Health communication with parents and teachers and unhealthy behaviours in 15- to 16-year-old Swedes

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ABSTRACT

Background: Unhealthy behaviours during adolescence constitute a major risk for numerous diseases in adulthood.

Aim: To explore the associations between multiple unhealthy behaviours in adolescents and health behaviour information communicated by their parents and teachers, how much the adolescents cared about this information and whether adolescents went to schools with an annual health-themed week or not.

Methods: In this cross-sectional study, a self-reported questionnaire was delivered to pupils aged 15 and 16 (n = 492). The results were analysed using Poisson regression.

Results: The number of unhealthy behaviours was lower in adolescents whose parents encouraged them to adopt healthy behaviours. Adolescents at schools with an annual health-themed week reported more unhealthy behaviours than other adolescents. In addition, attendance at such schools did not compensate for a lack of health behaviour information communicated by parents. Caring about health behaviour information communicated by parents was associated with fewer unhealthy behaviours. In contrast, the opposite was found when adolescents cared about health information communicated by teachers.

Conclusion: It is important for parents to encourage their adolescent children to adopt healthy behaviours because this is particularly effective at lowering the number of unhealthy behaviours in adolescents. It also appears to be important for parents and teachers to develop credibility among adolescents regarding information communicated about health issues. The results also indicate the importance of involving parents in the school health work to influence them to encourage their adolescent children to adopt healthy behaviours.

1. Introduction

Four of the most critical behaviours that affect health are cigarette smoking, alcohol consumption, unhealthy eating habits and a low level of physical activity (Eaton et al., 2006,
2012; World Health Organization, 2014). While Swedish adolescents generally have better health-related behaviours than their global peers (Currie et al., 2012; Organisation for Economic Co-operation and Development, 2009); negative health behaviours still exist. Adolescence is known to be a time of ‘risk taking’ behaviour which may account for unhealthy behaviours. Adolescence is a critical period for developing health habits that will continue later in life. Thus, improving the health-related behaviours of Swedish adolescents could greatly lower their risk of poor health later in life.

1.1. Health behaviours of Swedish adolescents

Fewer than 15% of 15-year-olds in Sweden meet the World Health Organisation recommendation of 1 hour of physical activity per day (Currie et al., 2012; Folkhälsomyndigheten, 2014b), which is low compared with adolescents from other countries in the West (Currie et al., 2012; Folkhälsomyndigheten, 2014b). There are no signs of this inactivity improving (Currie et al., 2012; Folkhälsomyndigheten, 2014b) and the number of overweight adolescents in Sweden is increasing (Socialstyrelsen, 2013). Furthermore, smoking among Swedish adolescents started to increase in 2005 (Gripe, 2015; Socialstyrelsen, 2013). This trend continued until 2010, and then started to decrease (Folkhälsomyndigheten, 2014a; Gripe, 2015; Statens Folkhälsoinstitut, 2013); however, Swedish adolescents still have the highest rate of smoking in Scandinavia (Currie et al., 2012). Further, researchers have found that unhealthy behaviours tend to cluster together in adolescents (Faeh, Viswanathan, Chiolero, Warren, & Bovet, 2006; Kulbok & Cox, 2002; Paavola, Vartiainen, & Haukkala, 2004; Padrão, Lunet, Santos, & Barros, 2007; Wiefferink et al., 2006). Thus, it is not just individual behaviours such as physical inactivity and smoking, but overall health-related habits that require improvement in Swedish adolescents.

1.2. Multiple unhealthy behaviours

Multiple unhealthy behaviours imply a greater health risk than individual ones (Mazur & Woynarowska, 2004; Peters, Kok, Ten Dam, Buijs, & Paulussen, 2009). Adolescents with multiple unhealthy behaviours face a higher risk of numerous diseases later in life than those with one or no unhealthy behaviours (Eaton et al., 2012; Kelder, Perry, Klepp, & Lytle, 1994; Kemper, Snel, Verschuur, & Storm-van Essen, 1990). The proportion of adolescents exhibiting multiple unhealthy behaviours is not fully known, but researchers agree on the importance of addressing factors that protect against the development of multiple unhealthy behaviours (Kulbok & Cox, 2002; Meader et al., 2016; Neumark-Sztainer et al., 1997; Wiefferink et al., 2006).

1.3. Health behaviour knowledge in adolescents

One crucial factor that can protect against multiple unhealthy behaviours is knowledge about health-related behaviours. Studies have revealed that knowledge about the connection between healthy/unhealthy behaviours and health is associated with the adoption of healthy behaviours (Cutler & Lleras-Muney, 2010; Escalon, Beck, & Bossard, 2013; Patel, Jeve, Sherman, & Moss, 2016; Peltzer & Pengpid, 2014; Spronk, Kullen, Burdon, &
O’Connor, 2014). Researchers have also asserted that a lack of knowledge about unhealthy behaviours could result in an impression that such behaviours are not detrimental (Desalu, Iseh, Olokoba, Salawu, & Danburam, 2010; Roskin & Aveyard, 2009). This highlights the importance of communicating about health-related behaviours to adolescents. However, adolescents’ knowledge of the health risks connected to unhealthy behaviours, such as smoking, has decreased in Sweden (Nilsson, 2010). The reason for this is unknown. However, there is little doubt that adolescents’ knowledge of health-related behaviours is affected by their information sources.

1.4. Parental influence on adolescent health behaviours

Parents are important players in improving adolescents’ health-related behaviours (Moreno et al., 2009; Pedersen, Granado-Alcón, & Moreno-Rodriguez, 2004; Waylen, Stallard, & Stewart-Brown, 2008; Woodward, Oliphant, Lowe, & Tunstall-Pedoe, 2003) and they can serve as an important educational resource for their adolescent children (Davies, Crosby, & DiClemente, 2009). Numerous studies have shown that parents’ health-related behaviours can affect their children’s behaviours (Bricker et al., 2006; Case & Paxson, 2002; Harakeh, Scholte, Vermulst, de Vries, & Engels, 2004; Nilsson, 2010; Stanton et al., 1982). Communication between parents and their adolescent children has also been found to reduce the likelihood that children will consume alcohol (Newman, Harrison, Dashiff, & Davies, 2008; Tobler & Komro, 2010) and smoke (Newman et al., 2008). Further studies are needed to determine the influence of communication on eating habits and physical activity (Newman et al., 2008; Small, Morgan, Bailey-Davis, & Maggs, 2013). Previous studies have found, however, that communication by parents is directed by parents’ values and attitudes towards unhealthy behaviours. Adolescents’ health-related behaviours are also influenced by these values and attitudes (Dittus & Jaccard, 2000; Ford et al., 2005; Hesketh, Waters, Green, Salmon, & Williams, 2005; Yung, Lee, Ho, Keung, & Lee, 2010). If parents establish rules against smoking, for example, the risk that their adolescent children will smoke is lower (Clark et al., 2006).

1.5. Communication of health information by teachers

In contrast to health-related communication by parents, information on health-related behaviours communicated by teachers in Sweden is governed by the Swedish educational legislation and curricula (Swedish National Agency for Education [SNAE], 2016). This means that all adolescents are supposed to receive information in school regarding health and its associations with diet, physical activity and addictive substances (SNAE, 2016). In addition, there is a growing trend for schools in Sweden to further enhance health-related knowledge by allocating 1 week each year to focus on the theme of health. Previous research has shown that single health interventions have an effect on knowledge regarding health-related behaviours (Schäfer-Elinder & Faskunger, 2006; Statens Folkhälsoinstitut, 2011). One study investigated health-themed weeks in schools and other institutions in Sweden found that they affect health-behaviour-related knowledge (Schäfer-Elinder & Faskunger, 2006). However, health-themed weeks in Swedish schools have not been specifically studied. Other health programmes
in schools have, in some cases, been shown to affect health-related behaviours (De Bourdeaudhuij et al., 2010; Peters et al., 2009; Wallace & Vienonen, 1989). There is evidence, however, that school-based health behavioural interventions have a limited or moderate effect on health-related behaviours (Karlberg, 2016; Statens Folkhälsoinstitut, 2011; Van Cauwenberghe et al., 2010). School-based interventions that address multiple unhealthy behaviours have been scientifically investigated (Busch, de Leeuw, de Harder, & Schrijvers, 2013). To our knowledge, however, health information communicated by teachers, in general, and its association with multiple unhealthy behaviours, in specific, has not yet been studied.

1.6. Credible communication sources in adolescents

It is important that teachers’ communication regarding health behaviours be effective so that all adolescents have the same chance of living healthy lives, regardless of factors such as their socio-economic status and the amount of health-related information they receive from their parents. Rosenthal and Reichler (1994) asserted that ‘the credibility of a source is an important factor acting the persuasiveness of a communication’. Parents and teachers may not necessarily have a high degree of credibility with adolescents. Given that credible communication sources are more effective at persuading adolescents to adopt healthy behaviours, it is important for parents and teachers to have a high degree of credibility with adolescents. If adolescents do not trust information sources, they are unlikely to care about the health behaviour information that is being communicated to them. Given the above, we propose the following hypothesis: we expect that communication by parents and teachers regarding health-related behaviours is only associated with fewer unhealthy behaviours in adolescents if the adolescents care about the information.

2. Aim

This study aimed at exploring the associations among multiple unhealthy behaviours in adolescents and whether parents and teachers communicated the importance of adopting healthy behaviours, whether adolescents cared about health behaviour information from parents and teachers and whether adolescents went to schools with an annual health-themed week (hereafter ‘health-focused schools’) or not.

3. Methods

3.1. Sample

A total of 161 Swedish compulsory lower secondary schools in 21 Swedish municipalities (out of 290 municipalities in Sweden) were specifically selected (Figure 1) to ensure a sample representative of the entire Swedish population. They were selected to ensure both urban (city with a population of 50,000 or more as defined by the Swedish Association of Local Authorities and Regions (SALAR), 2011) and nonurban areas (population with less than 50,000) in all geographical areas (north, south, east and west) of Sweden. The selection of municipalities were made to ensure a sample representative of the entire Swedish population (including a geographic and socio-demographic spread).
Approximately half of the Swedish population lives in urban areas and half in more rural ones according to the SALAR (2011).

We sent an initial inquiry form containing three questions to the schools’ principals. The first question asked whether the principals would allow their school to participate in the study. The second question asked whether the school had annual health-themed days in addition to ordinary teaching regarding health-related topics (with the following possible answers: ‘no, never’, ‘yes, 1 day/year’, ‘yes, 2–3 days/year’, ‘yes, 4 days/year’, ‘yes, 1 week/year’ and ‘yes, more than 1 week/year’). The final question asked about the approaches used to teach about health-related issues at the school (with the following possible answers: ‘health taught as a separate school subject’, ‘health issues are integrated into other school subjects’, ‘health-themed days’, ‘other themed days’, ‘information from the school nurse’, ‘visits to classrooms by other knowledgeable people’, ‘study visits’ and ‘other’).

