Eating habits, body image and health and behavioural problems of adolescents
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Chapter 8

General discussion

The aim of this study was to explore eating habits and body image of adolescents and the associations of these with health and behavioural problems in the context of the school and family environment. In addition, we explored whether sociodemographic characteristics, such as gender, age or family affluence, affected these associations.

This final chapter summarises and discusses (8.2) the main findings of the study. Then the methodological considerations of the study (8.3) and the implications for practice and future research (8.4) are addressed.

8.1 Main findings

The main findings are summarized per research question.

Research question 1

Is there an association between subjective perception of negative body image and involvement in bullying among boys and girls?
We found an association between a negative body image and involvement in bullying among adolescents. Self-reported dissatisfaction because of overweight was found to be strongly connected with involvement in bullying as a victim and as a bully-victim among both boys and girls. Regarding feeling too thin, we found gender differences in the bully-victim category: boys feeling too thin were more likely to become bully-victims, whereas girls were not.

Research question 2

Is involvement in bullying and fighting more likely with higher soft drinks consumption, and do nervousness and irritability add to this?
We found that adolescents reporting daily soft drinks consumption were more likely to be involved in bullying and fighting. The associations between daily soft drinks consumption and bullying and fighting were mediated by daily nervousness and irritability. Adding gender, age and family affluence did not change the results.

Research question 3

Are adolescents reporting a lack of eating-related parental rules more likely to have unhealthy eating habits, such as skipping breakfast, insufficient fruits and vegetables consumption, and frequent sweets, soft drinks and energy drinks consumption?
This study demonstrated that in the case of a lack of parental rules on eating, boys and girls more frequently had a wide range of unhealthy eating habits, such as skipping breakfast, insufficient fruits and vegetables consumption and frequent use of sweets,
soft drinks and energy drinks. Adolescents perceiving a lack of parental rules on eating were thus at higher risk of unhealthy eating habits.

Research question 4
Is there an association between regular energy drinks consumption and negative health and behavioural outcomes among adolescents?
Adolescents reporting regular energy drinks consumption were at higher risk of a wide range of negative health and behavioural outcomes and negative school experiences. This association did not change after adjustment for gender, age and family affluence. The association thus seems to be rather robust.

Research question 5
Do adolescents who combine alcohol and energy drinks report negative behavioural outcomes more frequently?
Adolescents consuming alcohol and energy drinks were more likely to report behavioural problems than consumers of alcohol only, energy drinks only and non-consumers. The joint association of alcohol and energy drinks consumption was greater than the sum of the associations of energy drinks consumption and alcohol consumption separately regarding fighting but not regarding the other behavioural outcomes.

8.2 Discussion of the main findings
The main findings will be discussed within the framework of the general aims, as outlined in Chapter 1, and repeated in figure 8.1. We will focus on the association of eating habits and body image in adolescents with health and behavioural problems. Furthermore, we will discuss the relationship between the family and school environments and eating behaviour in adolescents. Finally, we will also discuss the role of other factors, such as gender, age and the indicators of socioeconomic status (Figure 8.1).
Figure 8.1 Model of the relationships examined in this thesis
8.2.1 Eating habits and body image in adolescents

Unhealthy eating behaviour, such as skipping breakfast, low fruit and vegetable consumption, high sweets consumption or frequent soft drinks and energy drinks consumption, was highly prevalent among Slovak adolescents. Around 50% of them reported skipping breakfast on school days; more than 60% of adolescents reported insufficient fruit consumption and more than 20% reported consumption of soft drinks on a daily basis. Internationally, based on the results of Health Behaviour in School-aged study 2014, the rates of soft drinks consumption and breakfast-skipping among Slovak adolescents were higher than the average values for adolescents from Europe and South America (Inschley et al., 2016). This suggests a need for more efficient and better suited strategies supporting healthy eating behaviour in adolescents. For example, adolescents from Finland, Norway or Sweden reported the lowest prevalence of soft drinks consumption among European adolescents (Inschley et al., 2016), which can be associated with stricter actions and legislation aimed at decreasing the consumption of these drinks (Seifert et al., 2011). Moreover, Finland introduced health education as a stand-alone school subject, which might also contribute to the low prevalence of unhealthy eating habits in adolescents (Aira, Välilmaa, Paakkari, Villberg, & Kannas, 2014). These examples show the potential for improvement of the situation in the eating habits of Slovak adolescents.

