

ORIGINAL ARTICLE: ASTHMA

Adolescent girls with asthma have worse asthma control and health-related quality of life than boys—A population based study

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Abstract

Background: Population-based studies investigating health-related quality of life (HRQoL) among asthmatic adolescents are rare. Further, among subjects with asthma, HRQoL may be affected by asthma control and severity.

Aim: To investigate HRQoL in relation to asthma control and asthma severity among adolescents.

Method: As a part of the population-based OLIN pediatric study, 266 adolescents with current asthma (14–15 yr) were identified. *N* = 247 completed the DISABKIDS HRQoL asthma module, including the domains impact and worry. The Asthma Control Test (ACT) was used and a disease severity score was calculated based on symptoms and medicine use.

Results: The prevalence of current asthma was 11%. Well-controlled asthma was reported by 15% of the adolescents, and 53% had partly controlled asthma. The prevalence of uncontrolled asthma was significantly higher among girls than boys (38% vs 25%), and girls also reported lower HRQoL scores. There was a fairly strong correlation between the ACT and DISABKIDS scores. Independent risk factors for low HRQoL impact (a score <67) were female sex (OR 4.66, 95%CI 1.82–9.54) and decreased ACT scores (1.38, 1.18–1.62). Risk factors for low HRQoL worry (a score <70) were female sex (3.33, 1.41–7.86), decreased ACT scores (1.35, 1.16–1.57), severe asthma (6.23, 1.46–16.50), and having current eczema (2.68, 1.00–7.24).

Conclusion: Only a minority of the asthmatic adolescents reported well-controlled asthma, and poor asthma control and female sex were risk factors for low HRQoL. Our results demonstrate that evaluation of asthma control is of great importance for asthma management.

KEYWORDS

asthma, asthma control, asthma severity, health-related quality of life, teenagers

1 | INTRODUCTION

In Sweden, the prevalence of physician-diagnosed asthma is reported to be 10% in the age-group 16–25 yr.¹ It is well-known that the prevalence of asthma is higher among boys in childhood,² but there is a

shift in adolescence when asthma and wheeze become more common among girls.³ The long-term goals of asthma management is to achieve good symptom control, maintain a normal level of activity and limit the risk of future exacerbations and decline in lung function.^{4,5} These goals should be person-centered, meaning that also the patient's own goals should be identified.⁵

Asthma control and asthma severity are often used to label the intensity of asthma symptoms such as wheeze, chest tightness, shortness of breath and cough.⁵ Poor asthma control has a negative

Meetings: Some of the results in this paper have been presented as an oral presentation, in the European Respiratory Society international congress in 2016.

effect on HRQoL among children^{6–8} and increases the risk of exacerbations among both children and adults.^{9,10} Additionally, asthma severity, corticosteroid use and the number of physician visits are also previously reported risk factors for a worse HRQoL,⁶ as well as allergic co-morbid conditions such as rhino-conjunctivitis and eczema.¹¹ It is well known that adolescents with asthma report a worse HRQoL than their healthy peers,¹² and that girls are more affected than boys.^{13,14} However, HRQoL among adolescents with asthma seems to improve with increasing age,¹⁴ which may be due to improved general well-being after the transition from adolescence to adulthood.

Regardless of having a chronic disease or not, in the transition from childhood to youth, HRQoL seems to decrease and girls are more affected than boys.^{15,16} Adolescents meet age-specific challenges, for example, expectations from school, separation from parents, establishment of new relationships and dealing with puberty, and risk-behaviors such as tobacco and alcohol use are as common among adolescents with a chronic disease as among their healthy peers.¹⁷ Risk-behaviors are related to poorer adherence and coping,¹⁸ and coping strategies may have an association with HRQoL.¹⁹ In other words, it is a new chapter in life that young people have to face when they transit into adulthood, and we hypothesize that poor asthma control and asthma severity affect HRQoL among young asthmatics, particularly girls. Previous studies of asthmatics often include children recruited from the health care, why subjects with a severe disease may be over-represented and not reflecting the asthma severity distribution in the general population. Therefore, the aim of this study was to investigate HRQoL in relation to asthma control and asthma severity among adolescents aged 14–15 years in a population-based study. A further aim was to study sex differences in this context.

