

Lower parental socioeconomic status in childhood and adolescence predicts unhealthy health behavior patterns in adolescence in Northern Finland

Abstract

Objectives To determine the association between parental socioeconomic status in childhood and adolescence and unhealthy health behavior patterns among adolescents in Northern Finland.

Methods The sample, drawn from the Northern Finland Birth Cohort 1986 Study, consisted of 15-16-year-old adolescents (n=4305). Data on socioeconomic status and health behaviors was based on questionnaires collected from cohort members and their parents during the former's childhood and adolescence. Logistic regression served to assess the association.

Results Controlling for all other factors in the model, several socioeconomic factors were found to be significant predictors of unhealthy health behavior patterns. In childhood, father's low and medium education for boys, and mother's low or medium education as well as fathers' unemployment for girls predicted greater likelihood of engaging in unhealthy behavior patterns. For both genders having a stay-at-home mother in childhood (and for boys also in adolescence) protected from unhealthy health behavior patterns. For boys, mother's and for girls, fathers' low occupational education in adolescence increased the risk of developing unhealthy patterns.

Conclusions In the development of effective health prevention strategies it is important to identify children and adolescents who are at risk of developing lifestyle diseases.

Key words: adolescence, childhood, health behavior, health behavior pattern, socioeconomic status

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Introduction

Adolescents' health and wellbeing is strongly influenced by their health behavior choices (1-2), which also form a base for health behaviors later in life (1). Thus, the health behavior choices that adolescents make have a lifelong influence on their health and wellbeing. Unhealthy health behaviors among adolescents are very common. Less than half of adolescents eat fruit and/or vegetables on a daily basis and only a quarter meet the criteria for physical activity (3). Globally, every tenth of the girls aged 13–15 years and every fifth of the boys aged 13-15 years use tobacco (4) and more than a quarter of all 15–19-year-olds drink alcohol (5).

Unhealthy health behaviors tend to cluster together (6-7), which is a serious concern considering the fact that unhealthy health behavior patterns are known to increase various health risks. For example, the combination of poor eating behavior and excessive screen time is associated with unhealthy weight control behavior (8), while the combination of low levels of physical activity and poor eating is associated with psychosocial risks (7). A more complete understanding of overall health behavior and wellbeing (or lack of) during adolescence is achieved by focusing on health behavior patterns instead of individual health behaviors (8, 10).

Various health behavior patterns among adolescents have been previously identified. Findings from a review by Leech et al. (11) reveal that health behaviors cluster in both healthy and unhealthy ways but co-occurrence of both healthy and unhealthy health behaviors has also been found. In the development and targeting of health prevention strategies it is important to recognize the predicting factors, such as socioeconomic status, of these health behavior patterns (12). It should be possible establish how and to what extent socioeconomic inequalities determine the way that health risks accumulate among adolescents (13).

Previous studies have mostly focused on the association between socioeconomic status and individual health behaviors (13): only a few researchers have explored the co-occurrence between socioeconomic status and patterns of health behavior (see 6, 13-20). Thus, there is still a lack of substantial evidence regarding how particular health behavior patterns accumulate among specific socioeconomic groups. The effects of parental socioeconomic status during earlier childhood on health behavior patterns in adolescence is an area which is especially unexplored.

The importance of the subject is self-evident: childhood and adolescence are widely recognized to be vulnerable periods in life when socioeconomic status can have both immediate and long-lasting effects on health (21). Health behaviors are initiated and consolidated at different stages of the formative years (22) when children and adolescents are profoundly affected by the environment created by their parents (23). Hence we may assert with some confidence that adolescents' health behavior is strongly influenced by family factors (24) such as socioeconomic status (22, 25): as has been suggested above, what is lacking at the moment, however, is a more precise explication of this truism.

The association between socioeconomic status and health outcomes in adolescence has been proven to be robust, especially in developed countries of Western Europe and Asia. There is a positive association between higher socioeconomic status and better health outcomes (25). Higher socioeconomic status is, for example, associated with higher levels of physical activity (26) and healthier diet (27). Accordingly, adolescents with lower socioeconomic status have unhealthier health behavior habits (22): their dietary behaviors are poorer (28), they spend more time in front of screen media (26, 29), and they are less physically active (26). They also have a higher probability of being overweight (30).

