

# Perspectives on managing asthma and facilitators in asthma self-management among Thai school-age children: a qualitative study

Asthma self-management in school-age children

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## Abstract

**Purpose** – This study explored self-management in the context of asthma experiences of school-age children and the factors that facilitate asthma self-management.

**Design/methodology/approach** – This is qualitative research used in-depth interviews. Purposive sampling was employed to select 15 school-age children with asthma attending the outpatient pulmonary department at university hospital in Thailand. Semistructured in-depth individual interviews were conducted, which were audiotaped and transcribed verbatim. Content analysis was used to analyze the data.

**Findings** – Two major themes emerged from this study: (1) perspectives on managing asthma and (2) facilitators in asthma self-management. Four subthemes emerged from the first major theme related to views on managing asthma: (1) emphasizing use of an inhaler for asthma, (2) self-monitoring for symptom, (3) difficulties with the daily regimens and (4) family support on asthma self-management. Two subthemes emerged from the second major theme related to facilitators in asthma self-management: (1) confidence in performing asthma care behaviors and (2) asthma communication.

**Originality/value** – This study described strategies that support asthma management of children in Thailand and provided insight into factors that influence asthma self-management. Findings will inform the development of future self-management interventions for school-age children with asthma.

**Keywords** Asthma, Self-management, School-age children, Thailand

**Paper type** Research paper

## 1. Introduction

An estimated 300 million people suffer from asthma around the world, a number predicted to surpass 400 million by 2025 [1]. In most nations, including Thailand, asthma continues to be a substantial health issue. Childhood asthma is a predominant chronic disease [2] with 14% of

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the world's children suffering from asthmatic symptoms [1]. Although children's asthma might not be curable, the focus in the treatment plan is to achieve good asthma control [3]. Unfortunately, the findings from a 2014 Thai survey showed that 53.3% of Thai elementary school students (aged 6–12 years) did not have their asthma under control [4]. This means that most school-age children fail to follow their treatment regimens and have difficulty controlling their asthma symptoms. Uncontrolled asthma is a leading cause of functional limitations, decreased physical activity, frequent absenteeism from school and psychological distress in Thai school-age children [5]. For optimal asthma control, self-management is an efficient and guideline-recommended approach. Enhanced quality of life, reduced healthcare utilization, reduced school absenteeism and nocturnal asthma are some of the results of effective self-management [6–9]. Mastering various tasks such as identifying symptoms of an acute attack, recognizing and avoiding triggers, monitoring peak flow and using asthma medications correctly are needed to ensure effective asthma self-management [2,10].

Self-management is “the process of engaging in specific behaviors enhancing a person's ability to manage a chronic illness or risk behaviors” [11]. Self-management tends to increase from childhood through adolescence, particularly school-age children who are at a developmental transition period and at the beginning of their ability to take care of their own health [2]. According to Piaget's cognitive development theory, school-age children (age 7–12 years old) have logical thoughts that allow them to plan, solve problems and make decisions and understand the reasons for adhering to medical regimens [12]. As a result, this age is vital for mastering self-management of any chronic conditions, including asthma [10,13].

Several previous studies about asthma management are mainly from the parent's/caregivers' perspective rather than from the perspective of the child's own experience. Although families need to play a role in managing the diseases of children, children spend an increasing extent of time away from direct parental care after they begin school. Therefore, understanding the experiences directly from the children themselves requires the need to comprehend essential self-management interventions for asthma. The interview method, as utilized in this study, is a good technique for gaining an understanding of children's thoughts. Consequently, this qualitative interview study was conducted in order to provide rich and in-depth information concerning the practices and relationships that impact adherence to self-management. School-age children are able to communicate efficiently and can use a variety of words to communicate their thoughts, ideas and feelings. During this stage, children as young as seven years have an advanced vocabulary and speaking skills and have already developed the ability to express their understanding in both the written and spoken language. On the other hand, older children continue to use more complex sentences and link sentences for the expression of greater detail. Thus, children from seven years onward can be interviewed using structured questionnaires or can also competently complete self-reports [12,14].