2 | MATERIAL AND METHODS

2.1 | Study population

In 2006 a parental questionnaire about respiratory symptoms, asthma and allergic diseases was distributed to all children in first and second grades (age 7–8 yr) of three municipalities in Northern Sweden (Luleå, Piteå, and Kiruna) within the Obstructive Lung Disease in Northern Sweden (OLIN) studies. The participants ($n = 2585$, 96% of the invited) formed a cohort that has been followed up on several occasions,^{20–22} and in 2013, 2345 adolescents now in the age of 14–15 yr participated in the study (88% of the invited). Adolescents included in the current study ($n = 247$) had 1) reported current asthma defined as physician-diagnosed asthma and either current wheeze or asthma medication use during the last 12 months ($n = 266$), and 2) answered the DISABKIDS HRQoL questionnaire ($n = 247$). The study was approved by the Regional Ethical Review Board at Umeå University, Sweden. Informed consent was given by parents/guardians at the beginning of the study, and the adolescents gave their informed consent at the time of data collection.

2.2 | Questionnaires and definitions

The International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire²³ was used together with additional questions about symptoms, use of asthma medications, the validated question of physician-diagnosed asthma, and questions about risk factors and lifestyle factors such as parental socio-economic status, living conditions, smoking, and physical activity.^{21,24} The validated Asthma Control Test (ACT) consists of five questions with responses on a 5-point scale, respectively. The sum of the score ranges from 5 to 25 and a lower score indicates a poorer asthma control. The scores were classified into three levels; well-controlled asthma (score 25), partly controlled asthma (score 24–20) and uncontrolled asthma (score ≤ 19).^{25–27} The ACT score was also used as a continuous variable in risk analyses.

The asthma severity score (range 0–5) was based on five questions regarding symptoms and asthma medication during the last 12 months as reported in the questionnaire; current wheeze, daily use of asthma medication, ≥ 1 nights per week with disturbed sleep, ≥ 1 episode of speech-limiting wheeze, and > 12 episodes of wheezing, with each item generating one point.²⁰ Due to a few cases with scores of 3–5, these were pooled together in one group (≥ 3).

To estimate HRQoL, the DISABKIDS asthma module questionnaire was used. The DISABKIDS puts focus on specific physical and emotional aspects of asthma, and was developed and validated in a cross-national European project including Sweden. The questionnaire consists of two domains; *impact* (6 items) which describes experiences of limitations and symptoms during sports and activities, and *worry* (5 items) which describes fears related to asthma. The score ranges from 0 to 100 and lower scores represent a worse HRQoL.^{28,29} Because DISABKIDS lacks an established cut-off for low HRQoL, we chose to define low HRQoL as the lowest quartiles in the impact and worry domain scores, respectively.

2.3 | Statistical analyses

The computer software IBM SPSS Statistics (Version 23.0; New York) was used for the statistical analyses. The Chi square test was used for bi-variate comparisons of proportions and Mann-Whitney when comparing distributions. To examine the correlation between ACT scores and DISABKIDS HRQoL impact and worry scores, the Spearman's rho was used. A P -value < 0.05 was considered statistically significant.

Factors related to low HRQoL were analyzed by logistic regression and expressed as odds ratios (OR) with 95% confidence intervals (CI). Dependent variables were low HRQoL defined as the lowest quartiles of the impact (score < 67) and worry (score < 70) domains, respectively. Bivariate analyses were performed to identify factors related to low HRQoL. Two regression models were performed: Model 1 was adjusted for sex, asthma control, and asthma severity. Model 2 included additional adjustment for factors significantly associated in the bivariate analyses, for example, current eczema, personal smoking, not being able to participate in physical activity, asthma symptoms at school and school absenteeism.

3 | RESULTS

3.1 | Basic characteristics

The prevalence of current asthma was 11.3% (girls 12% vs boys 11%, $P=0.337$). A significantly higher proportion of boys reported asthma onset before age 7-8 yr (60% vs 24%, $P=0.010$), whereas a higher proportion of girls reported current eczema (24% vs 9%, $P=0.002$). No significant sex differences were found regarding current rhinitis, living conditions, parental smoking, participation in sports, use of asthma medication or health care visits due to asthma (Table 1). While the prevalence of wheeze, dyspnea, disturbed sleep, or asthma severity score did not differ significantly between girls and boys, more girls reported that respiratory symptoms interfered with their daily life (Table 2).

