, prof LTW de Jong-van den Berg)

**Sinha R.** *Adjustment to amputation and artificial limb, and quality of life in lower limb amputees*  
(prof WJA van den Heuvel, prof P Arokiasamy, dr JP van Dijk)

## 2012

**Pechlivanoglou P.** *Applying and extending mixed-effects models in health in health economics and outcomes research*  
(prof MP Postma, prof JE Wieringa, dr HH Le)

**Verboom CE.** *Depression and role functioning; their relation during adolescence and adulthood*  
(prof J Ormel, prof WA Nolen, prof BWJH Penninx, dr JJ Sijtsma)

**Benka J.** *Living with rheumatoid arthritis: do personal and social resources make a difference?*  
(prof JW Groothoff, prof JJJ van der Klink, dr JP van Dijk, dr I Rajnicova-Nagyova)

**Kalina O.** *Sexual risky behaviour among Slovak adolescents and young adults; social and psychological factors*  
(prof SA Reijneveld, dr JP van Dijk, dr A Madarasova-Geckova)

**Crijns HJMJ.** *Drug related safety issues affecting pregnancy outcome and concerning risk minimisation measures; emphasis on pregnancy prevention programmes*  
(prof LTW de Jong-van den Berg, dr SMJM Straus)

**Vries HJ de.** *Working with pain; sustainable work participation of workers with chronic non-specific musculoskeletal pain*  
(prof JHB Geertzen, prof JW Groothoff, prof MF Reneman, dr S Brouwer)

**Karsten J.** *On the threshold of disorder; definition and course of subthreshold depression and subthreshold anxiety*  
(prof WA Nolen, prof BWJH Penninx, dr CA Hartman)

**Abma FI.** *Work functioning: development and evaluation of a measurement tool*  
(prof JJL van der Klink, prof U Bültmann)

**Rodrigues HCML.** *Who's the patient? Ethics in and around maternal-fetal surgery*  
(prof PP van den Berg, prof M. Düwell)

**Munster JM.** *Q fever during pregnancy; lessons from the Dutch epidemic*  
(prof E Hak, prof JG Aarnoudse, dr ACAP Leenders)

**Holwerda N.** *Adaptation to cancer from an attachment theoretical perspective*  
(prof R Sanderman, prof MAG Sprangers, dr G Pool)

**Salonna F.** *Health inequalities among Slovak adolescents over time*  
(prof SA Reijneveld, prof JW Groothoff, dr JP van Dijk,  
dr A Madarasova-Geckova)

**Kolarčik P.** *Self-reported health and health risky behaviour of Roma adolescents in Slovakia*  
(prof SAReijneveld, dr JP van Dijk, dr A Madarasova-Geckova)

**Schreuder JAH.** *Managing sickness absence; leadership and sickness absence behavior in hospital care*  
(prof JW Groothoff, prof JJL van der Klink, dr CAM Roelen)

**Hoen PW.** *New perspectives on depression and heart disease*  
(prof P de Jonge, prof J Denollet)

**For more 2012 and earlier SHARE-theses see our website.**

# Stellingen

behorende bij het proefschrift  
**Sociocultural determinants, gender and health-related  
behaviour in adolescence**

**Lukas Pitel**

25 november 2013

1. In fruit and vegetables consumption, lower socioeconomic groups tend to have higher odds of unhealthy behaviours than the highest socioeconomic group. This association is stronger for girls when compared with boys. *-this thesis-*
2. The prevalence rates of smoking among boys are not related to the degree of urbanisation, but girls who live in more urbanised are more likely to smoke. *-this thesis-*
3. Substance use is less likely among religious adolescents. This association is stronger for girls than for boys. *-this thesis-*
4. Socioeconomic differences in substance use developed in a different way for Slovak boys and girls between 1998 and 2006. *-this thesis-*
5. Physical inactivity decreased in Slovakia among both boys and girls between 1998 and 2006. *-this thesis-*
6. Focusing on historical trends in health behaviours may also illuminate the mechanisms that link socio-economic status to health behaviours. *Pampel et al. (2010)*
7. Good health from prenatal life to adolescence is a resource for social and economic development. *WHO Europe (2005)*
8. People today sometimes get uncomfortable with empirical claims that seem to clash with their political assumptions, often because they haven't given much thought to the connections. *Steven Pinker (2002)*
9. An international partnership in scientific research helps with the sharing of existing knowledge in health-related behaviour in adolescence and its determinants. *-this thesis-*
10. What people think they want is news, but what they really crave is olds... Not news but olds, telling people that what they think they already know is true. *Terry Prachett (2000)*