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# The Common Sense Model in early adolescents with asthma: Longitudinal relations between illness perceptions, asthma control and emotional problems mediated by coping

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ABSTRACT

*Objective:* The present study examined the longitudinal relations between illness perceptions and asthma control and emotional problems (i.e., anxiety, depression, stress), respectively, in adolescents with asthma. Furthermore, the mediating effects of asthma-specific coping strategies on these relations were examined, as specified in the Common Sense Model (CSM).
*Methods:* In 2011, 2012, and 2013, adolescents (aged 10–15) with asthma were visited at home ($N = 253$) and completed questionnaires about their illness perceptions, asthma-specific coping strategies, asthma control, symptoms of anxiety and depression, and perceived stress. Path analyses were used to examine the direct relations of illness perceptions with asthma control and emotional problems and the mediating effects of coping strategies cross-sectionally and longitudinally.
*Results:* Perceptions of less perceived control and attributing more complaints to asthma were associated with better asthma control. Perceptions of more concern, less coherence, and increased influence of asthma on emotional well-being were associated with more emotional problems. Longitudinally, perceptions of more treatment control and fewer concerns predicted less emotional problems over time. More worrying mediated the cross-sectional relation between perceiving more concern about asthma and less asthma control and the longitudinal relation between perceiving more concern about asthma and more emotional problems.
*Conclusion:* Illness perceptions were associated with asthma control and emotional problems; however, over time, illness perceptions only predicted changes in emotional problems. Most coping strategies did not mediate the relation between illness perceptions and outcomes. Interventions aimed to change illness perceptions in adolescents with asthma could decrease emotional problems.



## Introduction

Asthma is the most common chronic disease in childhood [1] and is characterized by chronic inflammation of the airways. A major problem in adolescent asthma is the lack of control over their asthma, which can result in exacerbated symptoms [2]. In addition to experiencing symptoms, adolescents with asthma experience increased anxiety [3,4] and depression [5–7] compared to their non-asthma peers. However, adolescents with asthma do not explicitly experience more stress than do their healthy peers [8], but stress has a major negative influence on asthma [9]. These emotional challenges affect adolescents' lives [10,11].

To maximize control over asthma and minimize emotional problems (i.e., anxiety, depression, stress), it is imperative to examine which factors relate to these problems. The Common Sense Model (CSM) [12] is a framework in which illness perceptions (i.e., subjective and emotional beliefs in response to the disease) are expected to affect illnesses and emotional problems. Therefore, the main aim of this study was to examine whether illness perceptions related to asthma control and emotional problems, respectively. Furthermore, the CSM states that coping strategies mediate the relation between illness perceptions and outcomes. Consequently, the second aim of this study was to clarify whether asthma-specific coping strategies mediated the relations between illness perceptions and outcomes.

Illness perceptions are personal perspectives that individuals create when they try to make sense of a threat to their health and obtain control over that threat. These perceptions are divided into six cognitive representations: cognitive representations about the chronicity of a disease (timeline), the influence of the disease on daily life (consequences),

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patients' perceptions of their abilities to control the illness (personal control), perceptions of the effectiveness of asthma treatment (treatment control), the amount and nature of complaints attributed by patients to the illness (identity), and the degree to which patients are able to make sense of the illness (coherence). Two emotional representations also exist: concern regarding the disease (concern) and the influence the illness has on emotional well-being (emotional representation).

In the CSM, relations are described between illness perceptions, on the one hand, and by illness and emotional problems on the other. Cross-sectionally, research has shown that, in adult patients with asthma, perceptions of high personal and treatment control, perceiving asthma as a chronic disease, and perceiving a low influence of asthma on emotional well-being related to better illness-related problems and higher quality of life [13]. In adolescents with asthma, no studies have yet examined the relations between illness perceptions and illness and emotional problems, respectively, over time. Results based on adult studies and other studies on other chronic diseases (e.g., coronary artery disease, survivors of esophageal cancer) [14,15] cannot be generalized easily to adolescents with asthma.

Adolescents are in a developmental phase with increasing emotional problems [16], and priorities (e.g., the importance of health) of adolescents might differ from those of adults. Furthermore, illness perceptions could have varying consequences for different diseases [17]. Nevertheless, we hypothesized that the following factors would predict increased asthma control and decreased emotional problems: (1) cognitions that reflect asthma as more chronic (timeline), (2) perceptions about asthma having little influence on daily life (consequences), (3) adolescents perceiving themselves as being able to control their asthma (personal control), (4) perceptions of asthma treatment as being effective (treatment control), and (5) perceived little influence of asthma on emotional well-being (emotional representation).