3.2 | Asthma control and HRQoL

Based on ACT, well-controlled asthma was reported by 15% of the adolescents. Fifty-three percent had partly controlled asthma and 32% an uncontrolled asthma. A higher proportion of girls than boys reported an uncontrolled asthma (38% vs 25%, $P=0.024$). The girls also had lower HRQoL impact scores (md 79 vs 83, $P<0.001$) as well as HRQoL worry scores (md 75 vs 85, $P<0.001$) (Table 2).

Fairly strong correlations were found between ACT and DISABKIDS. Spearman's rho was 0.60 (R^2 0.36, $P<0.001$) for the

impact domain and 0.56 (R^2 0.31, $P<0.001$) for the worry domain. When stratifying for sex, the correlations were somewhat stronger among girls than boys. For impact, the Spearman's rho was 0.63 (R^2 0.40, $P<0.001$) among girls and 0.52 (R^2 0.27, $P<0.001$) among boys, and the corresponding estimates for worry were 0.60 (R^2 0.36, $P<0.001$) among girls and 0.49 (R^2 0.24, $P<0.001$) among boys.

3.3 | Risk factors for low HRQoL impact (score <67)

In bivariate analyses, a low HRQoL impact was associated with female sex, decreased ACT score, asthma severity, wheeze, dyspnea, emergency health care visits, disturbed sleep, use of asthma medication, asthma interfering with daily life, not participating in physical activity, worsening of asthma in school, and personal smoking (Table 3). In the adjusted analyses, low HRQoL impact was independently related to female sex (OR 3.42, 95%CI 1.69-6.92) and decreased ACT score (OR 1.43, 95%CI 1.26-1.62) (Table 4, Model 1). These results remained also after the model was extended (Table 4, Model 2).

3.4 | Risk factors for low HRQoL worry (score <70)

In bivariate analyses, a low HRQoL worry was associated with female sex, decreased ACT score, asthma severity, current eczema, wheeze, dyspnea, disturbed sleep, use of asthma medication, asthma interfering with daily

TABLE 1 Basic characteristics of adolescents with current asthma age 14-15 yr, by sex

Basic characteristics, n (%)	Girls 128 (51.8)	Boys 119 (48.2)	P-value
Asthma onset before age 7-8 yr	31 (24.2)	47 (60.3)	0.010
Current rhinitis	26 (20.3)	25 (21.0)	0.893
Current eczema	31 (24.2)	11 (9.2)	0.002
Living in apartment ^a	37 (30.6)	30 (26.3)	0.469
Single parent household	17 (13.3)	17 (14.3)	0.819
Father smokes ^a	19 (15.7)	15 (13.6)	0.658
Mother smokes ^a	17 (13.9)	17 (15.0)	0.809
Personal smoking (sometimes to everyday) ^a	15 (12.0)	10 (8.5)	0.366
Parental socioeconomic status ^a			
Professionals/self-employed	35 (29.4)	39 (34.5)	
Non-manual workers	48 (40.3)	42 (37.2)	
Manual workers	29 (24.4)	31 (27.4)	
Unemployed	7 (5.9)	1 (0.9)	0.170
Participation in sports on leisure time ^a	91 (72.2)	89 (75.4)	0.507
Taking full part in physical education in school ^a	93 (81.6)	99 (95.2)	0.002
Worsening of asthma in school ^a	41 (36.3)	32 (30.8)	0.390
Staying home from school due to asthma ^a	16 (14.2)	14 (13.5)	0.882
Any current asthma medication	124 (97.0)	115 (96.6)	0.917
Current short-acting β -agonist (SABA)	107 (83.6)	99 (83.2)	0.842
Current long-acting β -agonist (LABA)	13 (10.2)	10 (8.4)	0.668
Current inhaled corticosteroids (ICS) ^b	77 (60.2)	68 (57.1)	0.643
Asthma emergency health care visits	11 (8.6)	9 (7.6)	0.767

^aA few internally missing values: percentages calculated for those who answered the question.

^bUse of ICS also includes the ICS when administrated together with LABA in combined inhalers.

Bold values indicate P -values < 0.05.

