ASSOCIATION BETWEEN ADHD SYMPTOMS AND ADOLESCENTS’ PSYCHOSOCIAL WELL-BEING: A STUDY OF THE NORTHERN FINLAND BIRTH COHORT 1986

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ABSTRACT

Objectives. To investigate the psychosocial well-being of adolescents with and without symptoms of attention deficit hyperactive disorder (ADHD).

Study design. A cross-sectional study.

Methods. Adolescents who were 15 and 16 years old with (n=487) and without (n=5988) ADHD symptoms were drawn from the Northern Finland Birth Cohort 1986 (n=9432). ADHD symptoms were assessed by the parents on the SWAN scale while the adolescents completed a questionnaire on their current life situation.

Results. The adolescents with ADHD symptoms more often attended a special school and had repeated a grade than those without. Over one-third of those with symptoms were uncertain about their educational plans while 44% of them preferred vocational education. They also reported their health as being poorer and they visited a physician or a nurse more often than the others. Most adolescents reported that they were satisfied with their life, but there were a larger proportion of adolescents with ADHD symptoms among the fairly dissatisfied ones. As well, boys with ADHD symptoms reported the lack of close friends. Adverse psychosocial factors accumulated in those adolescents with greater ADHD symptoms.

Conclusions. The adolescents with ADHD symptoms considered their psychosocial well-being to be poorer than those without ADHD symptoms. In clinical work, it is essential to recognize the most impaired adolescents who need special attention and support at school as well as in their social interactions with their peers and families. From a public health perspective, this information is necessary in order to focus society’s limited resources on those with a higher risk of experiencing complicated outcomes. (Int J Circumpolar Health 2009; 68(2):133-144)

Keywords: ADHD symptoms, adolescents, education, health, psychosocial well-being, family relations
INTRODUCTION

Adolescence has been regarded as a period of crisis characterized by profound change in the process of development into adulthood. It is a time of mental turmoil, and a time when psychiatric symptoms are apt to accumulate. Even though there are studies that indicate that the majority of adolescents actually go through this stage successfully without any major problems reporting a level of relative well-being, there are also studies showing contrary results (1). One of the most common psychiatric disorders among children and adolescents is attention deficit hyperactivity disorder (ADHD), the prevalence of which varies in children, but is mostly reported to be between 5% and 10% (2–4). It has been suggested that symptoms of ADHD alter and decrease with age (5–8), but several studies have shown that about half of these children continue to be impaired in adolescence or meet the current diagnostic criteria for ADHD (5,9,10).

Previous studies indicate that individuals with ADHD often manifest learning problems and cognitive disabilities (5,11,12). They run a considerably greater risk of family conflicts, repetition of grades at school, low academic achievement, conduct and emotional problems and impaired social competence than their peers as they progress into adolescence and young adulthood. Those with highly aggressive behaviour have a much greater risk of many of these outcomes than do those who are less aggressive (5,9,13,14). Furthermore, ADHD and co-morbid disorders seem to be related to poor psychosocial health (15), possibly with a distorted sense of self (16), loneliness and a lack of close friends (17). In general, these earlier studies did not adjust for behavioural problems and, consequently, there is inadequate information about the independent impact of ADHD symptoms on the psychosocial well-being of an individual.

ADHD also affects physical health, as it is liable to lead to the more frequent use of health care services and thus an increase in related costs (18–21). Chan et al. (22), for instance, indicated that children with ADHD had six times more outpatient visits than children with asthma who had 4.3 visits (p<0.001), while the figure for the general population was 2.4 visits (p<0.001).

Even though there are evident genetic factors (4,23), the elucidation of personal and social factors in childhood that predict later negative or positive developmental paths and outcomes is very important (24). According to Hechtman et al. (25), the outcome and functioning of hyperactive children in young adulthood could be predicted by personality characteristics and social and family adversities: when accumulated in childhood, they could increase impaired functioning in young adulthood.