To better understand the way that the risks of unhealthy health behavior patterns accumulate among particular groups of adolescents it is necessary to investigate the effect that socioeconomic status has on these patterns. While previous studies have shown that adolescents with low socioeconomic status have unhealthier health behaviors (22), it is not clear whether this is the case with health behavior patterns. Therefore, the purpose of the present study was to determine the association between parental socioeconomic status in childhood and adolescence and unhealthy health behavior patterns among adolescents in Northern Finland. The research question was as follows: Is parental socioeconomic status in childhood and adolescence associated with unhealthy health behavior patterns among adolescents? The hypothesis was: Low parental socio-economic status predicts unhealthy behavior patterns among adolescents. The results of this study could help with the development and targeting of health promotion programs among adolescents who are at risk of developing lifestyle-related diseases.

Methods

Data

The study population belongs to the longitudinal, population-based research program Northern Finland Birth Cohort 1986 (NFBC1986), the ultimate aim of which is to promote the health and wellbeing of the population. The raw data of the study includes healthcare records, questionnaires and clinical examinations as well as data on parents and their children born between July 1985 and June 1986 in Northern Finland (specifically, the provinces of Oulu and Lapland). (31.)

The data for this study is based on multidisciplinary follow-up surveys collected via postal questionnaires. The childhood data was collected in 1993–1994 from parents (mean age of parents at child's birth 27.7 years) of 7- to 8-year-old children (n=8292). In 2000 and 2001 a follow-up survey was collected from the then 15–16-year-old adolescents (n=7182) and their parents (n=6866). The surveys consisted of a wide range of questions that covered the socioeconomic factors underpinning the family and adolescents' health behaviors. The study was approved by the Ethical Committee of the Northern Ostrobothnia Hospital District and followed the principles of the Declaration of Helsinki. The participants took part on a voluntary basis and provided their informed consent. (31.)

The health behavior patterns of 15- to 16-year-old adolescents (n=4305) have been identified in a previous study which utilized NFBC1986 data from a follow-up survey collected from adolescents in 2000–2001 (31). In the current study these results were utilized to examine how parental socioeconomic status in childhood and adolescence predicts health behavior patterns in adolescence. Participants with identified health behavior patterns were included in the analyses. The final sample consisted of 4305 (boys=2003, girls=2302) subjects at 15 to 16 years old.

Measures

Health behavior patterns

Within the framework of the longitudinal NFBC1986, two clusters of typical health behavior patterns of 15- to 16-year-old adolescents have been previously identified for both genders (32). In that particular study, participants completed a questionnaire evaluating the following health behaviors: physical activity, screen time, cigarette smoking, alcohol use, and diet.

Physical activity was ascertained with the question: “How many hours do you practice vigorous exercise outside of school hours? (getting out of breath and sweating at least mildly)”. Response categories varied from “1=not at all” to “6=7 hours a week or more”. The variable was then categorized

into the following categories: 1=not at all to about an hour per week; 2=2–3 hours per week; and 3=about 4 hours to 7 hours per week.

Screen time was assessed with the following questions: “On average, how many hours a day do you watch TV outside of school hours?”, and “On average, how many hours a day do you play or use the computer and/or video games outside of school time?” A sum variable was created based on the reported hours. The sum variable was then categorized into two groups: less than or equal to 2 hours per day and more than 2 hours per day.

Cigarette smoking was ascertained with the question: “At the present time, do you smoke cigarettes?” Response options ranged from “1=not at all” to “6=7 days per week”. The variable was then categorized into the following categories: 1=not at all; 2=occasionally to 2–4 days a week; and 3=5 to 7 days a week.

Participants were asked to indicate have they ever drank or do they still – even occasionally – drink some alcoholic beverages?” The answer alternatives ranged from “1=never” to “6=at least once a week or more”. The variable was categorized into three categories: 1=never to have tasted but do not presently consume; 2=consume casually to consume about once a month; and 3=consume 2–3 times a month to consume at least once a week or more.

Participants indicated how often they eat each of the following fast foods: French fries or fried potatoes, hamburgers or pizza, and chips. Participants were also asked to indicate how often they eat each of the following sugary foods: cake and cookies, ice cream, sugary beverages, chocolate, and sweets. Response options for each question ranged from “1=less than once a month or not at all” to “7=once a day or more”, and a sum variable was created based on the responses.