Out of the 19 schools that agreed to participate, 10 were included in the study. These 10 schools were chosen because they represented equal numbers of schools and pupils in urban and rural areas and because they are located in different regions of Sweden (the north, south, east and west). Half of the chosen schools reported having a health focus (health-themed events lasting 4 days to 1 week per year) and the other half did not report having any health-themed days or any of the options in question 3 in the inquiry form (such as, for example, health issues integrated into other school subjects). None of the schools reported any other type of health-related activities apart from health-themed days. Similar to non-health-focused schools, the health-focused schools were equally distributed between urban and rural areas.

A questionnaire was given to the pupils at the schools included in this study. A total of 492 15- to 16-year-old adolescents (61% of all target participants) completed the survey. Among these participants, 49% lived in urban areas and 51% in more rural areas. The sample was also representative of the Swedish population with regard to the education level of parents and the number of adolescents with a passing leaving certificate in grade 9 (SNAE, 2016). Among the adolescents who completed the questionnaire, 70.3% attended health-focused schools and 29.7% did not. Both groups were equally distributed between rural and urban areas. The 39% drop-out rate was due to pupils being absent (n = 39), questionnaires not being distributed by the teachers (n = 151) and one school not returning their questionnaires (n = 123).

Figure 1. Recruitment criteria and sampling procedure.
3.2. Procedure

The self-reported paper-based questionnaire contained 82 questions. Some of these questions were specifically developed for this cross-sectional study, but most of them had been used in other studies. To ensure the validity of this questionnaire, a pilot study was performed in one class. Pupils were encouraged to ask about the questions if they had any inquiries. A retest was later sent to the same class to ensure the reliability of the questions.

Cronbach’s $\alpha$ was calculated in SPSS Statistics 22 and the internal consistency was shown to be adequate (the Cronbach’s $\alpha$ for the questions ranged from a low 0.58 (How often do you feel that you have less money than your peers) to 0.74 (Parents tell me to have healthy behaviours)). A few questions and answering alternatives were reformulated. A second pilot study was performed in four school classes to test the validity of the edited questions.

The principals asked their teachers to hand out the questionnaire. The questionnaires were distributed to the adolescents in the classroom during ordinary class hours. The questionnaire took approximately 30 minutes to complete. Questionnaires were sent back to the researcher in June 2009. The aim of the questionnaire, confidentiality measures, informed consent (which was given by the act of completing the questionnaire), the voluntary nature of participation and the fact that one could withdraw one’s participation at any time were included on the first page of the questionnaire.

Ethical regulations and guidelines for humanistic and social science research in Sweden were followed. The ethics committee at the Faculty of Medicine at Uppsala University in Sweden was consulted and the study was performed in accordance with ethical standards and Swedish law (Law, 2003:460); the need to apply for ethical approval was waived.

3.3. Study variables

Thirty-three questions (out of the 82 in the questionnaire) were used for analysis (appendix). These questions focused on health-related behaviours (smoking, alcohol consumption, physical activity, meal frequency, and unhealthy eating) and possible factors associated with these behaviours.

3.3.1. Health behaviour variables

The health-related variables (five questions) acted as the outcome variables and concerned whether the adolescents smoked, drank alcohol, exercised in their spare time, ate regularly and consumed unhealthy food (e.g. ‘Do you smoke?’).

3.3.2. Socio-demographic variables

Socio-demographic variables (three questions concerning age, gender and whether the adolescents felt that they had less money than their peers ‘How often do you feel that you have less money than your peers?’) were included as potential confounders. Adolescents’ self-perceived economic situation was used because it has been demonstrated as a good measure of socio-economic status for adolescents in relation to health-related behaviours (Goodman, Huang, Schafer-Kalkhoff, & Adler, 2007).
3.3.3. Variables concerning parental encouragement and health information at school

Four questions asked about the pupils’ main sources of information regarding health-related behaviours. Another question concerned whether they received health-related information at school. In addition, four questions dealt with whether the pupil’s parents encouraged them to adopt healthy behaviours (e.g. ‘Agree or disagree with the statement: My parents tell me not to smoke’). These were predictors in the analyses. Whether or not adolescents went to health schools was included as an effect modifier in the interaction analyses.

3.3.4. To care or not about health communication

Four questions focused on how much the adolescents cared about the health behaviour information that was conveyed by parents (e.g. ‘Agree or disagree with the statement: I care about what my parents say about physical activity’). Similar questions asked about whether the adolescents cared about the health behaviour information from their teachers (four questions), friends (four questions) and the media (four questions) (e.g. ‘Agree or disagree with the statement: “I care about what media (e.g. TV, internet, magazines) write/present about alcohol”’). These were predictors in the analyses. Questions regarding health behaviour information from friends (Hartup, 2005; Hesketh et al., 2005; Kuntsche, Simons-Morton, Fotiou, ter Bogt, & Kokkevi, 2009; Zambon et al., 2010) and the media (Falk, Ivarsson, & Brynhildsen, 2010; Hesketh et al., 2005) were included because other studies have shown these factors to be associated with health-related behaviours among adolescents.

3.4. Statistical analyses

The statistical analyses were carried out using SPSS Statistics 22. The analyses were performed separately for adolescents in health-focused schools and adolescents in non-health-focused schools and then for all adolescents together.

3.4.1. Frequency analysis

The first analysis was a frequency analysis of the variables included in the study.

3.4.2. Cross-tabulation analysis

The second analysis was a cross-tabulation analysis, which was performed to identify significant differences between pupils attending health-focused schools and those attending non-health-focused schools.

3.4.3. Poisson regression analyses

Poisson regression analyses were performed. The dependent variable for this part of the study was the number of unhealthy behaviours (from 0 to 5) that adolescents reported. Using the Poisson regression analyses, this factor was measured in relation to several other variables including whether parents encouraged their adolescent children to adopt healthy behaviours and whether adolescents cared about the health behaviour information that was communicated to them by parents, teachers, friends and the media. The adolescents’ gender, age and self-identified socio-economic status were also investigated in relation to the number of unhealthy behaviours exhibited. First, univariate Poisson regression analyses were performed on all of these variables in association with the
number of unhealthy behaviours in the adolescents. A second Poisson regression analysis involving multivariate analysis was also performed to examine whether the associations survived adjustment for other factors. Univariate and multivariate Poisson regression analyses were also performed to determine whether the number of unhealthy behaviours was associated with health behaviour information given by parents and teachers. Then we carried out a third round of Poisson regression analyses, in which we performed both additive and multiplicative interaction tests. These analyses were intended to determine whether attending a health-focused school would protect against unhealthy behaviours in adolescents whose parents did not encourage them to adopt healthy behaviours. These interaction analyses were also intended to compare the number of unhealthy behaviours in adolescents who were encouraged by their parents to adopt healthy behaviours with those who were not. All Poisson regression analyses were performed with robust variance estimates. To account for clustering of adolescents within school classes, we used generalised estimating equations with an exchangeable correlation structure.

3.4.4. Correlation analysis
Finally, we used Pearson correlation analysis to measure the correlation between whether adolescents cared about what their parents said about health-related behaviours with what their teachers said regarding health-related behaviours.

4. Results

4.1. Frequency analysis
The frequency analysis (Table 1) indicated that more than half of the adolescents in this study exhibited one (29.9%) or two (27%) unhealthy behaviours and nearly 60% (59.6%) reported two or more unhealthy behaviours. Approximately half of the adolescents (49.1%) reported that their parents encouraged them to adopt healthy behaviours, while the majority (92.9%) reported that they received health behaviour information at school. This high proportion resulted in only limited variation in the answers regarding the level of health-related information obtained at school. Thus, significant results regarding this factor could not be obtained through Poisson regression analysis. Therefore, this variable was only included in one of the Poisson regression analyses (Table 3) to study the association between the number of unhealthy behaviours and the level of health-related information provided at school. Nearly half of the adolescents reported that they mainly received health behaviour information about diet, physical activity, smoking and alcohol from their teachers. The second most common source of such information was the pupils’ parents (between 14% and 24.8% depending on the type of health-related behaviour information) (appendix). In addition, more than 40% of pupils reported that they cared about what their parents said regarding health-related behaviours. In contrast, 20% reported that they cared about health behaviour information provided by their teachers (Table 1).

4.2. Cross-tabulation analysis
A significantly higher proportion of adolescents at non-health-focused schools had parents who encouraged them to adopt healthy behaviours (57.9% vs. 45.4%) (Table 1).
| Variables (number of responses) | Answer alternatives | Schools with no health focus | Health schools<sup>b</sup> | All schools |
|---|---|---|---|---|
| Gender (492) | Boys | 42.5 (62) | 51.4 (178) | 48.8 |
| | Girls | 57.5 (84) | 48.6 (168) | .069 |
| Age (491) | Age – 15 years | 65.8 (96) | 66.1 (228) | 66.0 |
| | Age – 16 years | 34.2 (50) | 33.9 (117) | .807 |
| How often do you feel that you have less money than your peers? (487) | Fairly often or always | 10.3 (15) | 10.5 (36) | 10.5 |
| | Sometimes | 20.7 (30) | 20.5 (70) | 20.5 |
| | Rather seldom | 24.8 (36) | 28.1 (96) | .885 |
| | Never or almost never | 44.1 (64) | 40.9 (140) | 41.9 |
| Number of unhealthy behaviours (455) | No unhealthy behaviour | 10.9 (15) | 10.4 (33) | 10.5 |
| | One unhealthy behaviour | 32.8 (45) | 28.6 (91) | 29.9 |
| | Two unhealthy behaviours | 30.7 (42) | 25.5 (81) | 27.0 |
| | Three unhealthy behaviours | 11.7 (16) | 19.8 (63) | 17.4 |
| | Four unhealthy behaviours | 10.2 (14) | 12.9 (41) | 12.1 |
| | Five unhealthy behaviours | 3.6 (5) | 2.8 (9) | .308 |
| Do you receive health information in school? (476) | No | 6.3 (9) | 7.5 (25) | 7.1 |
| | Yes | 93.7 (133) | 92.5 (309) | .485 |
| My parents encourage me to adopt healthy behaviours (466) | Fully agree, agree to some extent | 57.8 (81) | 45.4 (148) | 49.1 |
| | Neither agree nor disagree | 39.3 (55) | 50.6 (165) | 47.2 |
| | Does not apply very well, do not agree at all | 2.9 (4) | 4.0 (13) | 3.6 |
| I care about what my parents say about health-related behaviours (468) | Fully agree, agree to some extent | 48.2 (68) | 37.6 (123) | 40.8 |
| | Neither agree nor disagree | 43.3 (61) | 49.5 (162) | 47.6 |
| | Does not apply very well, do not agree at all | 8.5 (12) | 12.8 (42) | 11.5 |
| I care about what my friends say about health-related behaviours (470) | Fully agree, agree to some extent | 14.7 (21) | 19.6 (64) | 18.1 |
| | Neither agree nor disagree | 61.5 (88) | 58.4 (191) | 59.4 |
| | Does not apply very well, do not agree at all | 23.8 (34) | 22.0 (327) | 22.5 |
| I care about what my teachers/the school staff say about health-related behaviours (469) | Fully agree, agree to some extent | 17.5 (25) | 23.6 (77) | 21.7 |
| | Neither agree nor disagree | 42.6 (61) | 53.7 (175) | 50.3 |

(Continued)
In addition, a higher proportion of adolescents in this group reported that they cared about the health behaviour information provided by their parents (although this difference was not significant). A significantly higher proportion of pupils at the health-focused schools cared about what their teachers said about health-related behaviours (23.6% compared with 17.5% at non-health-focused schools).