Much of what is known about ADHD is drawn from studies of children, especially from those of boys, and far less work has been done on adolescents with ADHD symptoms. It is important, however, to understand the long-term outcomes of ADHD from childhood to adolescence and to understand their clinical and public health implications (14). In the present study, we set out to investigate the academic performance, self-reported health and psychosocial well-being of adolescents with and without ADHD symptoms in a comprehensive population-based birth cohort in northern Finland (The Northern Finland Birth Cohort 1986, NFBC 1986). Our hypothesis was that adolescents with ADHD symptoms report more problems and poorer psychosocial well-being than those without such symptoms.
MATERIAL AND METHODS

Population and procedure
The population initially consisted of 9,432 live-born children with an expected date of birth between 1 July 1985 and 30 June 1986 (26) in the 2 northernmost provinces of Finland, Oulu and Lapland. The follow-up study was started in 2001, when the adolescents were 15 to 16 years old. At this phase, 99% (n=9340) of the adolescents were alive and the addresses were known for 9,215 of them. The parents were sent a questionnaire that screened ADHD symptoms in adolescents. The questionnaire also included items on the adolescents’ health and development and on the parents’ marital and social status, education, work, health and living habits. The adolescents received a questionnaire concerning their family, friends, school, health, living habits, hobbies and behaviour. Seventy-six percent of the parents (n=6985) and 80% of the adolescents (n=7344) returned their questionnaires. We used the data on those adolescents whose parents had returned the SWAN assessment and had given written permission to use their data (n=6728). After exclusion of those adolescents who refused to let us use their data (n=148) and those with an intellectual disability (n=105), the final analyses included data on 6,475 adolescents (3,222 boys, 3,253 girls) and their parents. The screening resulted in 487 adolescents (7.6%; 316 boys and 171 girls) with ADHD symptoms and 5,988 (2,906 boys and 3,082 girls) without. As a result of some missing data, the total number of respondents varies between the variables. The study was approved by the ethical committee of Oulu University Hospital.

We evaluated the psychosocial well-being of the adolescents by means of a self-reported questionnaire related to their school attendance and educational plans, self-reported health and satisfaction with their life situation, appearance and friends. These variables and their classifications are presented in Tables I to III. The family environment (whilst not presented in tables) was assessed by questions on (1) whether the adolescents thought that their parents were interested in their school attendance, hobbies and other important matters (not at all, rarely, almost always) and (2) how often the adolescents spent time with their parents in joint family activities (not at all, occasionally, monthly, weekly, daily).

In their postal questionnaire the parents assessed ADHD symptoms in their offspring using the SWAN scale (Strengths and Weakness of ADHD Symptoms and Normal Behaviour) (27). The SWAN has been found to be well applied to community samples where it is normally distributed (27–29). Of the various SWAN subscales, we used the 18-item ADHD scale basing the 18 ADHD symptoms described in the Diagnostic and Statistical Manual of Mental Disorders (DSM) IV (30). These symptoms are translated into statements in the SWAN, and are to be rated with scores of 3, 2 and 1 (describing problems), 0 for average behaviour, and -1, -2 and -3 (describing strengths). We used the 95th percentile of the distribution of scores on ADHD scale as a cutoff point to define adolescents with ADHD symptoms. This screening procedure has been described in detail elsewhere (31).

The variables chosen as possible confounding factors when studying all subjects together were family structure, social status of the family, birth order of the adolescent, behavioural problems and gender. The information about the family structure was collected at birth.
Psychosocial factors related to ADHD symptoms

and again at the age of 16 and the classification included (1) families with both biological parents, (2) divorced or widowed and, at the age of 16, single-parent families, (3) divorced or widowed and, at the age of 16, reconstructed families, and (4) always single-parent families. The social status of the family was measured in terms of the mother’s education, mainly due to 2 reasons: mothers were slightly better educated than the fathers, and there was less missing information in the mothers’ reports (32). This distribution included (1) professionals and entrepreneurs, (2) skilled workers, (3) unskilled workers and others, and (4) farmers. The birth order of the adolescents included being (1) the only child, (2) the oldest child, (3) the youngest child, or (4) a middle-born child. The adolescents assessed their own behavioural problems using the Youth Self-Report (YSR) questionnaire subscales of “rule-breaking behaviour” and “aggressive behaviour” (33). Adolescents scoring above the borderline range (82nd percentile) on either of the subscales were considered to have behavioural problems.