Adolescents' soft drinks and energy drinks consumption was associated with a wide range of health and behavioural problems in adolescents (Chapters 4, 6 and 7). Moreover, adolescents reporting simultaneous consumption of energy drinks with alcohol were at higher risk to behavioural problems compared with consumers of alcohol only and consumers of energy drinks only. This indicates an additive-synergistic association of energy drinks and alcohol consumption with negative behaviour outcomes. Our results are in line with already available evidence on the association between negative health and behaviour and the consumption of these beverages or the substances they contained (Kristjansson et al., 2013; Kristjansson et al., 2014; Martin et al., 2008; Solnick, & Hemenway, 2012; Suglia et al., 2013). The present study confirms this association but now based on a large and representative sample of adolescents and with inclusion of a wide range of health and problem behaviours.

Moreover, this study shows that energy drinks consumption in European adolescents is rather high, thus filling a knowledge-gap regarding this recent phenomenon. More specifically, existing evidence exploring adolescents’ energy drinks consumption in European countries and in the USA suggests that prevalences range from 5% to 80% (Gallimberti et al., 2013; Kumar, Park, & Onufra, 2015; Seifert et al., 2011; Zucconi et al., 2013). This wide range of estimates could be explained by different measures of energy drinks consumption, different inclusion criteria of chronic/regular energy drinks consumption and the different sociodemographic characteristics of the respondents involved in the studies. The results of the present study, based on a large and representative sample of Slovak adolescents, suggest that a significant number (20%) of the study participants aged 11 to 15 years old regularly consume energy drinks. A lower age of first energy drink consumption has been shown to be a risk factor for chronic consumption of these drinks in future (Sather, 2013), but evidence on the context of consumption of these drinks in young adolescents is rather limited. Our findings based on data from young adolescents provide important information on the initiation of energy drinks consumption and
thus add to the existing knowledge. By preventing energy drinks consumption during early adolescence, future chronic consumption of these drinks in adolescents could be avoided.

This study also showed that parents play an important role in the occurrence of energy drinks consumption. Adolescents reporting no eating-related parental rules in their families were at higher risk to drink these beverages regularly. Relatively little is known on the psycho-social mechanisms affecting adolescents’ energy drinks consumption. Prior research on the patterns and context of this phenomenon identified several factors that contribute to energy drinks consumption in Australian adolescents (Costa, Hayley, & Miller, 2014): limited awareness of energy drinks ingredients, peer and parental influence and the influence of mass media. We can hypothesize that consumption of these drinks in Slovak adolescents is due to the same factors as in other countries and that they can be tackled using similar approaches. More specifically, the inclusion of health education into the school curriculum is essential for increasing overall health literacy and adolescents’ awareness on adverse effect of energy drinks consumption (Aira et al., 2014). Another example of effective preventive action (already applied in Norway or Sweden) could be regulation of the sales of these drinks by age or warning labels about their high caffeine content (Oddy & O’Sullivan, 2010; Seifert et al., 2011). To date, scientific evidence on the effectiveness of strategies aimed at decreasing the prevalence of consumption of energy drinks is limited. Systematic development and evaluation of policies and interventions is definitely needed to minimize the prevalence of adolescent energy drinks consumers.

We found an association between adolescents’ soft drinks and energy drinks consumption and various health and behavioural problems, which can be explained in two ways. Firstly, this association may be caused by the adverse effect of the substances that these drinks contain (high doses of sugar or high-fructose syrup, fruit juice, sugar substitutes, caffeine and a variety of other stimulants and substances, such as guarana, taurine and vitamins). There is a growing body of research suggesting an adverse physiological effect of these substances (Harris & Munsell, 2015; Shearer & Graham, 2014; Temple, 2009). Our findings related to the mediating effect of nervousness and irritability on the relationship between soft drinks consumption and aggressive behaviour support the hypothesis that consumption of soft and energy drinks may have adverse effect on adolescents’ health and behaviour. Adolescents’ consumption of soft drinks or energy drinks may further cause frequent fluctuations in the blood glucose, subjectively perceived as health difficulties, which may also lead to behaviour problems. If this explanation holds, then a reduction in the consumption of drinks may really reduce negative outcomes in adolescents.