4.3. Poisson regression analyses

According to the univariate Poisson regression analyses (Table 2), all variables except for gender and age were significantly associated with the number of unhealthy behaviours reported. According to the multivariate Poisson regression analyses (Tables 2 and 3), there were significant associations between the number of unhealthy behaviours and only some of the investigated variables.

4.3.1. Parental encouragement and teacher health behaviour information

The Poisson regression analyses revealed that adolescents whose parents did not encourage them to adopt healthy behaviours reported more unhealthy behaviours if the adolescent went to a non-health-focused school (Table 2). Adolescents who neither agreed nor disagreed that their parents encouraged them to adopt healthy behaviours reported 1.35 times as many unhealthy behaviours as those who agreed that their parents encouraged them to adopt healthy behaviours (Table 2). However, at health-focused schools, this factor did not affect the number of unhealthy behaviours reported.

The second Poisson regression analysis (Table 3) indicated that there were no significant differences in the number of unhealthy behaviours depending on whether parents encouraged their adolescent children to adopt healthy behaviours or whether the adolescents received health behaviour information from teachers.
Table 2. Number of unhealthy behaviours in adolescents (Poisson regression analyses).

| Variables | Answer alternatives | Schools with no health focus |  | Health schools |  | All schools |  |
|-----------|---------------------|-----------------------------|---|----------------|---|-------------|---|
|           |                     | Univariate | RR | 95% CI | Multivariate | RR | 95% CI | Univariate | RR | 95% CI | Multivariate | RR | 95% CI |
| Gender    | Female              | 1.16 | 0.87–1.54 | 1.20 | 0.97–1.50 | 1.06 | 0.91–1.24 | 1.00 | 0.87–1.15 | 1.09 | 0.95–1.26 | 1.09 | 0.96–1.22 |
|           | Male                | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          |
| How old are you? | 16 years | 1.13 | 0.94–1.37 | 0.96 | 0.87–1.06 | 1.23 | 1.03–1.48* | 1.13 | 0.96–1.33 | 1.18 | 1.00–1.38* | 1.09 | 0.96–1.24 |
|           | 15 years            | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          |
| How often do you feel that you have less money than your peers? | Fairly often or always | 1.32 | 0.85–2.03 | 0.96 | 0.67–1.38 | 1.35 | 1.13–1.62* | 1.21 | 1.00–1.47 | 1.36 | 1.15–1.61* | 1.17 | 0.99–1.38 |
|           | Sometimes           | 1.65 | 1.36–2.01* | 1.64 | 1.36–1.99* | 1.10 | 0.93–1.31 | 1.14 | 0.97–1.33 | 1.28 | 1.09–1.52* | 1.29 | 1.11–1.50* |
|           | Rather seldom       | 1.21 | 0.97–1.52 | 1.22 | 0.99–1.50 | 1.11 | 0.95–1.31 | 1.16 | 1.01–1.34 | 1.16 | 1.01–1.33* | 1.17 | 1.03–1.32* |
|           | Never or almost never | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          |
| My parents encourage me to adopt healthy behaviours | Do not agree at all, does not apply very well | 1.70 | 1.16–2.49* | 1.50 | 0.83–2.71 | 1.65 | 1.32–2.07* | 1.01 | 0.86–1.19 | 1.72 | 1.40–2.10* | 1.12 | 0.91–1.39 |
|           | Neither agree nor disagree | 1.56 | 1.27–1.92* | 1.35 | 1.14–1.60* | 1.22 | 1.06–1.39* | 0.98 | 0.87–1.10 | 1.30 | 1.15–1.48* | 1.08 | 0.95–1.23 |
|           | Agree to some extent, fully agree | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          |
| I care about what my parents say about health-related behaviours | Do not agree at all, does not apply very well | 2.18 | 1.73–2.74* | 1.26 | 0.88–1.79 | 2.19 | 1.73–2.77* | 1.59 | 1.20–2.11* | 2.22 | 1.86–2.66* | 1.53 | 1.22–1.92* |
|           | Neither agree nor disagree | 1.61 | 1.32–1.96* | 1.20 | 0.87–1.65 | 1.71 | 1.41–2.08* | 1.37 | 1.14–1.64* | 1.66 | 1.43–1.93* | 1.34 | 1.12–1.60* |
|           | Agree to some extent, fully agree | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          | 1    | 1          |
| I care about what my teachers/the school staff say about health-related behaviours | Do not agree at all, does not apply very well | 0.46 | 0.37–0.57* | 0.58 | 0.38–0.88* | 0.44 | 0.35–0.55* | 0.52 | 0.40–0.67* | 0.43 | 0.37–0.52* | 0.56 | 0.45–0.70* |

(Continued)
Table 2. Continued.

| Variables                                                                 | Answer alternatives                      | Schools with no health focus |          |          |          |          |          |          |          |          |          |          |          |
|---------------------------------------------------------------------------|------------------------------------------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|                                                                           |                                           | Univariate                  | Multivariate | Univariate | Multivariate | Univariate | Multivariate | Univariate | Multivariate | Univariate | Multivariate |          |          |
|                                                                           |                                           | RR  | 95% CI      | RR  | 95% CI      | RR  | 95% CI      | RR  | 95% CI      | RR  | 95% CI      |          |          |
| I care about what my friends say about health-related behaviours          | Neither agree nor disagree               | 0.72 | 0.62–0.84*  | 0.74 | 0.58–0.94*  | 0.71 | 0.60–0.84*  | 0.75 | 0.62–0.90*  | 0.71 | 0.62–0.81*  | 0.76     | 0.65–0.89*  |
|                                                                           | Agree to some extent, fully agree        | 1   | 1           | 1   | 1           | 1   | 1           | 1   | 1           | 1   | 1           |          |          |
|                                                                           | Do not agree at all, does not apply very well | 0.63 | 0.46–0.86*  | 1.08 | 0.74–1.57   | 0.64 | 0.51–0.79*  | 1.12 | 0.81–1.53   | 0.61 | 0.51–0.73*  | 1.12     | 0.87–1.43   |
|                                                                           | Neither agree nor disagree               | 0.90 | 0.68–1.18   | 1.20 | 0.88–1.43   | 0.81 | 0.71–0.94*  | 1.05 | 0.85–1.30   | 0.81 | 0.72–0.92*  | 1.07     | 0.92–1.25   |
|                                                                           | Agree to some extent, fully agree        | 1   | 1           | 1   | 1           | 1   | 1           | 1   | 1           | 1   | 1           |          |          |
| I care about what media (TV, internet, magazines, etc.) say about health-related behaviours | Neither agree nor disagree               | 0.62 | 0.48–0.80*  | 0.96 | 0.71–1.30   | 0.66 | 0.51–0.84*  | 1.29 | 0.90–1.85   | 0.63 | 0.53–0.75*  | 1.14     | 0.88–1.47   |
|                                                                           | Agree to some extent, fully agree        | 1   | 1           | 1   | 1           | 1   | 1           | 1   | 1           | 1   | 1           |          |          |

Note: RR, rate ratio — number of unhealthy behaviours; CI, confidence interval.

*Schools with an annual health-themed week.

*Performed with robust variance estimates. To account for clustering of adolescents within school classes, generalised estimating equations with an exchangeable correlation structure were used.

*Statistically significant at 95% CI.
The multiplicative interaction Poisson regression analysis (Figure 2) confirmed this finding by revealing a very small significant ($P$-value .014) difference in the number of unhealthy behaviours between adolescents whose parents did not encourage them to adopt healthy behaviours at health-focused schools and those at non-health-focused schools. In this case, pupils at health-focused schools reported 0.177 fewer unhealthy behaviours than those at other schools. The corresponding additive interaction analysis with Poisson regression showed the same findings. However, the univariate analyses in the second Poisson regression analysis (Table 3) revealed that adolescents reported fewer unhealthy behaviours if their parents encouraged them to adopt healthy behaviours (0.59 fewer for pupils at non-health-focused schools and 0.71 fewer for pupils at health-focused schools). This finding was confirmed by the multiplicative interactive analysis, which revealed that pupils at health-focused schools had 0.426 fewer unhealthy behaviours and those at non-health-focused schools had 0.936 fewer unhealthy behaviours (Figure 2). The corresponding additive interaction analysis showed the same results.

Table 3. Number of unhealthy behaviours in adolescents (Poisson regression analyses).

| Adolescents who receive health information in school and whose parents encourage them to adopt healthy behaviours | RR  | 95% CI     | RR  | 95% CI    |
|---------------------------------------------------------------------------------------------------------------|-----|------------|-----|-----------|
| Adolescents who do not receive health information in school but whose parents encourage them to adopt healthy behaviours | 0.71| 0.57–0.89a | 0.97| 0.77–1.22 |
| Adolescents who receive health information in school but whose parents do not encourage them to adopt healthy behaviours | 0.59| 0.40–0.88a | 0.92| 0.69–1.23 |
| Adolescents who do not receive health information in school and whose parents do not encourage them to adopt healthy behaviours | 0.92| 0.79–1.09  | 1.04| 0.86–1.25 |

Note: RR, rate ratio; CI, confidence interval.

aPerformed with robust variance estimates. To account for clustering of adolescents within school classes, generalised estimating equations with an exchangeable correlation structure were used.

bRR adjusted for age, gender, how often adolescents feel that they have less money than their peers and whether adolescents care about what parents, teachers, friends and media say regarding health-related behaviours.
Among the adolescents who were encouraged by their parents to adopt healthy behaviours, those at health-focused schools had more unhealthy behaviours (0.333 more) than those at non-health-focused schools according to multiplicative interaction analysis (Figure 2). The additive interaction analysis and the second univariate Poisson regression analyses showed the same results.