Fruit, vegetable and berry intake was evaluated using the following questions: “How often did you eat uncooked vegetables (excluding potatoes) – whole, grated or as a salad – during the past week?”; “How often did you eat uncooked fruit or fruit salad during the past week?”; and “How often did you eat berries (including desserts made of berries) during the past week?” Response categories for each question ranged from “1=not at all” to “4=6-7 times per week”. A sum variable was then created based on the responses.

A cluster analysis revealed two distinct health behavior patterns for both boys and girls. Healthy health behavior patterns – denominated as Healthy Lifestyle – showed the most positive scores in terms of all health behaviors. The majority of adolescents (61% of the boys; n=1215, and 58% of the girls; n=1340) were grouped in this cluster. Unhealthy health behavior patterns – labelled as Unhealthy Lifestyle – represented an overall unhealthy health behavior in terms of all the health behaviors. A slightly higher proportion of the girls (42%; n=962) than boys (39%; n=788) were grouped in this cluster.

Socioeconomic measures

The data on socioeconomic status was obtained from the parents of the children and adolescents. Parental socioeconomic status was evaluated with questions concerning the education level and occupational status of both mother and father. In childhood, education level was evaluated with the question “What is the education of the mother/father?” Response alternatives were categorized as follows: low=under 9 years of comprehensive school, 9 to 10 years of comprehensive school, vocational school or college 6–12 months; medium=vocational school over 1 year, or secondary school graduate with no vocational training, secondary school graduate with unfinished college education, or unfinished university college education; and high=secondary school graduate with college education or university education. In adolescence, the basic education of the parents was established with the straightforward question “What is the mother’s/father’s basic education?” The possible alternative answers were: less than 9 years of comprehensive school, comprehensive school, matriculation examination. Parents’ occupational education in adolescence was evaluated with the question “What is the highest occupational education of the mother/father?” Response alternatives were categorized into four levels: low=no occupational education or vocational course; medium=vocational school; high=post-secondary college, polytechnic or university degree; and other/uncompleted=other education or uncompleted education.

Parents’ occupational status during their children’s childhood was assessed with the question “What best describes the mother’s/father’s occupational status at the moment?” Answer alternatives of the participants’ mothers were categorized according to the following: employed=employed or entrepreneur; stay-at-home mother=receives parental benefit, is at home and receives support of home care, or stay-at-home wife without income(s); and unemployed/not working=unemployed and receives benefit for unemployment, student receiving financial aid, or early retirement/sickness/unemploy-

ment/retirement pension. The occupational status of fathers was categorized thus: employed=employed or entrepreneur; and unemployed/not working=unemployed and receives benefit for unemployment, student receiving financial aid, early retirement/sickness/unemployment/retirement pension receives parental benefit, is at home and receives support of home care, or stay-at-home husband without income(s).

Parents' occupational status during their children's adolescence was assessed with the question "Which of the following best describes the mother's/father's current life situation?" Answer alternatives for mothers were categorized into three levels: employed=regular full-time employment, full-time employment for a fixed period or part-time employment, independent practitioner or entrepreneur; stay-at-home mother=maternity/childcare leave or housewife without income(s); and unemployed/not working=unemployed or laid off, student with student allowance, on long-term sick leave/sickness allowance/rehabilitation allowance, pension, or otherwise not working. The corresponding answers for fathers were categorized into two levels: employed=regular full-time employment, full-time employment for a fixed period or part-time employment, independent practitioner or entrepreneur; unemployed/not working=unemployed or laid off, student with student allowance, on long-term sick leave/sickness allowance/rehabilitation allowance, pension, or otherwise not working, paternity/childcare leave or househusband without income(s).

Data analysis

All data analyses and tests were performed using SPSS for Windows (version 25.0; IBM, Armonk, NY, USA). To identify adolescents' health behavior patterns, a k-means non-hierarchical cluster analysis (33) was performed in the aforementioned previous study. The reliability and stability of different cluster solutions was tested by calculating the kappa coefficient between the original data set and subsamples randomly taken from it. A two-cluster solution turned out to be the most meaningful representation of the study population for both genders. A more detailed description of the analysis can be found in the previous study alluded to (32). All analyses were performed separately according to gender, since the health behavior clusters were also identified separately for boys and girls. The association between childhood and adolescence and parental socioeconomic status and the health behavior patterns exhibited in adolescence was examined separately using logistic regression models.