Statistical analyses

Comparisons were made between the adolescents with and without ADHD symptoms as total groups and with the boys and girls considered separately. The basic analyses included frequency counts and percentages. An adjusted logistic regression model was created to study the education, self-reported health and psychosocial well-being of the adolescents with and without ADHD symptoms, and the results are presented as odds ratios with 95% confidence intervals (OR, 95% CI). The variables in the logistic regression model were adjusted by family type, social status of the family, birth order and behavioural problems of the adolescent, as these variables are considered in the literature to interfere with the associations under study. An additional latent class analysis, a specific statistical method developed for identifying unmeasured class membership among subjects using observed variables (34), was performed based on the main focus in this study, the psychosocial variables (satisfaction with life, pleased with appearance, close friends). The final selection of the latent class analysis was based on several statistics, the four class had a good model of fit (e.g., entropy statistic = 0.934) and this model offered also large enough groups for comparison. The data were analysed with SPSS 14.0 and the Mplus 3.1 software programs.

RESULTS

Demographic information (not presented in the tables) indicates that the majority of the adolescents (69.1%) were living in an intact family, although those with ADHD symptoms more often lived in some other type of family than did those without (34.5% vs. 23.4%, OR 1.7, 95% CI 1.4–2.1). Most of the adolescents (69.7%) belonged to the first social class in terms of their mother’s educational level, although those with ADHD symptoms more commonly belonged to some other social class than did those without (34.6% vs. 29.0%, OR 1.3, 1.1–1.6). When these differences were studied separately for both genders, the difference remained significant only for the boys. There was no significant difference between the groups in the birth orders of the adolescents. Those with ADHD symptoms reported more behavioural problems, that is, they scored
Table 1. Distribution of the adolescents with and without ADHD symptoms by type of school, repeating of a grade, school attendance and educational plans.

| School type          | All subjects (n=6477) | Boys (n=3224) | Girls (n=3253) |
|----------------------|-----------------------|---------------|----------------|
|                      | With ADHD symptoms    | Without ADHD symptoms | OR (95% CI)    | With ADHD symptoms | Without ADHD symptoms | OR (95% CI) |
|                      | n   %             | n   %         |               | n   %             | n   %         |               |
| **School type**      |                      |               |               |                      |               |               |
| Comprehensive school | 299 71.0           | 3882 69.6     | 1             | 189 70.5           | 1802 68.3     | 1             |
| Upper secondary school | 30 7.1         | 1022 18.3      | 0.4 (0.3-0.6) | 16 6.0             | 437 16.6      | 0.4 (0.2-0.7) |
| Vocational school    | 54 12.8           | 482 8.6       | 1.2 (0.9-1.8) | 40 14.9            | 300 11.4      | 1.1 (0.7-1.8) |
| Special school       | 20 4.8           | 46 0.8        | 5.6 (2.9-11.0) | 13 4.9            | 32 1.2        | 3.7 (1.6-8.8) |
| Working              | 0 0.0           | 9 0.2         | -             | 0 0.0             | 6 0.2         | -             |
| Elsewhere            | 18 4.3           | 137 2.5       | 1.2 (0.7-2.3) | 10 3.7            | 62 2.3        | 0.9 (0.4-2.1) |
| **Repeated grade**   |                      |               |               |                      |               |               |
| No                   | 395 92.5         | 5541 98.5     | 1             | 247 90.8          | 2603 97.9     | 1             |
| Yes                  | 32 7.5           | 86 1.5        | 2.8 (1.6-5.0) | 25 9.2            | 56 2.1        | 2.3 (1.1-4.8) |
| **School attendance**|                      |               |               |                      |               |               |
| Likes it very much   | 12 3.0           | 289 5.6       | 1             | 8 3.2             | 127 5.2       | 1             |
| Likes it to some extent | 124 31.5    | 2902 56.1     | 1.1 (0.5-2.2) | 77 31.0           | 1290 52.3     | 1.1 (0.4-2.7) |
| Does not like it very much | 204 51.8 | 1790 34.6     | 2.5 (1.2-5.2) | 131 52.8          | 937 38.0      | 2.1 (0.8-5.2) |
| Does not like it at all | 40 10.2        | 147 2.8       | 5.3 (2.3-12.2) | 24 9.7            | 94 3.8        | 3.8 (1.3-10.9) |
| **Educational plans**|                      |               |               |                      |               |               |
| Upper secondary school, polytechnic or university | 52 12.4 | 2218 40.4 | 40.4 | 28 10.6 | 905 34.9 | 1 |
| Upper secondary school and vocational school | 23 5.5 | 369 6.7 | 3.1 (1.6-5.3) | 15 5.7 | 156 6.0 | 3.4 (1.5-7.3) |
| Upper secondary school but nothing more | 8 1.9 | 182 3.3 | 1.9 (0.8-4.6) | 5 1.9 | 87 3.4 | 2.0 (0.7-6.2) |
| Vocational education | 185 44.2 | 1316 24.0 | 5.7 (3.9-8.4) | 128 48.3 | 781 30.2 | 5.3 (3.1-8.8) |
| Will not continue | 2 0.5 | 9 0.2 | 5.7 (0.6-50.5) | 2 0.8 | 4 0.2 | 16.8 (1.7-165.1) |
| Does not know yet | 149 35.6 | 1393 25.4 | 5.1 (3.5-7.5) | 87 32.8 | 657 25.4 | 4.7 (2.8-7.9) |