A second explanation of the association between frequent consumption of soft drinks and energy drinks and negative health and behavioural outcomes may be a clustering of health-compromising behaviours (e.g. de Winter et al., 2016; van Nieuwenhuizen et al., 2009). Evidence for the coexistence of behaviours is particularly strong for e.g. alcohol consumption, substance use and delinquent behaviours, which are commonly reported to comprise a ‘syndrome’ of problem behaviours (de Looze et al., 2015; Jessur, 1991; Klein Velderman et al., 2015). Unhealthy eating and other forms of health-compromising behaviours may each be manifestations of underlying psycho-social factors, such as family background, composition of peer group and wider environmental factors. This has been documented for several individual and social factors – predictors of the initiation of multiple health-risk behaviours (de Winter et al., 2016; Dusseldorp et al., 2014; Klein Velderman et al., 2015). In terms
of this hypothesis, adolescents vulnerable to behave in a risky manner might prefer to drink these soft drinks and energy drinks too. In that case, preventive strategies should be aimed at a broad spectrum of health-compromising behaviours and their determinants and on assessing adolescents who show multiple problem behaviour. Based on our cross-sectional data, we cannot make an evidence-based choice for either of these two explanations.

Furthermore, we found that a negative body image was associated with involvement in bullying as victim and as bully-victim (Chapter 3). This is in line with previous evidence (Brixval et al., 2012; Fox & Farrow, 2009; Wilson, Viswanathan, Rousson, & Bovet, 2013a) suggesting that adolescents who are dissatisfied because of self-perceived overweight are vulnerable to becoming victims in bullying. This vulnerability might be due to a combination of a low self-esteem and a different appearance, which can increase the probability of these adolescents becoming an easy target of bullying.

We also found that boys dissatisfied with their bodies due to thinness had higher risk of becoming a bully-victim. In general, boys run the risk of being under pressure due to the muscular male ideal (Cook, Williams, Guerra, Kim, & Sadek, 2010; McCabe et al., 2011). Thus, those who perceive their body to be too thin may be more vulnerable to suffering from mental and behavioural problems, leading to aggressive behaviour. Low self-esteem and different appearance may be reasons why these boys also become the victim of bullying. Taken together, our findings add to the knowledge about body image among adolescents – body image dissatisfaction due to feelings of thinness may be associated with adverse experiences among boys. Given that a significant number of adolescent boys from Europe and South America were found to have concerns with muscularity (Field et al., 2014; Jones & Crawford, 2005), not only girls, but all adolescents should be supported to develop and maintain a positive body image.

8.2.2 Family environment and eating behaviours in adolescents

Adolescents who perceived a lack of parental rules on eating were more likely to report unhealthy eating habits. These unhealthy habits included skipping breakfast, low fruit and vegetable consumption and frequent sweets, soft drinks and energy drinks consumption. Previous research has also shown an association between parental rule-setting on eating and some types of unhealthy behaviour of adolescents (Bourcier et al., 2003; Gross et al., 2010; Kristjansdottir et al., 2009; Verzeletti et al., 2010; Verzeletti, Maes, Santinello, Baldassari et al., 2010). However, we found that a lack of parental rules is associated with a wide range of unhealthy eating habits of adolescents, including regular consumption of soft drinks and energy drinks, which is a phenomenon of the last decade.

Our findings regarding the association between a lack of parental rules on eating and unhealthy eating habits in adolescents may be explained in two ways. Firstly, applying eating-related parental rules may shape the eating habits of adolescents, and then a lack of such rules leads to poorer habits. A second explanation could be that the general family food-eating practice or culture determines both particular eating-related parental activities, such as applying rules and eating habits of adolescents. Based on our data, we cannot discriminate between these two explanations. However, in general our findings point to the important role of parents in shaping eating habits of adolescents, with an emphasis on particular mechanisms, such as applying eating-
related rules. In general, family practices have a significant impact on a wide range of health-related behaviours (Haggerty, McGlynn-Wright, & Klima, 2013). Multiple problem behaviour in adolescents should be prevented or reduced by optimisation of family influence.