4.3.2. To care or not about health behaviour information

Adolescents at health-focused schools who reported not caring what their parents said about health-related behaviours had more unhealthy behaviours (1.59) than those who reported that they cared (Table 2). In non-health-focused schools, there was no significant difference in the number of unhealthy behaviours depending on whether adolescents cared about health behaviour information communicated by parents or not. When pupils from both types of schools were investigated together, however, adolescents had significantly more unhealthy behaviours (1.53) if they did not care about what their parents said about health-related behaviours. Adolescents in both health-focused schools and non-health-focused schools who did not care about health information from teachers had fewer unhealthy behaviours (0.56) than those who cared about such information.

4.4. Correlation analysis

The correlation analysis showed that when adolescents cared about what their parents said regarding health-related behaviours, they were less likely to care what their teachers said, and vice versa (Pearson correlation coefficient $-0.657$ with a significant $P$-value ($P < .01$)).

5. Discussion

The purpose of this study was to explore the number of unhealthy behaviours in Swedish adolescents with regard to health behaviour information communicated by parents and teachers. Nearly 60% of adolescents reported having more than one unhealthy behaviour. This large proportion is alarming because multiple unhealthy behaviours increase the risk of numerous diseases later in life. Fifty percent of US adolescents were reported to have two or more unhealthy behaviours in 2002 (Kulbok & Cox, 2002). Multiple unhealthy behaviours have been found to be common among adolescents in many studies (Durkee et al., 2016; Eaton et al., 2012; Faeh et al., 2006; Meader et al., 2016; Ottevaere et al., 2011; Wiefferink et al., 2006), including studies of adolescents in Europe and Sweden (Durkee et al., 2016; Ottevaere et al., 2011).

Despite previous studies reporting that adolescents are particularly strongly influenced by their families (Novak & Pelaez, 2004; Szapocznik, Coatsworth, Glantz, & Meyer, 1999), only half of the adolescents in the current study reported that their parents encouraged them to adopt healthy behaviours. Earlier studies have found that parents telling their adolescent children not to smoke or consume alcohol greatly affects the children’s behaviour (Newman et al., 2008; Tobler & Komro, 2010). However, few studies have examined health behaviour information communicated by parents in association with other behaviours and with multiple unhealthy behaviours in adolescents. This study found that it is important that parents encourage their children to adopt healthy behaviours to decrease the risk of developing multiple unhealthy behaviours. This finding is an addition to earlier literature.
The initial analyses in the current study found that adolescents at non-health-focused schools reported a higher number of unhealthy behaviours if their parents did not encourage them to adopt healthy behaviours (Table 2). Yet, this was not true for adolescents who attended health-focused schools. This suggests that health-focused schools protect against the risk of increased unhealthy behaviours associated with parents not encouraging their adolescent children to adopt healthy behaviours. However, our subsequent analyses did not confirm this.

The first interaction test (Figure 2) compared adolescents who were not encouraged by their parents to adopt healthy behaviours and did attend health-focused schools with those who did not attend such schools. The results indicated that there was no significant difference in the number of unhealthy behaviours between these two groups. In other words, attending a health-focused school did not compensate for a lack of health behaviour information communicated from one’s parents. Health-promoting initiatives and their effects on health behaviours are well studied and this finding is in line with these studies, i.e. that health-promoting initiatives have often shown to be limited (Thompson, 1978; Van Cauwenbergh et al., 2010; Wiehe, Garrison, Christakis, Ebel, & Rivara, 2005) or unclear (Mukoma & Flisher, 2004; St Leger, 1999). Univariate analyses in the second Poisson regression (Table 3) revealed that the number of unhealthy behaviours was lower in adolescents at both health-focused schools and non-health-focused schools when their parents encouraged them to adopt healthy behaviours. The second interaction test (Figure 2) confirmed this finding. Thus, our results reinforce those of earlier studies showing that it is important for parents to encourage their children to adopt healthy behaviours (Clark et al., 2006; Folkhälsmyndigheten, 2014c; Halliday et al., 2014; Newman et al., 2008; Nilsson, 2010; Tobler & Komro, 2010). However, similar studies comparing adolescents at health-focused schools and non-health-focused schools have not been performed in Sweden. Therefore, it is difficult to truly compare the current results with those of previous works. The current results highlight the importance of parents (Table 3) encouraging their children to adopt healthy behaviours regardless of whether the adolescent attends a health-focused school or not. However, the second multivariate Poisson Regression analysis (Table 3) found no significant differences in the number of unhealthy behaviours depending on whether or not parents encourages their children to adopt healthy behaviours. The importance of this encouragement may thus be mediated by other factors, such as whether adolescents care about the health-related information they receive.

In the current study, just over 40% of participants reported that they care about what their parents say about health behaviours. As predicted in our hypothesis, adolescents who reported that they care about health behaviour information communicated by their parents exhibited fewer unhealthy behaviours than those who did not (Table 2). This is an interesting finding because it implies that it is insufficient for parents to encourage their adolescent children to adopt healthy behaviours—the adolescents must also care about the information that is communicated to them. To our knowledge, an association between multiple unhealthy behaviours and adolescents caring about health behaviour information communicated to them by their parents has not previously been identified.

Almost all adolescents in this study reported that they receive health behaviour information at school and teachers were reported to be the most common source of
information regarding health behaviours. In Sweden, school is an important arena for adolescents to receive information regarding health behaviours. Interestingly, adolescents at health-focused schools cared about what their teachers said regarding health behaviours to a greater extent than those at non-health-focused schools. However, those at health-focused schools exhibited more unhealthy behaviours than their counterparts at non-health-focused schools. One potential explanation for this is that the parents of pupils at non-health-focused schools were more likely to encourage their children to adopt healthy behaviours. Another possible explanation is that the health-focused schools may have introduced an annual health-themed week because of their awareness that pupils exhibited many unhealthy behaviours. Health-promoting initiatives and their effects on health behaviours are well studied and the latter have often been shown to be limited (Thompson, 1978; Van Cauwenberghe et al., 2010; Wiehe et al., 2005) or unclear (Mukoma & Flisher, 2004; St Leger, 1999). Health-themed weeks in Swedish schools have only been scientifically evaluated by one national project, ‘A Healthier Sweden’ (‘Ett Friskare Sverige’) (Statens Folkhälsoinstitut, 2011). This project evaluated health-themed weeks at various institutions in Sweden, including schools. Our study provides the first investigation specific to health-themed weeks in Swedish schools. Although, our study is not an evaluation of health schools in Sweden, the findings of the current study are similar to the results of ‘A Healthier Sweden’, which found that health weeks increased knowledge of healthy behaviours but were not associated with actual behaviour.

Nearly 80% of the adolescents in our study reported that they did not care about what their teachers told them regarding health-related behaviours. Unexpectedly, adolescents who cared about health behaviour information from teachers had more unhealthy behaviours than those who did not. To our knowledge, whether or not adolescents care about health behaviour information from teachers and an association with multiple unhealthy behaviours has not been investigated previously.

Rosenthal and Reichler (1994) argued that a communication source needs to be credible for the information to be persuasive. Teachers’ credibility among adolescents regarding information about health behaviours may be lower than that of parents. According to Cutler and Lleras-Muney (2006), adolescents place different levels of priority on different sources of health information ‘depending on their informational content and their perceived credibility’. Adolescents who cared about what their parents said regarding health behaviours in this study did not care about what their teachers said and vice versa. Teachers’ credibility regarding information on health behaviours may therefore be lower among adolescents who are encouraged to adopt healthy behaviours by their parents. In contrast, teacher’s credibility on this issue may be higher among adolescents who do not receive such encouragement from their parents.

If the most effective sources of health information are those that are credible, it is important for teachers (as the most frequently encountered source of health behaviour-related information) to have a high degree of credibility among adolescents. Teachers may have to work harder to gain credibility among their pupils with regard to health behaviour information. Frelin (2010, 2012) discussed the need for teachers to be accepted by adolescents to be successful at teaching them. This acceptance could also be important for gaining credibility. Frelin (2010, 2012) also emphasised the importance of teachers having a close relationship with pupils because this relationship affects students’ academic performance. This may also be true for ensuring that health behaviour communication is
effective. Previous studies have reported that disengagement and poor teacher–student relationships are associated with unhealthy behaviours such as drug use (Fletcher, Bonell, & Hargreaves, 2008). In contrast, engagement and positive teacher–student relationships improve efforts to combat smoking in schools (Aveyard et al., 2004; Sellstrom & Bremberg, 2006; West, Sweeting, & Leyland, 2004).

Similarly, the quality of parent–child relationships and their association with health-related behaviours in adolescents has been studied in relation to smoking. The results showed that this factor was an important factor determining whether adolescents smoke (Fleming, Kim, Harachi, & Catalano, 2002; Karcher & Finn, 2005; Tilson, McBride, Lipkus, & Catalano, 2004). Previous works have also suggested that parent–child relationships may mediate adolescents’ health-related behaviours, such as alcohol use, eating habits and physical activity (Riesch, Anderson, & Krueger, 2006). In the current study, however, we found that parents’ encouragement is decreasing the likelihood of adolescents engaging in multiple unhealthy behaviours. Although the importance of parents’ actions to adolescents’ health-related behaviours has already been established, previous studies investigated only single behaviours. Similar to the results of earlier studies (Newman et al., 2008; Tobler & Komro, 2010), those of the current work suggest that it is important for parents to encourage their adolescent children to adopt healthy behaviours. However, all adolescents should have the same chance of adopting healthy behaviours, regardless of whether their parents encourage them to be healthy or not. Therefore, it is important that communication of health behaviour-related information by teachers is effective at reducing unhealthy behaviours in adolescents. One way of ensuring this is for teachers to work to gain credibility among their pupils. This suggestion needs to be tested longitudinally to assess whether improved credibility is associated with a lower number of unhealthy behaviours in adolescents. Furthermore, it may be important to involve parents in the school health work to influence them to encourage their children to adopt healthy behaviours.

5.1. Methodological considerations

One of this study’s strengths is that it includes a representative sample of adolescents in Sweden in terms of the proportions of pupils from urban and rural areas as well as the level of parental education and pupils’ grades. We surveyed representative samples of both the health-focused schools and non-health-focused schools, which suggests that the comparisons between the two groups are valid. However, more pupils at health-focused schools than non-health-focused schools were included as a result of drop-out after the schools were chosen initially. The proportion of all schools in Sweden that have an annual health-themed week is unknown. Among the schools in this study, 70.3% had such a week. However, this percentage is probably greater than the national average of schools with health weeks, which may have affected the results. Another possible limitation of the study is that the findings are based on the adolescents’ questionnaires responses. The data are based on subjective experiences, which raises the possibility of response bias. A third potential limitation is the thresholds used in this study to define healthy behaviours. For example, the World Health Organisation (2016) recommends 1 hour of physical activity per day for adolescents. In this study, we considered exercising at least two to three times per week for more than 30 minutes as the threshold for...
healthy physical activity. The threshold values were set to ensure sufficient numbers of adolescents were included on both sides of the thresholds to facilitate data analysis.