In explaining mechanisms that underlie the relations between illness perceptions and asthma control and emotional problems, respectively, Leventhal and colleagues [12] proposed that these relations could be mediated by coping strategies. Relations were shown in different patient populations between illness perceptions and coping strategies cross-sectionally [13] and longitudinally [18]. However, the relation between illness perceptions and coping in patients with asthma has not yet been studied [19]. We considered it important to formulate coping strategies specific to the challenges that adolescents face when dealing with asthma [20]. Therefore, we examined asthma-specific coping strategies. Relations have been found between coping strategies and health and emotional problems in adolescents with asthma cross-sectionally [20–22]. However, no longitudinal studies exist that have focused on this population. Of note, among populations with chronic diseases other than asthma, like esophageal cancer survivors and those with psoriasis, studies have found that coping affects emotional outcomes [15,23].

Only few cross-sectional studies have examined the actual mediating effects of coping strategies on the relation between illness perceptions and outcomes. These studies have been conducted in populations with chronic diseases other than asthma, and results on the mediating effects of coping have been mixed [24–27]. In adult women with rheumatoid arthritis [24] and adult patients with hepatocellular carcinoma (i.e., the most common form of liver cancer) [25], indirect relations were found between illness perceptions and illness and emotional outcomes via coping strategies. However, other studies did not find these indirect relations via coping [26,27]. Therefore, these results cannot be generalized to the population of the present study, and no specific hypotheses could be formulated about the mediating effects of asthma-specific coping strategies on the relation between illness perceptions and illness and emotional problems.

In sum, the aim of the present study was to examine whether the illness perceptions of adolescents with asthma predicted changes in their asthma control and emotional problems (i.e., anxiety, depression, stress). Subsequently, the mediating effects of asthma-specific coping strategies on these relations were studied.

## Method

### Procedure

This study was approved by the ethics committee of the Faculty of Social Sciences of Radboud University-Nijmegen. Participants were recruited through schools, and an announcement of the study was published in the magazine of the Lung Foundation, Netherlands. Detailed information on the recruitment procedure can be found elsewhere [28].

Families were included if the adolescent (1) received an asthma diagnosis by a physician, (2) used asthma medication or experienced asthma-related symptoms at least once in the last 12 months, and (3) had adequate Dutch language skills. Adolescents' parents also had to have adequate Dutch language skills. Of the 311 families that responded to the invitation letter, 261 (83.9%) families met the inclusion criteria at baseline. In total, 257 (98.5%) families participated at follow-up (T2) one year later, and 253 (96.9%) families participated two years later (T3). Participating families were visited at their homes three times, in March–September of 2011, 2012, and 2013. During the home visits, the researchers provide brief instructions and guarantee anonymity, and adolescents and their parents filled out the informed consent forms and completed the questionnaires. Additionally, adolescents performed a lung function test to assess asthma control. In Years 1 and 2, participating families received a 20 Euro voucher for their participation and a 35 Euro voucher in Year 3.

### Sample characteristics

At T1, the mean age of the adolescents was 11.9 (see Table 1). Males (59.4%) were overrepresented slightly. Most adolescents (98.1%) were born in the Netherlands. On average, adolescents suffered from asthma for 7.3 years, and most had partly controlled asthma according to the GINA guidelines [29] (57.7%).

### Measures

#### Illness perceptions

Illness perceptions were assessed using the Dutch translation [30] of the Brief-Illness Perception Questionnaire (B-IPQ) [31], which was shown as reliable in a population of adolescents with type I diabetes. Cognitive perceptions were measured with six items: timeline ('How long do you think your illness will continue?'), consequences ('How much does your illness affect your life?'), coherence ('How well do

**Table 1**
Demographic characteristics of adolescents with asthma and their mothers

| | | |
|---|---|---|
| Mean age[a] | | 11.9 (1.0) |
| Mean years asthma[a] | | 7.3 (3.9) |
| Gender[b] | Male | 160 (59.4%) |
| | Female | 108 (40.6%) |
| Country of birth[b] | Netherlands | 255 (98.1%) |
| | Other | 5 (1.9%) |
| Grade adolescent[b] | Primary | 123 (47.1%) |
| | Secondary | 138 (52.9%) |
| Asthma control[b,c] | Controlled | 47 (17.5%) |
| | Partly controlled | 153 (57.7%) |
| | Uncontrolled | 68 (25.4%) |
| Education mother[b] | Lower | 30 (11.3%) |
| | Intermediate | 105 (39.5%) |
| | Higher | 131 (49.2%) |

*Education mother: Lower = Elementary, lower vocational; Intermediate = Intermediate general, intermediate vocational; Higher = higher general, higher vocational, university.
[a] Values represent the mean and standard deviation.
[b] Values represent numbers and percentage.
[c] Asthma control is based on the Global Initiative for Asthma (GINA) guidelines [29].