Descriptive statistics were calculated to describe the sample by socioeconomic characteristics. Chi-square tests were used to examine differences in clusters according to socioeconomic status. A p-

value ≤ 0.05 was considered significant. First, the associations between the above-mentioned factors and health behavior patterns in adolescence were tested using crosstabulation and chi-squared tests. Logistic regression (crude and adjusted) was used, with values expressed in odds ratio (OR) and their respective 95% confidence intervals (95% CI), to examine the childhood and adolescence parental socioeconomic predictors of health behavior patterns in adolescence. Unhealthy Lifestyle was the reference category, and represented a negative combination of unhealthy health behavior in terms of all the health behaviors considered. Statistical significance (p-value) was established as $p \leq 0.05$.

Results

The unhealthy health behavior pattern found in a previous study (29) represented an overall unhealthy health behavior in terms of following health behaviors: screen time, alcohol use, cigarette smoking, fast food intake, sugary foods intake, physical activity, fruit, vegetable and berry intake. A slightly higher proportion of girls (42%; n=962) than boys (39%; n=788) were grouped in this cluster.

The participants' socioeconomic characteristics (n=4305) are listed in Table 1 and Table 2. In childhood, the majority of the boys and girls in the unhealthy health behavior cluster had mothers and fathers with a medium educational level (vocational school over 1 year, or secondary school graduate with no vocational training, secondary school graduate with unfinished college education, or unfinished university college education). Most children in the unhealthy health behavior cluster had parents who were employed. Overall, the parents of the boys and the girls belonging to the Unhealthy Lifestyle health behavior pattern had lower levels of education and were more likely to be unemployed than those in the Healthy Lifestyle health behavior pattern.

In adolescence, most of the participants' parents' basic education was that provided by a standard comprehensive school. Most adolescents had mothers with high occupational education. Boys and girls belonging to the Healthy Lifestyle health behavior pattern were more likely to have fathers with high occupational status, and adolescents in the Unhealthy Lifestyle health behavior pattern were more likely to have fathers with medium occupational education. A majority of adolescents had employed parents. Overall, the parents of adolescents belonging to the Unhealthy Lifestyle health behavior pattern had lower education levels and were more likely to be unemployed than those in the Healthy Lifestyle health behavior pattern.

Association between socioeconomic status in childhood and unhealthy health behavior pattern in adolescence

The results of childhood's regression analyses are presented in Table 3. For both genders, mother's low (OR 1.60 for boys, OR 1.67 for girls) and medium (OR 1.46 for boys, OR 1.70 for girls) and father's low (OR 2.00 for boys, OR 1.71 for girls) and medium (OR 1.71 for boys, OR 1.52 for girls) education level significantly increased the risk of developing unhealthy health behavior patterns in adolescence in the crude model. For boys, father's low (OR 1.76) and medium (OR 1.55) education level, and for girls, mother's low (OR 1.51) and medium (OR 1.56) education level remained as a significant risk factor when all other socioeconomic variables were controlled for in the adjusted model.

For both genders, having a stay-at-home mother during childhood (OR 0.75 for boys, OR 0.66 for girls) was a significant protective factor against unhealthy health behavior patterns in adolescence in both models. For both genders, father's unemployment (OR 1.47 for boys, OR 1.35 for girls) predicted unhealthy health behavior patterns in adolescence, although significant association remained only for girls (OR 1.47) when all other independent variables were controlled for. For boys, also mother's unemployment (OR 1.29) predicted unhealthy health behavior patterns in the crude model.

Association between socioeconomic status in adolescence and unhealthy health behavior patterns in adolescence

The results of adolescents' multivariable analyses are presented in Table 4. For both genders, if the father's basic education level was comprehensive school (OR 1.52 for boys, OR 1.49 for girls) or under 9 years of comprehensive school (OR 2.28 for boys, OR 1.94 for girls) the risk of developing an unhealthy health behavior pattern significantly increased. The risk also increased for boys if the mother's basic education level was under 9 years of comprehensive school (OR 1.57) or comprehensive school (OR 1.35), and for girls if the mother's basic education level was comprehensive school (OR 1.52). However, after controlling by all the other variables, the associations were no longer significant. Mother's medium (OR 1.42 for boys, OR 1.48 for girls) and low (OR 1.61 for boys, OR 1.38 for girls), and father's medium (OR 1.48 for boys, OR 1.30 for girls) and low (OR 1.20 for boys, OR 1.55 for girls) occupational education, compared to high, also increased the risk significantly in the crude model for both genders. After controlling all the socioeconomic variables for boys, mother's low occupational education (OR 1.50), and for girls, father's low occupational education (OR 1.37) remained as a significant risk factor for developing an unhealthy health behavior pattern.