*Odd ratios (OR) with 95% confidence intervals (CI) for symptoms of ADHD were calculated by logistic regression analysis and adjusted for family type, social status of the family, birth order and self-reported behavioural problems (YSR), and also for gender when studying all the subjects together.
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above the 82nd percentile on either the rule-breaking or the aggressive behaviour scale in the YSR (55.4% vs. 27.1%; OR 3.3, 2.7–4.1) than did those without such symptoms.

The adolescents with ADHD symptoms more often attended a special school (OR 5.6, 2.9–11.0) (Table I), and they had also repeated a grade more often than their counterparts (OR 2.8, 1.6–5.0), and over two-thirds did not like to go to school. Most of those with symptoms preferred vocational education (OR 5.7, 3.9–8.4), but more than one-third of them were uncertain about their future educational plans. These results were similar for the boys and the girls.

The adolescents with ADHD symptoms more frequently reported their health as being poor or very poor (3.0% vs. 0.9%; OR 3.0, 1.4–6.5) and they used the health care services more often than those without symptoms (Table II). Most of the adolescents in the whole study population reported that they were fairly or very satisfied with their life situation (81.8% with symptoms and 91.1% without), although there were statistically significantly larger proportion of adolescents (especially girls) with ADHD symptoms among the fairly dissatisfied ones (OR for girls 2.5, 1.3–4.5) (Table III). Boys with ADHD symptoms more frequently reported that they had no close friends (OR for boys 1.7, 1.1–2.7), and the adolescents with ADHD symptoms, both boys and girls, more often reported that they were not pleased with their appearance.

As for the family environment, most of the adolescents in the whole study population reported that their parents were interested in their schooling, hobbies and other important matters, but those with ADHD symptoms reported that less frequently (79.7% of those with symptoms and 86.5% of those without, OR 1.6, 1.2–2.1, not presented in tables). Nearly half of the adolescents with ADHD symptoms (48.0%) reported that they had joint activities with other members of their family on a daily basis. However, 6.1% of the adolescents with symptoms had such activities only monthly and 3.3% did not have these activities at all when compared with 3.3% and 1.2% of those without symptoms (OR 2.2, 1.1–4.5, OR 2.4, 1.5–3.9, respectively, not presented in tables). On taking a closer look at the demographic factors, it was evident that joint activities with family members showed no association with family structure.