6. Conclusions

We investigated unhealthy behaviours in Swedish adolescents and health behaviour information communicated by parents and teachers in health-focused schools and non-health-focused schools. The number of unhealthy behaviours was lower among adolescents whose parents encouraged them to adopt healthy behaviours. Furthermore, caring about what one’s parents said regarding health behaviours was associated with fewer unhealthy behaviours. Attending a health-focused school did not compensate for a lack of information regarding health behaviours from one’s parents. In fact, adolescents at health-focused schools had more unhealthy behaviours than those at non-health-focused schools. Those at health-focused schools cared more about what their teachers said regarding health behaviours than others. However, caring about health behaviour information conveyed by teachers was actually associated with a higher number of unhealthy behaviours. Attending a health-focused school and caring about health behaviour information communicated by teachers were not related to a lower number of unhealthy behaviours in adolescents. These findings highlight the importance of parents encouraging their adolescent children to adopt healthy behaviours to decrease the risk of children adopting multiple unhealthy behaviours. It is also important that adolescents care about what their parents say regarding health-related behaviours. These results indicate the importance of involving parents in the school health work to encourage their adolescent children to adopt healthy behaviours.

Further studies on parents’ communication to adolescents regarding health behaviours are needed as are studies on multiple unhealthy behaviours in adolescents and those behaviours’ association with the level of health behaviour information communicated by teachers. Furthermore, studies are needed that examine the association between adolescents caring about the health behaviour information communicated by their parents and teachers and healthy behaviours. Finally, the importance of parents’ and teachers’ credibility with adolescents should be investigated to identify possible associations between health behaviours and health behaviour information communicated by parents and teachers.

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References

Aveyard, P., Markham, W. A., Lancashire, E., Bullock, A., Macarthur, C., Cheng, K. K., & Daniels, H. (2004). The influence of school culture on smoking among pupils. *Social Science & Medicine, 58*(9), 1767–1780. doi:10.1016/S0277-9536(03)00396-4

Bricker, J. B., Peterson, A. V., Jr., Leroux, B. G., Andersen, M. R., Rajan, K. B., & Sarason, I. G. (2006). Prospective prediction of children’s smoking transitions: Role of parents’ and older siblings’ smoking. *Addiction, 101*(1), 128–136. doi:10.1111/j.1360-0443.2005.01297.x

Busch, V., de Leeuw, J. R., de Harder, A., & Schrijvers, A. J. (2013). Changing multiple adolescent health behaviors through school-based interventions: A review of the literature. *Journal of School Health, 83*(7), 514–523. doi:10.1111/josh.12060

Case, A., & Paxson, C. (2002). Parental behavior and child health. *Health Affairs, 21*(2), 164–178.

Clark, P. I., Schooley, M. W., Pierce, B., Schulman, J., Hartman, A. M., & Schmitt, C. L. (2006). Impact of home smoking rules on smoking patterns among adolescents and young adults. *Preventing Chronic Disease, 3*(2), A41. Retrieved from http://www.cdc.gov/pcd/issues/2006/apr/05_0028.htm

Currie, C., Zanotti, C., Morgan, A., Currie, D., de Looze, M., Roberts, C., ... Barnekow, V. (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* (Health Policy for Children and Adolescents, No. 6). Copenhagen: WHO Regional Office for Europe.

Cutler, D., & Lleras-Muney, A. (2006). *Education and health: Evaluating theories and evidence* (Working Paper 12352). Paper presented at the conference The Health Effects of Non-health Policies, The National Poverty Center. Retrieved from http://www.nber.org/papers/w12352.pdf

Cutler, D., & Lleras-Muney, A. (2010). Understanding differences in health behaviors by education. *Journal of Health Economics, 29*(1), 1–28. doi:10.1016/j.jhealeco.2009.10.003

Davies, S., Crosby, R., & DiClemente, R. (2009). Family influences on adolescent health. In R. DiClemente, J. Santelli, & R. Crosby (Eds.), *Adolescent health* (pp. 391–410). San Francisco, CA: Jossey-Bass.

De Bourdeaudhuij, I., Van Cauwenbergh, E., Spittaels, H., Oppert, J. M., Rostami, C., Brug, J., ... Maes, L. (2010). School-based interventions promoting both physical activity and healthy eating in Europe: A systematic review within the HOPE project. *Obesity Reviews, 12*(3), 205–206. doi:10.1111/j.1467-789X.2009.00711.x

Desalu, O. O., Iseh, K. R., Olokoba, A. B., Salawu, F. K., & Danburam, A. (2010). Smokeless tobacco use in adult Nigerian population. *Nigerian Journal of Clinical Practice, 13*(4), 382–387. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2947622/

Dittus, P. J., & Jaccard, J. (2000). Adolescents’ perceptions of maternal disapproval of sex: Relationship to sexual outcomes. *Journal of Adolescent Health, 26*(4), 268–278. doi:10.1016/S1054-139X(99)00096-8

Durkee, T., Carl, V., Floderus, B., Wasserman, C., Sarchiapone, M., Apter, A., ... Wasserman, D. (2016). Pathological Internet use and risk-behaviors among European adolescents. *International Journal of Environmental Research and Public Health, 13*(3). doi:10.3390/ijerph13030294

Eaton, D. K., Kann, L., Kinchen, S., Ross, J., Hawkins, J., Harris, W. A., ... Wechsler, H. (2006). *Youth risk behavior surveillance – United States, 2005*. Atlanta, GA: Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion.

Eaton, D. K., Kann, L., Kinchen, S., Shanklin, S., Flint, K. H., Hawkins, J., ... Prevention. (2012). *Youth risk behavior surveillance – United States, 2011*. Surveillance summaries: Morbidity and mortality weekly report (MMWR) (Vol. 61, No. 4, pp. 1–162). Surveillance Summaries/CDC.

Escalon, H., Beck, F., & Bossard, C. (2013). Connection between the knowledge of the recommendations of the national nutrition and health program and patterns of eating behaviour and physical activity. *Revue d’Épidémiologie et de Santé Publique, 61*(1), 37–47. doi:10.1016/j.respe.2012.05.007

Feah, D., Viswanathan, B., Chiolero, A., Warren, W., & Bovet, P. (2006). Clustering of smoking, alcohol drinking and cannabis use in adolescents in a rapidly developing country. *BMC Public Health, 6*, 169. doi:10.1186/1471-2458-6-169
Falk, G., Ivarsson, A. B., & Brynhildsen, J. (2010). Teenagers’ struggles with contraceptive use – What improvements can be made? *The European Journal of Contraception & Reproductive Health Care, 15*(4), 271–279. doi:10.3109/13625187.2010.493623

Fleming, C. B., Kim, H., Harachi, T. W., & Catalano, R. F. (2002). Family processes for children in early elementary school as predictors of smoking initiation. *Journal of Adolescent Health, 30*(3), 184–189. doi:10.1016/S1054-139X(01)00327-5

Fletcher, A., Bonell, C., & Hargreaves, J. (2008). School effects on young people’s drug use: A systematic review of intervention and observational studies. *Journal of Adolescent Health, 42*(3), 209–220. doi:10.1016/j.jadohealth.2007.09.020

Folkhälsomyndigheten. (2014a). *Folkhälsan i Sverige - Årsrapport 2014* (978-91-7603 176-6 pdf). Stockholm: Folkhälsomyndighetens beställningsservice c/o Strömberg. Retrieved from https://www.folkhalsomyndigheten.se/pagefiles/17825/Folkhalsan-i-Sverige-arsrapport-2014.pdf

Folkhälsomyndigheten. (2014b). *Skolbarns hälsovanor i Sverige 2013/14, Grundrapport* (978-91-7603-372-2 pdf). Stockholm: Edita. Retrieved from https://www.folkhalsomyndigheten.se/pagefiles/18915/skolbarns-halsovanor-sverige-2013-14.pdf

Folkhälsomyndigheten. (2014c). Projekt TÄNK OM - Viktigt att föräldrar pratar med sina tonårsbarn om alkohol. Retrieved from http://www.folkhalsomyndigheten.se/nyheter-och-press/nyhetsarkiv/2014/april/viktigt-att-foraldrar-pratar-med-sina-tonarsbarn-om-alkohol/

Ford, C. A., Pence, B. W., Miller, W. C., Resnick, M. D., Bearinger, L. H., Pettingell, S., & Cohen, M. (2005). Predicting adolescents’ longitudinal risk for sexually transmitted infection: Results from the national longitudinal study of adolescent health. *Archives of Pediatrics & Adolescent Medicine, 159*(7), 657–664. doi:10.1001/archpedi.159.7.657

Frelin, A. (2010). *Teachers’ relation practices and professionality* (Doctoral dissertation). Retrieved from http://uu.diva-portal.org/smash/record.jsf?pid=diva2%3A300138&dswid=3014 (978-91-506-2127-3)

Frelin, A. (2012). *Lyhörda lärare, Professionellt relationsbyggande i förskola och skola*. Stockholm: Liber. Retrieved from http://skl.se/download/18.5e95253d14642b207e86e1f/1402935660165/ SKL-rapport-kommungruppsindelning+2011_101020.pdf

Goodman, E., Huang, B., Schafer-Kalkhoff, T., & Adler, N. E. (2007). Perceived socioeconomic status: A new type of identity that influences adolescents’ self-rated health. *Journal of Adolescent Health, 41*(5), 479–487. doi:10.1016/j.jadohealth.2007.05.020

Grepe, I. (2015). *Skolelevers drogvanor 2015, CAN rapport 154* (978-91-7278-263-1). Stockholm: EO Grafiska. Retrieved from http://www.can.se/contentassets/3b1d1dd4f8de437b0302d700ba4451/skolelevers-drogvanor-2015_webb.pdf

Halliday, J. A., Palma, C. L., Mellor, D., Green, J., & Renzaho, A. M. N. (2014). The relationship between family functioning and child and adolescent overweight and obesity: A systematic review. *International Journal of Obesity, 38*(4), 480–493. doi:10.1038/ijo.2013.213

Harakeh, Z., Scholte, R. H. J., Vermulst, A. A., de Vries, H., & Engels, R. C. M. E. (2004). Parental factors and adolescents’ smoking behavior: An extension of the theory of planned behavior. *Preventive Medicine, 39*(5), 951–961. doi:10.1016/j.ypmed.2004.03.036