Being a stay-at-home mother compared to an employed mother significantly decreased the risk of developing an unhealthy health behavior pattern for both boys (OR 0.37) and girls (OR 0.65). After adjustment for all of the variables the association remained significant for boys (OR 0.35) only. In the crude model the risk of an unhealthy health behavior pattern emerging increased significantly if for girls, mother (OR 1.32) and for boys, father (OR 1.37) was unemployed; however, in the adjusted model the associations were no longer significant.

Discussion

The purpose of the study was to determine the association between parental socioeconomic status in childhood and adolescence and unhealthy behavior patterns among adolescents in Northern Finland. To the best of our knowledge, this is one of the first studies to examine whether the parental socioeconomic status in both childhood and adolescence predicts the unhealthy health behavior patterns in adolescence. In this study several socioeconomic factors in childhood and adolescence were associated with unhealthy health behavior patterns. In general, results suggested that participants with low parental socioeconomic status in childhood and adolescence had a higher risk of developing or having unhealthy health behavior patterns in adolescence.

Previous studies have suggested possible explanations for the association between low socioeconomic status and unhealthy health behaviors that may also explicate the results of this study. Parents with lower socioeconomic status may, for example, face barriers to meeting the financial costs (34), acquiring the necessary knowledge and resources (35) associated with healthy lifestyle choices and thus have challenges to provide their children with healthy lifestyle-related opportunities. Parents with low socioeconomic status may also be more prone to have unhealthier health behaviors themselves, and as immediate role models these health behaviors can easily transfer to adolescents (29, 36).

In this study low socioeconomic status in childhood predicted unhealthy health behavior patterns in adolescence. In the crude model, mother's and father's low and medium education significantly predicted unhealthy health behavior patterns for children of both genders. The results of the adjusted model suggest that for boys, father's low and medium education and for girls, mother's low and medium education are significant predictors of unhealthy health behavior patterns in adolescence. Fathers' low occupational status in childhood also predicted unhealthy health behavior patterns in

adolescence for both genders. Father's unemployment increased the risk of developing an unhealthy health behavior pattern for both genders, but after the adjustment the association remained significant for girls only. For boys, also mother's unemployment predicted unhealthy health behavior patterns in the crude model.

In showing that lower socioeconomic status in childhood predicts an unhealthy health behavior pattern in adolescence our work strengthens existing research findings that socioeconomic differences in health behaviors are already present in childhood. These differences may persist throughout later life, as lower socioeconomic status in childhood has also been shown to predict less healthier lifestyles in adulthood (37). A more disadvantaged socioeconomic status in childhood also foretells a more disadvantaged socioeconomic status later in life (37), compounding the negative influence that lower socioeconomic status has on people's lifestyles and health behaviors throughout their lives (2).

One particularly interesting finding of this study was that having a stay-at-home mother in childhood significantly protected participants from developing unhealthy health behavior patterns in adolescence. This was true for both genders and occurred in both crude and adjusted model. The protective role of a stay-at-home mother persisted when investigating the association between socioeconomic status in adolescence and health behavior patterns, although for girls the association was no longer significant when the model was adjusted for all of the variables. Stay-at-home mothers' protective role against unhealthy health behavior pattern in adolescence may be explained by the fact that stay-at-home mothers, compared to working mothers, have more emotional resources and time to invest in family life. This in turn may improve overall wellbeing of the family, specifically including adolescents' wellbeing. Wellbeing can be seen as better family functioning (38), which may be taken to include healthier parent-adolescent relationships (38-39), good family support mechanisms (40), parental monitoring (39) as well as a stable family environment (41), all of which have been shown to be associated with better health behaviors among adolescents. It is especially noteworthy that the mother's role as a monitoring (39) and supporting parent and as a role model has been found to protect children from unhealthy health behaviors (42).

Low parental socioeconomic status during adolescence seems to increase the risk of adolescents developing unhealthy health behavior patterns. In the crude model, lower levels of maternal and paternal basic education and low occupational education level significantly increased the risk of having unhealthy health behavior patterns for both genders. However, in the adjusted model the association between parents' basic education and an unhealthy health behavior pattern was no longer significant.