A latent class analysis was performed based on the distribution of the psychosocial variables (life satisfaction, pleased with appearance, close friends) among all the adolescents and a 4-class model was created (Table IV). Class 1 included adolescents who were satisfied with life, pleased with their appearance and had close friends; class 2 included those who were not satisfied with life and not pleased with their appearance but had close friends; class 3 included those who were satisfied with life and pleased with their appearance but did not have any close friends; and class 4 included those who were not satisfied with life, not pleased with their appearance and had no close friends. The proportion of adolescents with ADHD symptoms in class 4 was nearly twofold compared with class 1 (OR 1.8, CI 1.1–2.8), and they had more ADHD symptoms than those in class 1 (p=0.009, Table IV). These results were similar among the boys and girls, although there were more boys than girls in class 3 and their mean SWAN score was 1.66, whereas the corresponding figure for the girls was 0.83. There were mostly girls in class 2.
Table II. Distribution of the adolescents with and without ADHD symptoms by self-reported health and visits to a physician or school nurse.

| All subjects (n=6477) | Boys (n=3224) | Girls (n=3253) |
|-----------------------|---------------|----------------|
|                       | With ADHD symptoms | Without ADHD symptoms | OR (95% CI)<sup>a</sup> | With ADHD symptoms | Without ADHD symptoms | OR (95% CI)<sup>a</sup> | With ADHD symptoms | Without ADHD symptoms | OR (95% CI)<sup>a</sup> |
| Self-reported health  |               |                       |                       |               |                       |                       |               |                       |                       |
| Very good             | 75 (17.4%)    | 1429 (25.3%)          | 0.7 (0.5-0.96)       | 57 (20.9%)   | 826 (30.9%)           | 0.7 (0.5-1.1)         | 18 (11.4%)   | 603 (20.3%)           | 0.6 (0.3-1.1)         |
| Good                  | 245 (56.8%)   | 3371 (59.8%)          | 1                      | 155 (56.8%)  | 1484 (55.6%)          | 1                      | 90 (57.0%)   | 1887 (63.5%)          | 1                      |
| Moderate              | 98 (22.7%)    | 789 (14.0%)           | 1.4 (1.1-1.9)         | 54 (19.8%)   | 342 (12.8%)           | 1.3 (0.8-1.9)         | 44 (27.8%)   | 447 (15.0%)           | 1.6 (1.1-2.5)         |
| Poor or very poor     | 13 (3.0%)     | 52 (0.9%)             | 3.0 (1.4-6.5)         | 7 (2.6%)     | 18 (0.7)              | 3.4 (1.1-10.4)        | 6 (3.8%)     | 34 (1.1)              | 2.8 (0.9-8.4)         |
|                       |               |                       |                        |               |                       |                       |               |                       |                       |
| Physician or school nurse visits<sup>b</sup> |               |                       |                        |               |                       |                       |               |                       |                       |
| None                  | 38 (9.5%)     | 732 (13.5%)           | 1                      | 31 (12.4%)   | 440 (17.3%)           | 1                      | 7 (4.7%)     | 292 (10.1%)           | 1                      |
| Once                  | 74 (18.5%)    | 1201 (22.2%)          | 1.1 (0.7-1.7)         | 55 (22.0%)   | 654 (25.7)            | 1.0 (0.6-1.7)         | 19 (12.8%)   | 547 (19.0)            | 1.5 (0.6-4.0)         |
| Twice                 | 80 (20.1%)    | 1335 (24.6%)          | 0.9 (0.6-1.5)         | 52 (20.8%)   | 717 (28.2)            | 0.7 (0.4-1.3)         | 28 (18.8%)   | 618 (21.5)            | 1.9 (0.7-4.6)         |
| Three times or more   | 207 (51.9%)   | 2153 (39.7%)          | 1.7 (1.1-2.4)         | 112 (44.8%)  | 731 (28.8)            | 1.9 (1.2-2.9)         | 95 (63.8%)   | 1422 (49.4)           | 2.8 (1.2-6.5)         |

<sup>a</sup>Odd ratios (OR) with 95% confidence intervals (CI) for symptoms of ADHD were calculated by logistic regression analysis and adjusted for family type, social status of the family, birth order and self-reported behavioural problems (YSR), and also for gender when studying all the subjects together.