TABLE 2 Asthma symptoms, severity, control and health-related quality of life among adolescents with current asthma age 14-15 yr, by sex

	Girls (n = 128, 51.8%)	Boys (n = 119, 48.2%)	P-value
Current wheeze, n (%)	88 (53.7)	76 (46.3)	0.417
Wheezing without cold, n (%)	63 (49.2)	55 (46.6)	0.637
Speech-limiting wheeze, n (%)	19 (14.8)	9 (7.6)	0.071
Wheeze during or after exercise, n (%)	99 (77.3)	87 (73.1)	0.441
Dyspnea related to fur animals/pollen/grass/fragrances, n (%)	72 (56.3)	55 (46.2)	0.115
Disturbed sleep due to asthma, n (%)	29 (22.7)	17 (14.3)	0.091
Respiratory symptoms interfering with daily life, n (%)	100 (78.1)	77 (64.7)	0.019
Asthma severity score, n (%)			
0	32 (25.0)	33 (27.7)	
1	51 (39.8)	51 (42.9)	
2	24 (18.8)	21 (17.6)	
≥3	21 (16.4)	14 (11.8)	0.732 ^a
Asthma Control Test (ACT), n (%)			
Well-controlled	17 (13.3)	21 (17.6)	
Partly controlled	62 (48.4)	68 (57.1)	
Uncontrolled	49 (38.3)	30 (25.2)	0.041^a
ACT, median (IQR)	21 (18-23)	22 (19-24)	0.008^b
DISABKIDS Health-related quality of life (HRQoL)			
Impact, median (IQR)	79.2 (58-88)	83.3 (75-91)	<0.001^b
Worry, median (IQR)	75.0 (60-89)	85.0 (75-95)	<0.001^b
Low HRQoL impact <67, n (%)	51 (39.8)	17 (14.3)	<0.001
Low HRQoL worry <70, n (%)	45 (35.2)	14 (11.8)	<0.001

^aTest for trend.^bMann-Whitney. A few internally missing values: percentages calculated for those who answered the question.

Bold values indicate P-values < 0.05.

life, not participating in physical education, worsening of asthma in school, and staying home from school due to asthma (Table 3). In adjusted analysis (Table 5, Model 1), low HRQoL worry was independently related to female sex (OR 3.37, 95%CI 1.61-7.08), decreased ACT score (OR 1.33, 95%CI 1.17-1.50), asthma severity score 2 (OR 6.15, 95%CI 1.87-20.25) and asthma severity score ≥3 (OR 6.10, 95%CI 1.70-21.83). Model 2 indicates that also current eczema was associated to low HRQoL worry (OR 2.68, 95%CI 1.00-7.24) (Table 5).

4 | DISCUSSION

In this population-based cohort of adolescents at age 14-15 years, 11% (n = 247) reported having current asthma and different patterns occurred among girls and boys regarding asthma control and HRQoL, but not regarding asthma severity. Only a minority of the adolescents reported well-controlled asthma, and a higher proportion of girls than boys reported uncontrolled asthma and a worse HRQoL. Female sex and poor asthma control were independent risk factors for both low HRQoL impact and worry, and low HRQoL worry was also independently associated to more severe asthma and having current eczema.

According to The Global initiative for Asthma (GINA) program, one goal of asthma management is to achieve a good control of the disease.⁵ In our study, only a minority of the adolescents reported well-controlled asthma.

Conversely, in an out-patient study from Greece, 58% of children in the age 8-14 yr reported well-controlled asthma, and 42% an insufficient asthma control.⁶ In an adult population-based study from Sweden, the corresponding proportions were 42% (well-controlled) and 58% (insufficient).³⁰ These results contrast to our study, where nearly 85% of the adolescents had an insufficiently controlled asthma. However, our results are in line with a Dutch study where 33% of adolescents aged 12-18 years had uncontrolled asthma according to ACT.³¹ One explanation for the different result in the studies presented above could be due to different tools used to assess asthma control; ACT and the consensus-based GINA symptom control tool. Although ACT and GINA seem to correlate well,^{5,31} some studies indicate that an ACT score <19 identifies those with uncontrolled asthma defined by GINA³² while others have shown that this cut-off may underestimate uncontrolled asthma as defined by GINA.³¹ However, our population-based result indicates that adolescents with asthma at the age of 14-15 years are in need of enhanced care, and ACT is a useful, recommended and easy-to-use instrument in clinic work, also correlating well with disease specific HRQoL instruments such as the DISABKIDS.