For boys, mother's low occupational education and for girls, father's low occupational education remained as a significant factor in the adjusted model. An unemployed father increased the risk of having an unhealthy health behavior pattern for boys, but in the adjusted model this association disappeared. For girls, mother's unemployment in adolescence increased the risk of an unhealthy health behavior pattern, although the significant association disappeared in the adjusted model. For girls, father's unemployment was no longer a risk factor of having an unhealthy health behavior pattern. Overall, the link between parental socioeconomic status and health behavior patterns weakened in adolescence. The results support the equalization in health hypothesis. According to it, the influence of family socioeconomic status on health weakens during adolescence as youth become more independent and are exposed to other influences (43).

Results of this study support previous findings on the association between socioeconomic status and health behavior patterns in adolescence. Previous studies have strongly suggested that high socioeconomic status (14, 17) and more specifically high parental educational level (6, 11, 13, 15, 18-20) protects from healthier health behavior patterns in adolescence, although it should be noted that some contrary results have also been found (see 15, 19). Accordingly, lower socioeconomic status has been found to associate strongly with healthier health behavior patterns (14).

High parental education (13, 44) as well as low maternal education (44) have also been found to associate with health behavior patterns, including both healthy and unhealthy health behaviors. High parental education level does not therefore always protect from all unhealthy health behaviors. And accordingly, low parental educational level does not always predict distinct unhealthy health behavior patterns in adolescence. What needs to be taken into consideration when comparing our results to these previous studies is the fact that the identified health behavior patterns are different: in our study health behavior patterns show only distinct healthy and unhealthy patterns, whereas in previous studies health behavior patterns found included both – healthy and unhealthy – health behaviors. Therefore, the association between health behavior patterns identified and socioeconomic status is more complex in these studies than in our study.

A strength of this study is that both, parental education level and occupation status, were chosen as a variable to measure socioeconomic status. Previous studies investigating the association between socioeconomic status and health behavior patterns in adolescence have mostly used only parental education level as the only indicator of socioeconomic status. We also observed maternal and paternal

education level and occupation status separately. Based on the results of this study, we may confidently suggest that both the parents' education level and occupational status influence adolescents' health behavior patterns. This approach thus yields additional information about the multifaceted role of socioeconomic status on health behavior patterns.

Another strength of this study is that our data was based on a large birth cohort and included a representative sample of Finnish adolescents (n=4305). The longitudinal study design of the NFBC1986 provides the possibility of identifying the way in which parental socioeconomic status, both in childhood and adolescence, predicts health behavior patterns in adolescence. Thus, this study adds knowledge to the field, specifically about how parental socioeconomic status at different points in childhood and adolescence is associated with health behavior patterns in adolescence.

Some potential limitations of the study should be noted. The results of this study may not be generalizable to the present as the raw data were collected in 1993-1994 and 2000-2001. The analyses were based on self-reported data, which might introduce bias. The data on socioeconomic status was obtained from the parents of the children and adolescents, not from the participating children and adolescents themselves, which may increase the reliability of self-reporting in this case. It is also worth noticing that although this study included more than one measure of socioeconomic status, not all socioeconomic factors were included. It remains unclear how other aspects of socioeconomic status – such as income levels, for example – predict unhealthy health behavior patterns in adolescence. Also, we did not include any confounding factors – such as peer influence – in our analysis, so it remains unclear how they, in addition to socioeconomic status, affect unhealthy health behavior pattern.

Socioeconomic determined differences in health behaviors are already present in childhood and adolescence, which are considered to be crucial periods for developing often deeply engrained health behavior patterns. It therefore follows that socioeconomic status can have long-lasting effects on the health of individuals. This study provides new information about how socioeconomic status in childhood and adolescence predicts health behavior patterns in adolescence. Results of this study suggest that parental socioeconomic status in childhood, compared to parental socioeconomic status in adolescence, may be more strongly associated with an unhealthy health pattern in adolescence. Furthermore, the results of this study help to identify children and adolescents who are at risk of developing unhealthy health behavior patterns. Identifying these risk groups is important in the development and

targeting of health prevention strategies, such as health promotion, health coaching, counseling interventions, designed specifically to protect these groups.