<sup>b</sup>During the last six months.

Table III. Distribution of the adolescents with and without ADHD symptoms by psychosocial factors (life satisfaction, pleased with appearance and close friends).

| All subjects (n=6477) | Boys (n=3224) | Girls (n=3253) |
|-----------------------|---------------|----------------|
|                       | With ADHD symptoms | Without ADHD symptoms | OR (95% CI)<sup>a</sup> | With ADHD symptoms | Without ADHD symptoms | OR (95% CI)<sup>a</sup> | With ADHD symptoms | Without ADHD symptoms | OR (95% CI)<sup>a</sup> |
| Life satisfaction     |               |                       |                       |               |                       |                       |               |                       |                       |
| Very satisfied        | 96 (22.7%)    | 1741 (31.2%)          | 0.9 (0.7-1.2)         | 61 (22.8%)    | 905 (34.3%)           | 0.8 (0.5-1.1)         | 35 (22.4%)    | 836 (28.3%)           | 1.2 (0.8-1.9)         |
| Fairly satisfied      | 250 (59.1%)   | 3348 (59.9%)          | 1                      | 163 (61.0%)   | 1504 (57.1)           | 1                      | 87 (55.8)     | 1844 (62.4)           | 1                      |
| Fairly dissatisfied   | 33 (7.8%)     | 219 (3.9)             | 1.8 (1.2-2.8)         | 17 (6.4%)     | 95 (3.6)              | 1.3 (0.7-2.5)         | 16 (10.3%)    | 124 (4.2)             | 2.5 (1.3-4.5)         |
| Very dissatisfied     | 11 (2.6%)     | 57 (1.0)              | 1.6 (0.7-3.8)         | 8 (3.0%)      | 30 (1.1)              | 1.5 (0.5-4.1)         | 3 (1.9)       | 27 (0.9)              | 1.9 (0.4-8.7)         |
| Pleased with appearance|            |                       |                       |               |                       |                       |               |                       |                       |
| Quite pleased         | 152 (41.9%)   | 2584 (51.0%)          | 1                      | 94 (41.2%)    | 1169 (49.8)           | 1                      | 58 (43.0)     | 1415 (52.0)           | 1                      |
| Nothing wrong         | 122 (33.6%)   | 1449 (28.6)           | 1.5 (1.1-1.9)         | 96 (42.1%)    | 928 (39.5)            | 1.4 (1.0-2.1)         | 26 (19.3)     | 521 (19.1)            | 1.6 (1.0-2.7)         |
| Worried about looks   | 47 (12.9%)    | 671 (13.2)            | 1.4 (1.0-2.1)         | 29 (12.7%)    | 192 (8.2)             | 2.4 (1.5-3.9)         | 18 (13.3)     | 479 (17.6)            | 0.8 (0.4-1.4)         |
| Feels ugly            | 42 (11.6%)    | 367 (7.2)             | 2.0 (1.3-3.1)         | 9 (3.9%)      | 60 (2.6)              | 1.9 (0.9-3.9)         | 33 (24.4)     | 307 (11.3)            | 2.6 (1.7-4.1)         |
| Close friends         |               |                       |                       |               |                       |                       |               |                       |                       |
| Several close friends | 174 (41.5%)   | 2610 (46.7)           | 1                      | 102 (38.9%)   | 1164 (44.3)           | 1                      | 72 (45.9)     | 1446 (48.8)           | 1                      |
| Two close friends     | 87 (20.8%)    | 1295 (23.1)           | 1.0 (0.7-1.4)         | 43 (16.4)     | 484 (18.4)            | 1.0 (0.6-1.5)         | 44 (28.0)     | 811 (27.4)            | 1.0 (0.7-1.6)         |
| One close friend       | 113 (27.0%)   | 1316 (23.5)           | 1.2 (0.9-1.6)         | 79 (30.2)     | 703 (26.7)            | 1.1 (0.8-1.6)         | 34 (21.7)     | 613 (20.7)            | 1.3 (0.8-2.1)         |
| No close friends       | 45 (10.7%)    | 373 (6.7)             | 1.7 (1.2-2.6)         | 38 (14.5)     | 278 (10.6)            | 1.7 (1.1-2.7)         | 7 (4.5)       | 95 (3.2)              | 1.5 (0.6-4.0)         |