Hartup, W. W. (2005). Peer interaction: What causes what? *Journal of Abnormal Child Psychology, 33*(3), 387–394. doi:10.1007/s10802-005-3578-0

Hesketh, K., Waters, E., Green, J., Salmon, L., & Williams, J. (2005). Healthy eating, activity and obesity prevention: A qualitative study of parent and child perceptions in Australia. *Health Promotion International, 20*(1), 19–26. doi:10.1093/heapro dah503

Karcher, M. J., & Finn, L. (2005). How connectedness contributes to experimental smoking among rural youth: Developmental and ecological analyses. *The Journal of Primary Prevention, 26*, 25–36. doi:10.1007/s10935-004-0989-6

Karlberg, I. (2016). Are lifestyle interventions among children and adolescents futile? *Scandinavian Journal of Public Health, 44*(5), 439. doi:10.1177/1403494816650610

Kelder, S. H., Perry, C. L., Klepp, K. I., & Lytle, L. L. (1994). Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *American Journal of Public Health, 84*(7), 1121–1126. Retrieved from http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.84.7.1121
Kemper, H. C., Snel, J., Verschuur, R., & Storm-van Essen, L. (1990). Tracking of health and risk indicators of cardiovascular diseases from teenager to adult: Amsterdam Growth and Health Study. Preventive Medicine, 19(6), 642–655. doi:10.1016/0091-7435(90)90061-N

Kulbok, P. A., & Cox, C. L. (2002). Dimensions of adolescent health behavior. The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 31(5), 394–400. doi:10.1016/S1054-139X(02)00422-6

Kuntsche, E., Simons-Morton, B., Fotiou, A., ter Bogt, T., & Kokkevi, A. (2009). Decrease in adolescent cannabis use from 2002 to 2006 and links to evenings out with friends in 31 European and North America countries and regions. Archives of Pediatrics & Adolescent Medicine, 163(2), 119–125. doi:10.1001/archpediatrics.2008.542

Mazur, J., & Woynarowska, B. (2004). Risk behaviors syndrome and subjective health and life satisfaction in youth aged 15 years. Med Wieku Rozwoj, 8(3 Pt 1), 567–583.

Meader, N., King, K., Moe-Byrne, T., Wright, K., Graham, H., Petticrew, M., ... Sowden, A. J. (2016). A systematic review on the clustering and co-occurrence of multiple risk behaviours. BMC Public Health, 16, 657. doi:10.1186/s12889-016-3373-6

Mukoma, W., & Flisher, A. J. (2004). Evaluations of health promoting schools: A review of nine studies. Health Promotion International, 19(3), 357–368. doi:10.1093/heapro/dah309

Neumark-Sztainer, D., Story, M., French, S. A., Hannan, P. J., Resnick, M. D., & Blum, R. W. (1997). Psychosocial concerns and health-compromising behaviors among overweight and nonoverweight adolescents. Obesity Research, 5(3), 237–249. doi:10.1002/j.1550-8889.1997.tb00298.x

Newman, K., Harrison, L., Dashiff, C., & Davies, S. (2008). Relationships between parenting styles and risk behaviors in adolescent health: An integrative literature review. Revista Latinoamericana de Enfermagem, 16(1), 142–150. doi:10.1590/S0104-11692008000100022

Nilsson, M. (Statens Folkhälsoinstitut). (2010). Tonåringar om tobak - vanor, kunskaper och attityder (2010:20). Stockholm: Author.

Novak, G., & Pelaez, M. (2004). Child and adolescent development: A behavioral systems approach. Thousand Oaks, CA: Sage.

Organisation for Economic Co-operation and Development. (2009). Doing better for children (9789264059344 (PDF)). OECD. Retrieved from http://www.keepeek.com/Digital-Asset-Management/oecd/social-issues-migration-health/doing-better-for-children_9789264059344-en#page1

Ottevaere, C., Huybrechts, I., Benser, J., De Bourdeaudhuij, I., Cuenca-Garcia, M., Dallongeville, J., ... Group, H. S. (2011). Clustering patterns of physical activity, sedentary and dietary behavior among European adolescents: The HELENA study. BMC Public Health, 11, 328. doi:10.1186/1471-2458-11-328

Paavolta, M., Vartiainen, E., & Haukkala, A. (2004). Smoking, alcohol use, and physical activity: A 13-year longitudinal study ranging from adolescence into adulthood. The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 35(3), 238–244. doi:10.1016/j.jadohealth.2003.12.004

Padrao, P., Lunet, N., Santos, A. C., & Barros, H. (2007). Smoking, alcohol, and dietary choices: Evidence from the Portuguese National Health Survey. BMC Public Health, 7, 138. doi:10.1186/1471-2458-7-138

Patel, H., Jeve, Y. B., Sherman, S. M., & Moss, E. L. (2016). Knowledge of human papillomavirus and the human papillomavirus vaccine in European adolescents: A systematic review. Sexually Transmitted Infections. Advance online publication. doi:10.1136/sxtrans-2015-052341

Pedersen, M., Granado-Alcón, M. C., & Moreno-Rodriguez, C. (2004). Family and health. In C. Currie et al. (Eds.), Young people’s health in context. Health Behaviour in School-aged Children study: International report from the 2001/2002 survey. Copenhagen: WHO Regional Office for Europe (Health Policy for Children and Adolescents, No.4). Retrieved December 20, 2011, from http://www.euro.who.int/__data/assets/pdf_file/0008/110231/e82923.pdf
Peltzer, K., & Pengpid, S. (2014). Tobacco use, beliefs and risk awareness in university students from 24 low, middle and emerging economy countries. *Asian Pacific Journal of Cancer Prevention, 15*(22), 10033–10038. doi:10.7314/APJCP.2014.15.22.10033

Peters, L. W., Kok, G., Ten Dam, G. T., Buijs, G. J., & Paulussen, T. G. (2009). Effective elements of school health promotion across behavioral domains: A systematic review of reviews. *BMC Public Health, 9*, 182. doi:10.1186/1471-2458-9-182

Peters, L. W., Wiefferink, C. H., Hoekstra, F., Buijs, G. J., Ten Dam, G. T., & Paulussen, T. G. (2009). A review of similarities between domain-specific determinants of four health behaviors among adolescents. *Health Education Research, 24*(2), 198–223. doi:cyn013 [pii]10.1093/her/cyn013

Riesch, S. K., Anderson, L. S., & Krueger, H. A. (2006). Parent–child communication processes: Preventing children’s health-risk behavior. *Journal for Specialists in Pediatric Nursing, 11*(1), 41–56. doi:10.1111/j.1744-6155.2006.00042.x

Rosenthal D. A., & Reichler H. (Eds.). (1994). *Young heterosexuals, HIV/AIDS and STDs*. Report prepared for the department of human services and health. Canberra: La Trobe University, Centre for the Study of Sexually Transmissible Diseases.

Roskin, J., & Aveyard, P. (2009). Canadian and English students’ beliefs about waterpipe smoking: A qualitative study. *BMC Public Health, 9*, 10. doi:10.1186/1471-2458-9-10

Schäfer-Elinder, L., & Faskunger, J. (Statens Folkhälsoinstitut). (2006). *Fysisk aktivitet och folkhälsa (91-7257-468-2)*. Retrieved from http://www.nynashamn.se/download/18.19abfca31197776dea580002701/146296815179/R200613_Fysisk_aktivitet_0701.pdf

Sellstrom, E., & Bremberg, S. (2006). Is there a ‘school effect’ on pupil outcomes? A review of multi-level studies. *Journal Epidemiology & Community Health, 60*(2), 149–155. doi:10.1136/jech.2005.036707

Small, M. L., Morgan, N., Bailey-Davis, L., & Maggs, J. L. (2013). The protective effects of parent-college student communication on dietary and physical activity behaviors. *Journal of Adolescent Health, 53*(2), 300–302. doi:10.1016/j.jadohealth.2013.03.010

Socialstyrelsen. (2013). *Barn och ungas hälsa, vård och omsorg 2013 (978-91-7555-042-8)*. Retrieved from http://www.socialstyrelsen.se/Lists/Artikelkatalog/Attachments/19016/2013-3-15.pdf

Spronk, I., Kullen, C., Burdon, C., & O’Connor, H. (2014). Relationship between nutrition knowledge and dietary intake. *British Journal of Nutrition, 111*(10), 1713–1726. doi:10.1017/S0007114514000087

Stanton, M. D., Todd, T. C., Heard, D. B., Kirschner, J. I., Kleiman, J. I., Mowatt, D. T., ... Van Deusen, J. M. (1982). A conceptual model. In M. D. Stanton, & T. C. Todd (Eds.), *The family therapy of drug abuse and addiction* (pp. 8–30). New York, NY: The Guildford Press.

Statens Folkhälsoinstitut. (2011). *Slutredovisning av regeringsuppdraget: Ett friskare Sverige 2011 - uppmärksamhetssvecka kring matvanor och fysisk aktivitet (VERK 2010/370, A 2011:15, 978-91-7257-925-5(PDF)).* Retrieved from https://www.folkhalsomyndigheten.se/pagefiles/12715/A-2011-15%20Slutredovisning-Ett-friskare-Sverige-2011.pdf

Statens Folkhälsoinstitut. (2013). *Barn och unga 2013 - utvecklingen av faktorer som påverkar hälsan och genomföra åtgärder, Samordnad folkhälso rapportering* (978-91-7521-079-7 (pdf)). Retrieved from https://www.folkhalsomyndigheten.se/pagefiles/12824/R2013-02-Barn-och-unga-2013.pdf

St Leger, L. H. (1999). The opportunities and effectiveness of the health promoting primary school in improving child health – A review of the claims and evidence. *Health Education Research, 14*(1), 51–69.

Swedish Association of Local Authorities and Regions. (2011). *Revidering Av Sveriges Kommuner och Landstings Kommungruppsindelning* (978-91-7164-585-2).

Swedish National Agency for Education. (2016). *Curricula for public school (Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011)* (978-913832691-6). Retrieved from: http://www.skolverket.se/om-skolverket/publikationer/visa-enskild-publikation?_xurl_=http3A2F2Fwww5.skolverket.se2Fwtpub2Fw2Fs2Fscolbok2Fwpubext2Ftrycksak2FBllob2Fpdf2575.pdf3Ff3k3D2575
Szapocznik, J., Coatsworth, J., Glantz, D., & Meyer, D. (1999). An ecodevelopmental framework for organizing the influences on drug abuse: A developmental model of risk and protection. In C. R. Hartel (Ed.), Drug abuse: Origins and interventions (pp. 331–366). Washington, DC: American Psychological Association.