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Tables and Figures

Table 1 Descriptive statistics (frequency and percentage) of included variables in childhood from the Northern Finland Birth Cohort 1986 follow-up survey in 1993–1994 (n=4305)

Childhood	Boys n=2003				p-value	Girls n=2302				p-value
	Healthy Lifestyle n=1215		Unhealthy Lifestyle n=788			Healthy Lifestyle n=1340		Unhealthy Lifestyle n=962		
	N	%	n	%		n	%	n	%	
Mother's education					<0.05*					<0.05*
High	311	27.4	142	20.0		360	29.1	171	19.6	
Medium	516	45.4	343	48.4		514	41.6	415	47.5	
Low	309	27.2	225	31.7		363	29.3	288	33.0	
Mother's occupational status					<0.05*					<0.05*
Employed	669	58.7	416	58.7		726	58.9	533	61.4	
Stay-at-home mother	253	22.2	118	16.6		290	23.5	141	16.2	
Unemployed/Not working	218	19.1	175	24.7		217	17.6	194	22.4	
Father's education					<0.05*					<0.05*
High	240	21.5	90	13.0		196	16.2	92	10.8	
Medium	492	44.2	315	45.6		567	46.9	404	47.3	
Low	382	34.3	286	41.4		446	36.9	358	41.9	
Father's occupational status					<0.05*					<0.05*
Employed	945	85.3	537	79.8		1004	83.6	664	79.0	
Unemployed/Not working	163	14.7	136	20.2		197	16.4	176	21.0	

*Statistically significant differences (χ^2 tests, $p < 0.05$)

Table 2 Descriptive statistics (frequency and percentage) of included variables in adolescence from the Northern Finland Birth Cohort 1986 follow-up survey in 2000–2001 (n=4305)

	Boys n=2003				p-value	Girls n=2302				p-value
	Healthy Lifestyle n=1215		Unhealthy Lifestyle n=788			Healthy Lifestyle n=1340		Unhealthy Lifestyle n=962		
Adolescence	n	%	N	%		n	%	n	%	
Mother's basic education					<0.05*					<0.05*
Matriculation examination	359	33.1	176	26.6		393	34.1	204	25.6	
Under 9 years of comprehensive school	55	5.1	42	6.3		59	5.1	43	5.4	
Comprehensive school	670	61.8	444	67.1		699	60.7	551	69.0	
Mother's occupational education					<0.05*					<0.05*
High	541	50.8	273	42.1		584	51.3	349	44.2	
Medium	224	21.1	160	24.7		219	19.2	194	24.6	
Low	170	16.0	138	21.3		198	17.4	163	20.7	
Other/Uncompleted	129	12.1	78	12.0		138	12.1	83	10.6	
Mother's occupational status					<0.05*					<0.05*
Employed	805	76.6	515	80.0		875	79.1	596	77.8	
Stay-at-home mother	101	9.6	24	3.7		83	7.5	37	4.8	
Unemployed/Not working	145	13.8	105	16.2		148	13.3	134	17.4	
Father's basic education					<0.05*					<0.05*
Matriculation examination	236	22.8	72	15.6		207	18.5	97	12.9	
Under 9 years of comprehensive school	76	7.4	98	11.5		101	9.0	92	12.2	
Comprehensive school	722	69.8	457	72.9		809	72.4	564	74.9	
Father's occupational education					<0.05*					<0.05*
High	386	37.8	176	28.5		371	34.0	199	27.0	
Medium	331	32.4	224	36.2		364	33.4	253	34.4	
Low	226	22.1	188	30.4		371	25.7	233	31.7	
Other/Uncompleted	78	7.7	30	4.9		76	7.0	51	7.0	
Father's occupational status					<0.05*					0.104
Employed	881	88.1	512	84.4		922	86.3	604	83.5	
Unemployed/Not working	119	11.9	95	15.6		144	13.7	119	16.5	

*Statistically significant differences (χ^2 tests, $p < 0.05$)

Table 3 Logistics regression models: Crude and adjusted ratios, and confidence intervals (95% CI) of unhealthy cluster in adolescence according to socioeconomic status in childhood from the Northern Finland Birth Cohort 1986 follow-up survey in 1993–1994 (n=4305)