8.2.3 School environment and eating behaviour in adolescents

High soft drinks or energy drinks consumption was strongly associated with negative school experiences, such as bullying, fighting, school dislike, low academic achievement or truancy. This finding is in line with previous evidence showing that adolescents consuming these beverages were more likely to report aggressive behaviour (Solnick & Hemenway, 2012), problems with school performance (Owens et al., 2014) or mood deviations (Lien et al., 2009), which may contribute to negative school experiences. In general, school experiences, such as academic achievement or school connectedness, are related to self-rated health and well-being (Danielsen, Samdal, Hetland, & Wold, 2009; Suldo, Riley, & Shaffer, 2006) and are an important health predictor (Cole, Jacquez, & Maschman, 2001); this area thus deserves special attention in public health practice.

Although the results of the present study confirmed the association of regular consumption of soft and energy drinks consumption with negative school experiences, we did not find any clustering per class or per school. In other words, adolescents’ affiliation to a particular school or class had no impact on this association. This may be interpreted as being a general characteristic of the association between adolescents’ consumption of soft and energy drinks and negative school experiences rather than the influence of a particular condition in a class or school. Thus, unhealthy eating habits, such as soft drinks and energy drinks consumption, may serve as a good indicator of adolescents at risk of adverse outcomes. Furthermore, reduction in the prevalence of soft drinks and energy drinks consumption in adolescents might also prevent negative school experience, such as poor relationships with peers, poor school performance or even absenteeism in school in this population.

8.3 Methodological considerations

8.3.1 Sample

The present study used two large and nationally representative samples of adolescents aged 11 to 15 years old, which represents a major strength of the study. Moreover, the response rates in both study samples used in this thesis were high. Next, a limitation might be that some adolescents do not attend school. However, this is a rather small group, i.e. less than 100 adolescents educated by home schooling in Slovakia during the 2014/2015 academic year.

8.3.2 Information

A further strength of this study is the use of validated measures that have been used in various studies and documented in a variety of reports and peer-reviewed publications at national and cross-national levels. A limitation of the present study might be that the data were based on adolescent self-reports, which can be inaccurate and biased by social desirability. More concretely, previous evidence dealing with the
level of agreement between adolescents’ and parents’ reports on adolescents’ eating behaviour showed differences between these reports. For example, adolescents reported a higher soft drinks consumption than that reported by their parents (van de Gaar, Jansen, van der Kleij, & Raat). The probability of under or over reporting was decreased by guaranteeing confidentiality, anonymity and privacy during self-administration of questionnaires in the absence of teachers. In addition, previous research has shown the high validity of the measures used by the present study (Currie et al., 2014). Another limitation might be that parental rule-setting on eating was measured based on the perception of adolescents (Chapter 5). This measurement may reflect the obedience degree of the adolescents in the face of these rules rather than the objective rules as enforced, and thus the real prevalence of parental rules applied in families should be underreported. However, the present study showed that even though a significant number of Slovak adolescents perceived the existence of parental rules, they did not follow them. Thus, it seems likely that the bias of this measure of parental rules perceived by adolescents is limited.

8.3.3 Causality

Another limitation of present study is its cross-sectional design, which limits the potential for making causal inferences. Adjustment for potential confounders, such as age, gender and family affluence, did not affect the associations that we found to a significant degree. However, this does not guarantee that the association that we found were indeed causal. In particular, they might also be due to common causes, e.g. an underlying personality trait that makes both consumption of energy drinks and aggression more likely, instead of consumption. However, it should be noted that such common causes might even lead to longitudinal associations, implying that probably the best design to establish causality would be an experimental one in which adolescents are stimulated to withdraw from energy drinks in order to establish a causal principle. Taking into account these caveats, the robustness of the associations and the biological plausibility of certain mechanisms provides at least some support for causality and for proposing interventions based on this causality.

8.4 Implications

Our study has several important implications for public health practice and policy, as well as for further research.

8.4.1 Implications for practice

Regular soft drinks and energy drinks consumption was very frequent among adolescents and seems to have adverse effects; therefore preventive actions should be aimed at decreasing this phenomenon. Following the theoretical framework of the social cognitive theory and an ecological perspective, preventive strategies should be targeted at each level of influence (individual, social environmental, physical environmental and societal level) (Story et al., 2002).