Thompson, E. L. (1978). Smoking education programs 1960–1976. American Journal of Public Health, 68(3), 250–257.

Tilson, E. C., McBride, C. M., Lipkus, I. M., & Catalano, R. F. (2004). Testing the interaction between parentchild relationship factors and parent smoking to predict youth smoking. Journal of Adolescent Health, 35(3), 182–189. doi:10.1016/j.jadohealth.2003.09.014

Tobler, A. L., & Komro, K. A. (2010). Trajectories or parental monitoring and communication and effects on drug use among urban young adolescents. Journal of Adolescent Health, 46(6), 560–568. doi:10.1016/j.jadohealth.2009.12.008

Van Cauwenberghe, E., Maes, L., Spittaels, H., van Lenthe, F. J., Brug, J., Oppert, J. M., & De Bourdeaudhuij, I. (2010). Effectiveness of school-based interventions in Europe to promote healthy nutrition in children and adolescents: Systematic review of published and ‘grey’ literature. British Journal of Nutrition, 103(6), 781–797. doi:10.1017/S0007114509993370

Wallace, H. M., & Vienonen, M. (1989). Teenage pregnancy in Sweden and Finland. Implications for the United States. Journal of Adolescent Health Care: Official Publication of the Society for Adolescent Medicine, 10(3), 231–236.

Waylen, A., Stallard, N., & Stewart-Brown, S. (2008). Parenting and health in mid-childhood: A longitudinal study. The European Journal of Public Health, 18(3), 300–305. doi:10.1093/eurpub/ckm131

West, P., Sweeting, H., & Leyland, A. (2004). School effects on pupils’ health behaviors: Evidence in the support of health promoting schools. Research Papers in Education, 19(3), 261–291. doi:10.1080/02671522.2004.10058645

Wiefferink, C. H., Peters, L., Hoekstra, F., Dam, G. T., Buijs, G. J., & Paulussen, T. G. (2006). Clustering of health-related behaviors and their determinants: Possible consequences for school health interventions. Prevention Science, 7(2), 127–149. doi:10.1007/s11121-005-0021-2

Wiehe, S. E., Garrison, M. M., Christakis, D. A., Ebel, B. E., & Rivara, F. P. (2005). A systematic review of school-based smoking prevention trials with long-term follow-up. The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 36(3), 162–169. doi:10.1016/j.jadohealth.2004.12.003

Woodward, M., Oliphant, J., Lowe, G., & Tunstall-Pedoe, H. (2003). Contribution of contemporaneous risk factors to social inequality in coronary heart disease and all causes mortality. Preventive Medicine, 36(5), 561–568. doi:10.1016/S0091-7435(03)00010-0

World Health Organization. (2014). Health for the world’s adolescents – A second chance in the second decade. Geneva: Author. Retrieved December 20, 2016, from http://apps.who.int/adolescent/second-decade/files/1612_MNCAH_HWA_Executive_Summary.pdf

World Health Organisation. (2016). Physical activity – Fact sheet. Retrieved June 20, 2016, from http://www.who.int/mediacentre/factsheets/fs385/en/

Yung, T. K., Lee, A., Ho, M. M., Keung, V. M., & Lee, J. C. (2010). Maternal influences on fruit and vegetable consumption of schoolchildren: Case study in Hong Kong. Maternal & Child Nutrition, 6(2), 190–198. doi:10.1111/j.1740-8709.2009.00198.x

Zambon, A., Morgan, A., Vereecken, C., Colombini, S., Boyce, W., Mazur, J., … Cavallo, F. (2010). The contribution of club participation to adolescent health: Evidence from six countries. Journal of Epidemiology & Community Health, 64(1), 89–95. doi:10.1136/jech.2009.088443
## Appendix. Variables and distribution of answers

| Characteristics | Variables (number of responses) | Answer alternatives | Frequency (%) |
|-----------------|----------------------------------|--------------------|---------------|
| Gender          | Gender (492)                     | Boys               | 48.8          |
|                 |                                  | Girls              | 51.2          |
| Age             | Age (491)                        | Age – 15 years     | 66.0          |
|                 |                                  | Age – 16 years     | 34.0          |
| Socio-economic group | How often do you feel that you have less money than your peers? (487) | Fairly often or always | 10.5 |
|                 |                                  | Sometimes          | 20.5          |
|                 |                                  | Rather seldom      | 27.1          |
|                 |                                  | Never or almost never | 41.9       |
| Regularity of meal habits | How often do you eat the following meal during a regular week? Breakfast (491) | Rarely or never | 7.9 |
|                 |                                  | 1–3 days           | 13.9          |
|                 |                                  | 4–6 days           | 14.9          |
|                 |                                  | Every day          | 63.3          |
|                 | Cooked lunch (486)               | Rarely or never    | 3.7           |
|                 |                                  | 1–3 days           | 9.9           |
|                 |                                  | 4–6 days           | 28.0          |
|                 |                                  | Every day          | 58.4          |
|                 | Cooked food in the evening (487) | Rarely or never    | 7.0           |
|                 |                                  | 1–3 days           | 10.5          |
|                 |                                  | 4–6 days           | 17.6          |
|                 |                                  | Every day          | 64.9          |
|                 | I eat at least two meals regularly every day\(^a\) (485) | Disagree          | 34.3          |
|                 |                                  | Agree              | 65.2          |
| Consumption of unhealthy foods | How often do you eat the following during a regular week? Crisps and fries (483) | Rarely or never | 57.6 |
|                 |                                  | 1–3 days           | 38.9          |
|                 |                                  | 4–6 days           | 2.7           |
|                 |                                  | Every day          | 0.8           |
|                 | Candy (488)                      | Rarely or never    | 25.0          |
|                 |                                  | 1–3 days           | 64.1          |
|                 |                                  | 4–6 days           | 8.6           |
|                 |                                  | Every day          | 2.3           |
|                 | Soft drinks (487)                | Rarely or never    | 28.5          |
|                 |                                  | 1–3 days           | 52.4          |
|                 |                                  | 4–6 days           | 14.6          |
|                 |                                  | Every day          | 4.5           |
|                 | Rarely or never consume chips/fries, candy and soft drinks or a maximum of one of these 1–3 times/week\(^a\) (485) | Disagree          | 68.0          |
|                 |                                  | Agree              | 32.0          |
| Exercise        | How often do you exercise in your spare time more than 30 minutes so that you get out of breath or sweat? (481) | Every day          | 10.4          |
|                 |                                  | 4–6 times per week | 31.4          |
|                 |                                  | 2–3 times per week | 34.9          |
|                 |                                  | Once a week        | 9.6           |
|                 |                                  | 1–3 times per month| 6.4           |
|                 |                                  | Less than once a month | 4.0       |
|                 |                                  | Never              | 3.3           |
|                 | Exercise at least 2–3 times per week more than 30 minutes so that I get out of breath or sweat\(^a\) (481) | Disagree          | 23.3          |
|                 |                                  | Agree              | 76.7          |
|                 | Smoking (484)                    | I have never smoked| 67.1          |
|                 |                                  | I have stopped     | 8.1           |

(Continued)
### Appendix. Continued.

| Characteristics | Variables (number of responses) | Answer alternatives | Frequency (%) |
|----------------|--------------------------------|--------------------|---------------|
| Smokinga (484) |                                | I smoke occasionally | 16.5          |
|                |                                | I smoke daily       | 8.3           |
|                |                                | No (I have never smoked, I have stopped) | 75.2 |
|                |                                | Yes (I smoke occasionally or daily) | 24.8 |
| Alcohol consumption | Do you drink alcohol so that you become drunk? (478) | Never | 52.3 |
|                  |                                | Every second month or less | 22.4 |
|                  |                                | About once a month | 13.4 |
|                  |                                | About 2–4 times per month | 9.4 |
|                  |                                | About 2–3 times/week | 0.8 |
|                  |                                | 4 times/week or more | 1.7 |
|                  | No alcohol consumption so that I get drunka (478) | Disagree | 47.7 |
| Total number of unhealthy behaviours | Number of unhealthy behavioursb (455) | No unhealthy behaviour | 10.5 |
|                  |                                | One unhealthy behaviour | 29.9 |
|                  |                                | Two unhealthy behaviours | 27.0 |
|                  |                                | Three unhealthy behaviours | 17.4 |
|                  |                                | Four unhealthy behaviours | 12.1 |
|                  |                                | Five unhealthy behaviours | 3.1 |
| Main source for health knowledge | From where do you mainly get your knowledge about diet? (468) | Teachers at school | 42.1 |
|                  |                                | School nurse | 3.8 |
|                  |                                | Media | 13.9 |
|                  |                                | Friends | 5.8 |
|                  |                                | Physician | 4.3 |
|                  |                                | Parents | 24.8 |
|                  |                                | Other | 3.3 |
|                  |                                | Do not remember | 2.0 |
|                  | From where do you mainly get your knowledge about physical activity? (470) | Teachers at school | 49.8 |
|                  |                                | School nurse | 1.5 |
|                  |                                | Media | 8.3 |
|                  |                                | Friends | 7.0 |
|                  |                                | Physician | 4.3 |
|                  |                                | Parents | 14.0 |
|                  |                                | Other | 13.0 |
|                  |                                | Do not remember | 2.1 |
|                  | From where do you mainly get your knowledge about smoking? (469) | Teachers at school | 43.7 |
|                  |                                | School nurse | 7.9 |
|                  |                                | Media | 9.2 |
|                  |                                | Friends | 11.7 |
|                  |                                | Physician | 3.6 |
|                  |                                | Parents | 15.6 |
|                  |                                | Other | 4.1 |
|                  |                                | Do not remember | 4.2 |
|                  | From where do you mainly get your knowledge about alcohol consumption? (471) | Teachers at school | 42.4 |
|                  |                                | School nurse | 4.7 |

(Continued)
### Appendix. Continued.