As shown in previous studies both among adolescents in general,^{15,16} as well as among asthmatics,^{13,14} we found that girls reported a worse HRQoL than boys, and furthermore that a higher proportion of girls had uncontrolled asthma. In fact, female sex was an independent risk factor for worse HRQoL. Conversely, some studies indicate that a poor asthma control is not related to sex,^{7,33} but to younger age and poor asthma

TABLE 3 Risk factors for low HRQoL impact and worry scores, respectively, among adolescents with current asthma age 14-15 yr

	Impact OR (95%CI)	Worry OR (95%CI)
Female sex	3.97 (2.13-7.41)	4.07 (2.09-7.91)
Decreased ACT-scores ^a	1.49 (1.33-1.69)	1.43 (1.27-1.59)
Asthma severity 2 ^b	3.67 (1.49-9.02)	8.00 (2.69-23.79)
Asthma severity ≥3 ^b	6.53 (2.53-16.83)	12.71 (4.11-39.24)
Current eczema	1.81 (0.90-3.64)	3.00 (1.49-6.04)
Current wheeze	2.72 (1.38-5.34)	5.04 (2.17-11.69)
Wheezing without cold	2.39 (1.34-4.24)	5.06 (2.60-9.87)
Speech-limiting wheeze	3.06 (1.37-6.81)	3.87 (1.72-8.69)
Wheeze during or after exercise	3.16 (1.41-7.05)	3.65 (1.48-8.99)
Dyspnea related to fur animals/pollen/grass/ fragrances	1.95 (1.09-3.45)	2.70 (1.45-5.04)
Emergency health care visits due to asthma	2.91 (1.15-7.36)	1.81 (0.69-4.79)
Disturbed sleep due to asthma symptoms	8.04 (3.99-16.23)	5.85 (2.94-11.63)
Asthma medication often/periodically/every day	3.12 (1.70-5.72)	2.81 (1.49-5.28)
Respiratory symptoms interfering with daily life	3.97 (1.79-8.84)	4.56 (1.86-11.18)
Non-participation in sports on leisure time	1.96 (1.06-4.55)	1.64 (0.89-3.13)
Not taking full part in physical education in school	3.85 (1.67-9.09)	4.17 (1.69-10.00)
Worsening of asthma in school	4.45 (2.39-8.29)	3.32 (1.76-6.27)
Staying home from school due to asthma	1.78 (0.80-3.95)	4.98 (2.55-9.71)
Personal smoking	3.87 (1.66-9.02)	2.30 (0.97-5.44)

Non-significant OR: Asthma onset before age 7-8 yr, current rhinitis, asthma severity score 1, living in an apartment, father smokes, mother smokes and parental socioeconomic.

Unadjusted odds ratios (OR) with 95%CI.

^aEntered as a continuous variable, inversed OR presented in the table.

^bAsthma severity score 0 as reference.

Significant associations are shown in bold.

TABLE 4 Multiple logistic regression models analyzing risk factors for low HRQoL impact (DISABKIDS score <67) among adolescents with current asthma age 14-15 yr

	Model 1 OR (95%CI)	Model 2 OR (95%CI)
Female sex	3.42 (1.69-6.92)	4.66 (1.82-9.54)
Decreased ACT-scores ^a	1.43 (1.26-1.62)	1.38 (1.18-1.62)
Asthma severity 1 ^b	1.11 (0.44-2.81)	0.63 (0.21-1.97)
Asthma severity 2 ^b	2.33 (0.83-6.51)	1.63 (0.50-5.36)
Asthma severity ≥3 ^b	2.46 (0.78-7.71)	1.90 (0.52-6.93)
Personal smoking	—	2.38 (0.69-8.22)
Non-participation in sports on leisure time	—	2.04 (0.83-5.00)
Not taking full part in physical education	—	0.82 (0.27-2.54)
Worsening of asthma in school	—	2.26 (0.97-5.29)
Staying home from school due to asthma	—	0.56 (0.18-1.79)

Model 1 was adjusted for sex, asthma control, and asthma severity, and model 2 included additional adjustment for factors significantly associated in the bivariate analyses.

^aEntered as a continuous variable, inversed OR presented in the table.

^bAsthma severity score 0 as reference.

management knowledge.³³ However, also among children and adolescents with diabetes, another chronic disease, a worse HRQoL seems to be related to female sex and metabolic control.³⁴ The authors' proposed explanation was that boys may be less willing to incorporate a chronic illness as a part of their identity, and therefore have a higher tendency to neglect their disease. Another explanation may be that women in general are more prone to report respiratory symptoms than men.^{35,36} However, our results showed no significant sex differences regarding reported respiratory symptoms or asthma severity. Additionally, a higher proportion of boys reported earlier asthma onset than the girls in our study, which can be an additional explanation for the sex differences in asthma control and HRQoL. The boys have lived longer with an asthma diagnosis, and have therefore had longer time to accept and adapt to the disease.