<sup>a</sup>Odd ratios (OR) with 95% confidence intervals (CI) for symptoms of ADHD were calculated by logistic regression analysis and adjusted for family type, social status of the family, birth order and self-reported behavioural problems (YSR), and also for gender when studying all the subjects together.
Factors indicating poor psychosocial well-being seem to be more common among adolescent boys and girls with ADHD symptoms than among those without, leading us to assume that a considerable number of them are having problems in the academic field and have relatively poor physical and psychosocial health. It seems that adverse psychosocial factors also accumulate among those with more ADHD symptoms. Consequently, they may be at risk of being marginalized.

Our results of the academic performance among adolescents with ADHD symptoms support those of previous clinical studies, which have indicated that poor academic performance and the receiving of special and vocational education is more common among adolescents with ADHD than among their counterparts (35–38). On the one hand, our results show that over one-third of the adolescents with ADHD symptoms were uncertain about their future education, which may indicate a lack of interest in studying and could have long-lasting consequences for their future education and careers. On the other hand, it is quite common for 15- to 16-year-olds to be uncertain about their future occupations, as shown by the fact that one-fourth of the adolescents without ADHD symptoms in this sample could not say anything about their future occupational plans.

Also consistent with previous findings (18–21) was the fact that those with ADHD symptoms reported poor or moderately poor health more often than the others and used health care services more frequently. Leibson et al. (18) showed that children with ADHD had a higher proportion of emergency department and hospital inpatient and outpatient visits than those without ADHD. Frequent use of health care services seems to continue in adolescence and is likely to cause an economic burden on society (7,18,22).

### Table IV.

Distribution of groups of adolescents formulated according to latent class analysis in terms of a positive screening on the SWAN scale (SWAN case) and mean scores for ADHD symptoms.

| Groups of adolescents based on latent class analysis\(^a\) | SWAN case | ADHD symptoms (SWAN scores) | p-value |
|----------------------------------------------------------|-----------|-----------------------------|---------|
|                                                          | n        | %  | OR (95% CI)\(^c\) | mean (SD) | t\(^d\) |       |
| class 1\(^b\)                                           | 3335     | 5.6 | 1 | 1.05 (2.18)  | ref. | ref.  |
| class 2\(^b\)                                           | 785      | 5.6 | 1.1 (0.7-1.7)  | 1.16 (2.17) | 1.241 | NS    |
| class 3\(^b\)                                           | 1342     | 7.4 | 1.3 (0.9-1.7)  | 1.36 (2.60) | 3.684 | <0.001 |
| class 4\(^b\)                                           | 416      | 9.7 | 1.8 (1.1-2.8)  | 1.44 (2.8)  | 2.630 | 0.009 |

\(^a\)Latent class analysis based on variables for psychosocial factors (life satisfaction, pleased with appearance, close friends).

\(^b\)Class 1 includes adolescents who are satisfied with life, pleased with their appearance and have close friends.

\(^c\)Class 2 includes adolescents who are not satisfied with life and are not pleased with their appearance but have close friends.

\(^d\)Class 3 includes adolescents who are satisfied with life and are pleased with their appearance but do not have any close friends.

\(^e\)Class 4 includes adolescents who are not satisfied with life, not pleased with appearance and have no close friends.

\(^f\)Odd ratios (OR) with 95% confidence intervals (CI) were calculated by logistic regression analysis and adjusted for family type, social status of the family, birth order, self-reported behavioural problems (YSR) and gender.