| Characteristics | Variables (number of responses) | Answer alternatives | Frequency (%) |
|-----------------|---------------------------------|---------------------|---------------|
| School health information | How do you receive health information in school? (tick as many answering alternatives as appropriate) (476) | Health as its own school subject | 27.8 |
|                  |                                  | Ordinary school classes | 33.5 |
|                  |                                  | Health theme days | 52.9 |
|                  |                                  | Other theme days | 22.2 |
|                  |                                  | Information by the school nurse | 21.1 |
|                  |                                  | Visit in class by other proficient person | 11.3 |
|                  |                                  | Study visit | 4.0 |
|                  |                                  | Other | 5.2 |
|                  |                                  | Do not get health information in school | 7.1 |
| Parental health communication | Agree or disagree with the statement: ‘My parents tell me to eat healthy’ (488) | Fully agree | 19.9 |
|                  |                                  | Agree to some extent | 31.6 |
|                  |                                  | Neither agree nor disagree | 28.9 |
|                  |                                  | Does not apply very well | 9.4 |
|                  |                                  | Do not agree at all | 10.2 |
|                  |                                  | Fully agree | 22.6 |
|                  | Agree or disagree with the statement: ‘My parents tell me to be physically active’ (483) | Agree to some extent | 31.9 |
|                  |                                  | Neither agree nor disagree | 24.0 |
|                  |                                  | Does not apply very well | 11.4 |
|                  |                                  | Do not agree at all | 10.1 |
|                  |                                  | Fully agree | 63.5 |
|                  | Agree or disagree with the statement: ‘My parents tell me to not smoke’ (482) | Agree to some extent | 16.6 |
|                  |                                  | Neither agree nor disagree | 8.7 |
|                  |                                  | Does not apply very well | 3.9 |
|                  |                                  | Do not agree at all | 7.3 |
|                  |                                  | Fully agree | 38.9 |
|                  | Agree or disagree with the statement: ‘My parents tell me to not consume alcohol’ (481) | Agree to some extent | 30.1 |
|                  |                                  | Neither agree nor disagree | 19.9 |
|                  |                                  | Does not apply very well | 4.4 |
|                  |                                  | Do not agree at all | 6.7 |
|                  |                                  | Fully agree | 6.7 |

**Parents tell me to have healthy behaviours in general (466)**

| Parents tell me to have healthy behaviours in general (466) | Agree to some extent | 49.2 |
|                                                           | Neither agree nor disagree | 47.2 |
|                                                           | Does not apply very well | 3.6 |
|                                                           | Do not agree at all | 3.6 |

(Continued)
## Appendix. Continued.

| Characteristics | Variables (number of responses) | Answer alternatives | Frequency (%) |
|-----------------|----------------------------------|--------------------|--------------|
| Adolescent value of parental health communication | Agree or disagree with the statement: 'I care about what my parents say about diet' (481) | Fully agree | 14.8 |
| | | Agree to some extent | 30.1 |
| | | Neither agree nor disagree | 30.3 |
| | | Does not apply very well | 14.8 |
| | | Do not agree at all | 10.0 |
| | Agree or disagree with the statement: 'I care about what my parents say about physical activity' (485) | | |
| | | Agree to some extent | 33.4 |
| | | Neither agree nor disagree | 30.5 |
| | | Does not apply very well | 10.9 |
| | | Do not agree at all | 8.1 |
| | | Fully agree | 37.7 |
| | Agree or disagree with the statement: 'I care about what my parents say about smoking' (486) | | |
| | | Agree to some extent | 28.8 |
| | | Neither agree nor disagree | 17.7 |
| | | Does not apply very well | 7.6 |
| | | Do not agree at all | 8.2 |
| | | Fully agree | 28.7 |
| | Agree or disagree with the statement: 'I care about what my parents say about alcohol' (481) | | |
| | | Agree to some extent | 25.6 |
| | | Neither agree nor disagree | 25.3 |
| | | Disagree to some extent | 9.8 |
| | | Totally disagree | 10.6 |
| | | Fully agree | 40.8 |
| Adolescent value of parental health communication – total scores | I care about what my parents say about having healthy behaviours (468) | | |
| | | Agree to some extent | 47.7 |
| | | Neither agree nor disagree | 11.5 |
| | | Does not apply very well | 11.5 |
| | | Do not agree at all | 8.1 |
| Adolescent value of friend health communication | Agree or disagree with the statement: 'I care about what my friends say about diet' (483) | | |
| | | Agree to some extent | 24.4 |
| | | Neither agree nor disagree | 32.5 |
| | | Does not apply very well | 19.9 |
| | | Do not agree at all | 15.1 |
| | | Fully agree | 10.4 |
| | Agree or disagree with the statement: 'I care about what my friends say about physical activity' (482) | | |
| | | Agree to some extent | 27.4 |
| | | Neither agree nor disagree | 38.6 |
| | | Does not apply very well | 13.9 |
| | | Do not agree at all | 9.7 |
| | | Fully agree | 37.7 |
| | Agree or disagree with the statement: 'I care about what my friends say about smoking' (486) | | |
| | | Agree to some extent | 28.8 |
| | | Neither agree nor disagree | 17.7 |
| | | Does not apply very well | 7.6 |
| | | Do not agree at all | 13.3 |
Appendix. Continued.

| Characteristics | Variables (number of responses) | Answer alternatives | Frequency (%) |
|-----------------|--------------------------------|---------------------|---------------|
|                  | Agree or disagree with the statement: ‘I care about what my friends say about alcohol’ (482) | Fully agree | 13.3 |
|                  |                                        | Agree to some extent | 25.7 |
|                  |                                        | Neither agree nor disagree | 33.8 |
|                  |                                        | Does not apply very well | 13.3 |
|                  |                                        | Do not agree at all | 13.9 |
|                  |                                        | Fully agree | 18.1 |
| Adolescent value of friend health communication – total scores | I care about what my friends say about having healthy behaviours (470) | Agree to some extent | 59.4 |
|                  |                                        | Neither agree nor disagree | 22.5 |
|                  |                                        | Does not apply very well | 22.5 |
|                  |                                        | Do not agree at all | 22.5 |
|                  | Agree or disagree with the statement: ‘I care about what my teachers/the school staff say about diet’ (482) | Fully agree | 9.3 |
|                  |                                        | Agree to some extent | 26.3 |
|                  |                                        | Neither agree nor disagree | 28.4 |
|                  |                                        | Does not apply very well | 18.9 |
|                  |                                        | Do not agree at all | 17.0 |
|                  |                                        | Fully agree | 10.2 |
|                  | Agree or disagree with the statement: ‘I care about what my teachers/the school staff say about physical activity’ (481) | Agree to some extent | 25.8 |
|                  |                                        | Neither agree nor disagree | 34.9 |
|                  |                                        | Does not apply very well | 15.2 |
|                  |                                        | Do not agree at all | 13.9 |
|                  |                                        | Fully agree | 22.6 |
|                  | Agree or disagree with the statement: ‘I care about what my teachers/the school staff say about smoking’ (486) | Agree to some extent | 24.1 |
|                  |                                        | Neither agree nor disagree | 22.8 |
|                  |                                        | Does not apply very well | 11.3 |
|                  |                                        | Do not agree at all | 19.1 |
|                  |                                        | Fully agree | 15.9 |
|                  | Agree or disagree with the statement: ‘I care about what my teachers/the school staff say about alcohol’ (483) | Agree to some extent | 21.1 |
|                  |                                        | Neither agree nor disagree | 27.1 |
|                  |                                        | Does not apply very well | 15.1 |
|                  |                                        | Do not agree at all | 20.7 |
|                  |                                        | Fully agree | 21.7 |
| Adolescent value of teachers/ school staff health communication – total scores | I care about what my teachers/the school staff say about having healthy behaviours (469) | Agree to some extent | 50.3 |
|                  |                                        | Neither agree nor disagree | 27.9 |
|                  |                                        | Does not apply very well | 27.9 |
|                  |                                        | Do not agree at all | 27.9 |
|                  |                                        | Fully agree | 6.0 |
| Adolescent value of media health communication | Agree or disagree with the statement: ‘I care about what media (e.g. TV, internet, magazines) write/present about diet’ (481) | Agree to some extent | 23.1 |
|                  |                                        | Neither agree nor disagree | 33.3 |

(Continued)
### Appendix. Continued.

| Characteristics                  | Variables (number of responses)                                                                 | Answer alternatives              | Frequency (%) |
|----------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------|---------------|
|                                  | Agree or disagree with the statement: ‘I care about what media (e.g. TV, internet, magazines) write/present about physical activity’ (480) | Does not apply very well          | 19.7          |
|                                  |                                                                                               | Do not agree at all              | 17.9          |
|                                  |                                                                                               | Fully agree                      | 9.0           |
|                                  |                                                                                               | Agree to some extent             | 23.1          |
|                                  |                                                                                               | Neither agree nor disagree       | 37.9          |
|                                  |                                                                                               | Does not apply very well         | 15.8          |
|                                  |                                                                                               | Do not agree at all              | 14.2          |
|                                  |                                                                                               | Fully agree                      | 22.6          |
|                                  | Agree or disagree with the statement: ‘I care about what media (e.g. TV, internet, magazines) write/present about smoking’ (486) | Agree to some extent             | 24.1          |
|                                  |                                                                                               | Neither agree nor disagree       | 22.8          |
|                                  |                                                                                               | Does not apply very well         | 11.3          |
|                                  |                                                                                               | Do not agree at all              | 19.1          |
|                                  |                                                                                               | Fully agree                      | 15.9          |
|                                  | Agree or disagree with the statement: ‘I care about what media (e.g. TV, internet, magazines) write/present about alcohol’ (483) | Agree to some extent             | 21.1          |
|                                  |                                                                                               | Neither agree nor disagree       | 27.1          |
|                                  |                                                                                               | Does not apply very well         | 15.1          |
|                                  |                                                                                               | Do not agree at all              | 20.7          |
|                                  |                                                                                               | Fully agree                      | 25.2          |
| **Adolescent value of media health communication – total scores** | I care about what media (e.g. TV, internet, magazines) say about having healthy behaviours (464)** | Agree to some extent             | 56.0          |
|                                  |                                                                                               | Neither agree nor disagree       | 18.8          |
|                                  |                                                                                               | Does not apply very well         |                |
|                                  |                                                                                               | Do not agree at all              |                |

Note: Bold letters are measures used in the Poison regression analyses.

*Cut off for healthy vs. unhealthy behaviour.

*Out of the criteria for healthy vs. unhealthy behaviours (the cut offs for healthy behaviours), the percentages of adolescents having, zero, one, two, three, four and five unhealthy behaviours were calculated.

*Points were given for each answering alternative. ‘Fully agree’ gave 20 points, ‘Agree to some extent’ gave 15 points, ‘Neither agree nor disagree’ gave 10 points, ‘Does not apply very well’ gave 5 points and ‘Do not agree at all’ gave 0 points. A total score (between 0 and 80) was calculated (for each adolescent, giving an indication of how much importance the adolescents placed on different health behaviour sources). 0–20 points represented ‘Does not apply very well’ (the adolescent did not place any importance to what was communicated), 25–55 points represented ‘Neither agree nor disagree’ (the adolescent was neutral to what was communicated) and 60–80 points represented ‘Fully agree, agree to some extent’ (the adolescent placed high importance to what was communicated). The same system was used to calculate the adolescents’ experience of whether their parents encouraged them to adopt a healthy lifestyle or not.