Childhood	Boys Unhealthy Lifestyle (adolescence) n=788				Girls Unhealthy Lifestyle (adolescence) n=962			
	Crude		Adjusted		Crude		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Mother's education								
High	1*		1		1*		1*	
Medium	1.46*	1.14-1.85	1.26	0.96-1.64	1.70*	1.36-2.13	1.56*	1.23-2.00
Low	1.60*	1.23-2.07	1.23	0.90-1.67	1.67*	1.32-2.12	1.51*	1.14-1.98
Mother's occupational status								
Employed	1*		1*		1*		1*	
Stay-at-home mother	0.75*	0.58-0.96	0.73*	0.56-0.94	0.66*	0.53-0.83	0.64*	0.50-0.81
Unemployed/Not working	1.29*	1.02-1.63	1.21	0.94-1.55	1.22	0.97-1.52	1.14	0.90-1.45
Father's education								
High	1*		1*		1*		1	
Medium	1.71*	1.29-2.26	1.55*	1.14-2.10	1.52*	1.15-2.01	1.20	0.89-1.61
Low	2.00*	1.50-2.66	1.76*	1.27-2.44	1.71*	1.29-2.27	1.30	0.94-1.78
Father's occupational status								
Employed	1		1		1		1	
Unemployed/Not working	1.47*	1.14-1.89	1.26	0.97-1.63	1.35*	1.08-1.69	1.47*	1.13-1.93

Unhealthy cluster is the reference group in logistic regression

OR odds ratio, 95% CI confidence interval

Model adjusted for both mother's and father's education and occupational status

*Significant at p<0.05

Table 4 Logistics regression models: Crude and adjusted ratios, and confidence intervals (95% CI) of unhealthy cluster in adolescence according to socioeconomic status in adolescence from the Northern Finland Birth Cohort 1986 follow-up survey in 2000–2001 (n=4305)

Adolescence	Boys Unhealthy Lifestyle (adolescence) n=788				Girls Unhealthy Lifestyle (adolescence) n=962			
	Crude		Adjusted		Crude		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Mother's basic education								
Marticulation examination	1*		1		1*		1	
Under 9 years of comprehensive school	1.57*	1.00-2.42	1.23	0.68-2.22	1.40	0.92-2.15	0.95	0.53-1.68
Comprehensive school	1.35*	1.09-1.68	1.01	0.76-1.34	1.52*	1.24-1.86	1.27	0.98-1.65
Mother's occupational education								
High	1*		1		1*		1	
Medium	1.42*	1.10-1.82	1.29	0.95-1.77	1.48*	1.17-1.87	1.16	0.86-1.55
Low	1.61*	1.23-2.10	1.50*	1.07-2.12	0.39*	1.08-1.76	1.03	0.76-1.41
Other/Uncompleted	1.20	0.88-1.64	1.33	0.91-1.92	0.93	0.70-1.32	0.81	0.56-1.16
Mother's occupational status								
Employed	1		1*		1*		1*	
Stay-at-home mother	0.37*	0.24-0.59	0.35*	0.21-0.59	0.65*	0.44-0.97	0.68	0.43-1.07
Unemployed/Not working	1.13	0.86-1.49	1.00	0.72-1.38	1.32*	1.02-1.70	1.28	0.95-1.72
Father's basic education								
Marticulation examination	1*		1		1*		1	
Under 9 years of comprehensive school	2.28*	1.53-3.40	1.52	0.89-2.61	1.94*	1.34-2.82	1.48	0.91-2.41
Comprehensive school	1.52*	1.17-1.98	1.24	0.87-1.77	1.49*	1.14-1.94	1.19	0.85-1.67
Father's occupational education								
High	1*		1		1*		1	
Medium	1.48*	1.16-1.90	1.22	0.88-1.68	1.30*	1.02-1.64	1.08	0.81-1.45
Low	1.20*	1.40-2.37	1.24	0.88-1.75	1.55*	1.22-1.98	1.37*	1.01-1.86
Other/Uncompleted	0.84	0.53-1.33	0.76	0.46-1.26	1.35	0.88-2.06	1.07	0.67-1.71
Father's occupational status								
Employed	1		1		1		1	
Unemployed/Not working	1.37*	1.03-1.84	1.24	0.89-1.73	1.24	0.96-1.62	1.15	0.86-1.54

Unhealthy cluster is the reference group in logistic regression

OR odds ratio, 95% CI confidence interval

Model adjusted for both mother's and father's education and occupational status

*Significant at p<0.05