First, adolescents’ as well as parents’ knowledge about the adverse consequences of soft drinks and energy drinks consumption should be extended. Although educational interventions were considered more effective for improving
eating habits in adolescents compared with children (Zota et al., 2016), preventive strategies based on providing only information had only a minor effect on improving the eating behaviour of adolescents (Koivisto Hursti, & Sjödén, 1997). However, education was identified as one of the most important intervention tools aimed at improving health-related behaviour (Nutbeam, 2000). Thus, providing information on nutrition should be a necessary part of interventions targeted on improving eating habits.

Next, at the level of the physical environment, accessibility and availability of foods should be regulated within the family and with the school environment. As to the family environment, existing evidence suggests that home availability of specific foods was positively associated with children’s consumption of fruits and vegetables (Gross et al., 2010; Pearson et al., 2009) but also with frequent soft drinks consumption (Denney-Wilson et al., 2009). Parents could thus improve the eating habits of their children by providing healthy food and by lowering the availability of unhealthy food at home. Within the school environment, unhealthy eating practices of adolescents were associated with the availability of vending machines (Park, Sappenfield, Huang, Sherry, & Bensyl, 2010) and the presence of fast-food retailers near schools (Virtanen et al., 2015). In contrast to having such detrimental effects, the school environment may also support healthy eating habits in adolescents by reducing the prices of healthy food in the school cafeteria (Kessler, 2016) and by providing school gardens (Utter, Denny, & Dyson, 2016). The overall school nutrition climate as perceived by adolescents further appears to have a positive influence on the eating behaviour of adolescents (Cvjetan, Utter, Robinson, & Denny, 2014). Taken together, schools may thus also serve as a strong promoter of healthy eating habits in adolescents.

Finally, at the societal level price policies could be implemented to decrease the purchase and consumption of unhealthy products. Examples of this may be a sugar-tax and regulations on the sale of drinks containing sugar or caffeine to children and adolescents, as was recently implemented in some EU countries (Seifert et al., 2011). The prevalence of soft drinks and energy drinks consumption is lower in countries that have regulated energy drinks availability, such as Norway or Sweden, than in other European countries (Inschley et al., 2016; Seifert et al., 2011; Zucconi et al., 2013). Taking into account time trends of adolescents’ soft drinks consumption in northern countries, such as Norway, Finland or Sweden, the prevalence of adolescents consuming these drinks has slightly decreased in these countries in recent years (Currie et al., 2012; Inschley et al., 2016). This suggests that these regulations are effective and contribute to the decrease of adolescents’ consumption of such drinks. Combining preventive strategies at various levels may reinforce their effectiveness, leading to multicomponent and multilevel interventions. The success of multi-level interventions within a variety of settings, including schools, health services and the family setting, has been well documented (Lindsay et al., 2006).

Regular soft drinks and energy drinks consumption in adolescents was found to be strongly associated with a wide range of negative health and behaviour outcomes. The consumption of these drinks could thus be used as an indicator to identify adolescents at potential risk to multiple problem behaviours and particularly for direct preventive actions aimed at these endangered adolescents, as described in the previous paragraphs.

Adolescents who consumed alcohol with energy drinks were at higher risk to report negative health and behaviour outcomes than their peers who drank only alcohol or energy drinks or were abstinent. These adolescents had especially a
higher risk of being aggressive. If causal indeed, this implies a need for broadening adolescents’ knowledge about the adverse effects of mixing alcohol with energy drinks, in addition to the risks associated with only energy drinks, as noted above. In particular, adolescents who are prone to aggressive behaviour should be the target of such preventive actions. The information on the association between mixing alcohol and energy drinks with aggressive behaviour should be a part of anti-bullying programs and activities aimed at optimising peer relationships in school.

We further found that adolescents reporting a lack of parental rules on eating were more likely to eat unhealthily. Since the family has been shown to have a crucial role in shaping their children’s dietary practices (Lindsay et al., 2006; Pedersen et al., 2015), overall family food and eating practices could be a promising target for preventive actions. Parents should be aware that they play an important role in the development of eating habits of their children, taking into account the importance of particular mechanisms, such as modelling, food-related parental rules or food availability. By optimization of such mechanisms, parents could significantly improve the eating habits of their children. The effectiveness of preventive strategies involving parents has been well documented (Hart et al., 2015).