\(^g\)Student’s t-test.
Adolescents with ADHD symptoms reported to be fairly dissatisfied with their life situation more so than other adolescents. The girls with symptoms seemed to manage socially better than boys, however, as they had close friends more often than boys did. These results are consistent with the finding reported by Topolski et al. (39), indicating that adolescent boys performed poorly in social relations. Friendship can be a major contributor to adolescents’ psychosocial adaptation and constitutes an important protective element against deviant behaviour, depression and feelings of alienation (40). On the one hand, the lack of friends may result in poor social skills and may be related to dropping out of community social networks later in life (41). On the other hand, boys may overestimate their social and academic performance as a way to protect their positive self-image (42). Almost a quarter of the girls with ADHD symptoms were not pleased with their appearance. Personal appearance is very important, especially for girls, and can affect an adolescent’s sense of satisfaction with her/his life, including her/his self-image. Self-image of adolescents, especially girls, with ADHD is an issue that has not been extensively studied. Future studies should address these issues more thoroughly in order to better understand the importance of social adjustment and academic achievement.

The results of the latent class analysis seem to be similar to those obtained by Hechtman et al. (25), indicating that adverse psychosocial factors may accumulate among those with ADHD symptoms. In addition, ADHD itself should probably be considered more as a continuum than a category, because there seemed to be a lot of ADHD symptoms (i.e., high SWAN scores) among the adolescents who reported adverse psychosocial well-being.

Generally, nearly all the adolescents were living with their parents and spent time with their family members daily. However, those with ADHD symptoms reported less parental interest than others. The parents may not realize or understand the remarkable impairment caused by these symptoms and may regard the adolescent’s problems and conduct as rebellious or bad behaviour. The interaction between some adolescents with ADHD symptoms and their parents may be confrontational and sometimes even hostile. Previous results suggest that the families of children with ADHD often experience difficult parent-child relationships (43). Moreover, as the aetiology of ADHD is highly inheritable, parents with ADHD symptoms may have problems raising a difficult child (44). Unfortunately, we were unable to study parental ADHD symptoms in this project.

**Strengths and limitations**

A large unselected population-based sample that provided powerful insights was the strength of our study. Data was obtained from both adolescents and their parents and yielded a high participation rate (parents 76%, adolescents 80%). Furthermore, our study has contributed to the existing knowledge about girls, because it indicates that girls with ADHD symptoms may be as impaired as boys, even though they may generally be more competent in social interactions.
However, some restrictive aspects of the study should be noted. First, the adolescents’ questionnaire on life satisfaction and psychosocial well-being were formed by selecting suitable items from questionnaires that measured the quality of life for adolescents (e.g., Youth Quality of Life Instrument – Research Version) (45). That is why no psychometric properties of our questionnaire are available. However, items measuring, for instance, appearance, friends and plans for the future are commonly used to assess psychosocial well-being. Second, the lack of information about co-morbid psychopathology related to ADHD was a limitation. An earlier study using a small subsample derived from the NFBC 1986 population indicated that about one-third of those with a diagnosis of ADHD suffered from co-morbid behavioural disorders while the corresponding figure for depressive disorders was around 10% (46). Consequently, we decided to control for behavioural problems and could use the information in the YSR for its clear and concise items regarding these problems. Unfortunately, the YSR does not provide sufficient information about affective psychopathology. Third, selection bias can be considered as one of the limitations because there were probably adolescents with severe problems among the non-participants. Finally, although the SWAN scale seems to be suitable to use with a general population, the timing of the data collection, at the age of 15 to 16, may create a bias if the parents over- or under-report ADHD symptoms. With no information about childhood symptoms, it is not clear whether the parents report true ADHD symptoms or normal adolescent turmoil. However, the SWAN showed strong sensitivity and specificity for the diagnosis of ADHD in this sample, which is discussed in more detail elsewhere (31).

In conclusion, it seems that adolescents with ADHD symptoms perform academically and socially more poorly than their counterparts, even though some of them do quite well. In clinical work, it is essential to recognize the most impaired adolescents who also need special attention and support at school and in social interactions with their peers and families. From a public health perspective, this information is necessary in order to focus society’s limited resources on those with a higher risk of experiencing complicated outcomes.

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