Asthma severity is a common reported risk factor for a worse HRQoL among children and adolescents.^{6,8,13} but in our study asthma severity was only an independent risk factor for the worry domain of HRQoL. The same pattern could be identified regarding current eczema. In line with our result, population-based studies with adolescents indicate that both eczema,³⁷ and reported allergic diseases (ie, asthma/wheezing, eczema/rash, rhino-conjunctivitis) have a negative impact on HRQoL.¹¹ Since eczema is a visible disease it may have a strong impact on HRQoL, particularly among adolescent girls who often are sensitive about their appearance.³⁸ These results support the importance of identifying and treating not only asthma but also co-morbid conditions such as eczema.

TABLE 5 Multiple logistic regression models analyzing risk factors for low HRQoL worry (DISABKIDS score <70) among adolescents with current asthma age 14–15 yr

	Model 1	Model 2
	OR (95%CI)	OR (95%CI)
Female sex	3.37 (1.61–7.08)	3.33 (1.41–7.86)
Decreased ACT-scores ^a	1.33 (1.17–1.50)	1.35 (1.16–1.57)
Asthma severity 1 ^b	2.31 (0.75–7.11)	1.65 (0.43–6.27)
Asthma severity 2 ^b	6.15 (1.87–20.25)	4.74 (1.18–19.16)
Asthma severity ≥3 ^b	6.10 (1.70–21.83)	6.23 (1.46–16.50)
Current eczema	—	2.68 (1.00–7.24)
Not taking full part in physical education	—	1.10 (0.35–3.49)
Worsening of asthma in school	—	1.53 (0.65–3.63)
Staying home from school due to asthma	—	0.83 (0.28–2.45)

Model 1 was adjusted for sex, asthma control, and asthma severity, and model 2 included additional adjustment for factors significantly associated in the bivariate analyses.

^aEntered as a continuous variable, inverted OR presented in the table.

^bAsthma severity score 0 as reference.

Studies on the association between socioeconomic status and HRQoL have yielded inconsistent results among adolescents. One European study showed that HRQoL seems to be affected by the family wealth,³⁹ while another found no effect of family income among asthmatics.⁶ In our study we evaluated both parental socioeconomic status based on occupation and living in an apartment versus living in a house, as proxies for socioeconomic status, but none of them were associated with HRQoL. However, due to a relatively small sample size, we have to interpret these results cautiously.

The strength of this study is the population-based design which identifies adolescents with both mild and severe disease, as well as those not seeking or being called to regular health care visits. The prevalence of current asthma was 11%, which is in line with previous reports from the south of Sweden.¹ Other strengths of this study are the high participation rate, and the use of well validated questionnaires.

One limitation of the study is that asthma was defined based on self-reports and not confirmed by medical records, which can lead to information bias. However, the question of self-reported physician-diagnosed asthma has been validated and showed high specificity.⁴⁰ Other studies have shown that a higher body mass index (BMI) may be associated with a worse asthma control and HRQoL among adults,⁴¹ an association that may be present also among adolescents. The participants in our cohort have previously been clinically examined at age 11–12 year; including height and weight. However, we chose not to use the BMI from this examination in the current analyses, due to the physical development that occurs from 11 to 15 years of age. Another limitation is that we lack information about cough. Since frequent cough is an indicator for severe and uncontrolled asthma³⁰ and coughing may cause social embarrassment it may also be associated with a worse HRQoL. Another possible confounder for asthma control and HRQoL is adherence to asthma treatment, but

unfortunately neither cough nor adherence were included in our questionnaire.

5 | CONCLUSION AND CLINICAL IMPLICATIONS

In this population-based study of 14–15 yr adolescents with asthma, only a minority had well-controlled disease and uncontrolled asthma was more common among girls than boys. Girls also reported a worse HRQoL than boys. Female sex and poor asthma control were independent risk factors for both low HRQoL impact and worry, and low HRQoL worry was also independently associated to more severe asthma and having current eczema. Our results clearly demonstrate that ACT is a useful instrument and should be used more commonly in the clinic, both in primary and secondary care. Since adolescents spend much of their time at school, ACT can be a useful instrument also for the school nurses. The use of this instrument may support adolescents to take control of their disease and achieve an improved HRQoL. Finally, it is important to acknowledge that girls may be more at risk for having a worse asthma control and HRQoL than boys.

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