Bullying, as a form of aggressive behaviour, was reported significantly more often by adolescents dissatisfied with their bodies than by their peers. Those who considered themselves to be too fat were more likely to be victims and bully-victims. Self-reported thinness was associated with being a bully-victim, but only in boys. These findings suggest that not only girls but also boys dissatisfied with their bodies are at risk of negative behavioural outcomes. This may be translated in a number of interventions. First, early intervention at schools should be provided to reduce the onset of body image dissatisfaction among girls and boys. Primary prevention activities should become a part of the school curriculum and thus reach every adolescent potentially at risk to body image dissatisfaction. Second, overweight or underweight adolescents potentially at risk of image dissatisfaction should be targeted by bullying prevention and intervention strategies. A school psychologist or other professional present in school should actively work with these adolescents. Third, existing programs focused on eating-disorder prevention should address a wider range of factors, such as self-esteem, body image and aggressive behaviour. The effectiveness of programs based on media literacy enhancement, incorporating health education activities or on supporting self-esteem has been confirmed (Stice, Shaw, Becker, & Rohde, 2008; Yager & O’Dea, 2008).

8.4.2 Implications for future research

Our findings suggest that unhealthy eating habits are very common in Slovak adolescents. Adolescents from other countries, such as Finland, have been shown to have overall healthier eating habits (Inschley et al., 2016), providing a benchmark for what could be improved. Future research should explore the effectiveness of preventive actions and legislation with the goal of reaching in Slovakia the more favourable levels achieved in other countries.

Moreover, adolescents reporting regular soft drinks and energy drinks consumption were at higher risk of a wide range of negative health and behavioural outcomes. Further research is needed to examine the biological and social mechanisms affecting the relationship between consumption of substances contained in soft drinks and energy drinks and negative outcomes among adolescents and the psycho-
social factors that influence these mechanisms. In addition, objective measures of eating behaviour, anthropometric measures (such as BMI or body-fat content) or family eating-related rules reported by parents could be included in the design. An additional topic of study may be general family eating habits, including particular mechanisms, such as modelling or availability of healthy food. This may provide an overview of possible family influence on the eating habits of children. In the case of reporting on bullying behaviour or fighting, techniques such as peer nomination or triangulation are needed to ascertain the validity of measures.

Given the cross-sectional design of the present study, we could not make strong causal inferences. To disentangle causality, future longitudinal studies and trend analyses on these relations are needed, and perhaps also some experimental research aiming to confirm the concepts. Furthermore, the adverse effect of adolescents’ eating habits in the context of sleeping habits, screen-based behaviour or sedentary behaviour should be explored, since these behaviours are strongly interrelated. Some previous works have explored screen based behaviour and sedentary behaviour in association with health complaints, body image, physical activity or parental influence (Brindova et al., 2014; Husarova et al., 2016; Kopcakova et al., 2014).

Finally, further research on the role of adolescents’ eating behaviour in the context of wider health-related behaviour is needed. The association of health literacy of adolescents with eating practices should be assessed in particular to evaluate the potential effectiveness of health education on improving the eating habits of adolescents.

8.5 Conclusion

Unhealthy eating habits were highly prevalent among Slovak adolescents. Adolescents reporting regular soft drinks and energy drinks consumption were at higher risk of negative health and behaviour outcomes. Especially the combination of energy drinks and alcohol consumption in adolescents was related to multiple adverse outcomes. Moreover, the family environment was found to have an important role in shaping the eating habits of adolescents. And finally, adolescents reporting body image dissatisfaction were at higher risk of being involved in bullying. Our findings highlight the need for improving public awareness about the negative consequences of regular soft drinks and energy drinks consumption. Preventive strategies should involve multiple levels of adolescents’ influence, including the family, the school setting and legislation and should target the wide range of problem behaviours, ranging from unhealthy eating habits or body image dissatisfaction to negative health and behaviour outcomes involving multiple levels of influence. Much can be gained regarding these relatively new challenges for adolescent public health.