Most existing asthma self-management programs for school-age children have been developed in Western countries [7,8,15]. However, the differences between Asian and Western culture can affect the self-management of children in dealing with asthma [16]. Therefore, different Thai cultural child-rearing patterns in which half of the children are under parental control [17] might affect the self-management development of children with asthma. In addition, there is limited published data on the asthma self-management of Thai school-age children. The aim of this study was to add to the body of knowledge related to self-management in pediatric asthma in the context of Thai school-age children by investigating the factors that facilitate self-management and the experiences of school-age children themselves.

## **2. Methods**

### *2.1 Study design and participants*

This study employed a qualitative descriptive approach as the research design [18], using semistructured in-depth interviews with 15 school-age children with asthma who attended

the outpatient pulmonary department at a university hospital in Thailand. Purposive sampling was used to recruit participants, and the inclusion criteria included children: (1) aged between 7 and 12 years old, (2) who had been diagnosed with asthma with mild to severe persistent asthma for at least six months, (3) with no physical or psychological disabilities and (4) able to communicate in Thai.

## *2.2 Research instruments*

The research tools comprised a demographic questionnaire, a semistructured in-depth interview guide for children with asthma and field notes. A demographic questionnaire was used to collect data to ascertain the characteristics of participants, including age, gender, grade level, asthma severity level and duration of asthma. Field notes with written records of participants' behaviors were attached to supplement related content in the transcripts. The semistructured in-depth interview guide included nine open-ended questions such as "How do you feel about having this disease?", "What kinds of things do you do for good health?", "What kind of help do you need from your family?", and "What do you have to do to prevent asthma attacks?" The interview questions were tested and verified by three experts including family nurses and nursing instructors with self-management expertise. Recommendations from these experts were incorporated into the revised interview guide and tested prior to data collection. The pretesting was conducted with three school-age children with asthma similar to the study target population in order to test whether the interview guide includes the key concepts being investigated and was easily understood by the participants.

## *2.3 Data collection*

The study was conducted from October to December of 2018 after obtaining the institutional review board's approval. Pediatric patients and their parents were approached by the researcher while waiting for a pediatrician at their regular clinic visit, and those who met the inclusion criteria were recruited. Prior to conducting the interviews, the researcher explained the study purpose and procedure to potential participants and then obtained written informed consent from the parents as well as assent from the school-age children. In order to ensure that the interviews with the children were as productive as possible, the researcher established rapport with them, asked clear and unambiguous open-ended questions and used frequent probes. The interviews for the young school-age children were conducted with the family caregivers present, whereas the interviews for the older school-age children that were 10–12 years of age were conducted away from their family caregivers in a separate room if preferred. The interview lasted between 30 and 40 min and included consent to be audio-recorded. Data from individual interviews were continuously gathered until data saturation was reached or when no new themes emerged. Procedures in collecting and analyzing qualitative data were conducted simultaneously.

## *2.4 Data analysis*

All interviews were transcribed verbatim followed by content analysis using Creswell's approach [19] including open coding, summarizing the codes into categories and identifying themes. During the analysis, the researcher transcribed and read the dialogues several times in order to recognize meaningful sentences. Subsequently, meaning units were extracted according to the latent meanings behind them using a coding process and creating groups by comparing the codes in terms of similarities and differences. The development of overall themes emerged after a comparison of the categories and consideration of latent meanings. In this study, content analysis by ATLAS.ti 8.0 (computer-assisted qualitative data analysis software) was used for data analysis in order to organize coded data.

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The strategy of gaining trust in evaluating qualitative research was composed of credibility, transferability, confirmability and dependability [20]. Member checking was performed to achieve confirmability. The transcript summary was reviewed by three participating children to ensure that the description accurately reflected their perspectives. Peer debriefing was carried out by an external researcher in reviewing the transcripts and analysis in order to establish credibility. The credibility of the findings was also supported by triangulating across various data sources, including participant interviews, medical records and field notes. To ascertain transferability, the researcher reported in-depth descriptions of findings. An audit trail that included transcripts, a record of coding from ATLAS.ti software and notes that were taken after the interviews were used in establishing confirmability and dependability.

### *2.5 Ethical considerations*

This study received approval from The Ethics Review Sub-Committee for Research Involving Human Research Subjects of Thammasat University, Thailand (COA No. 092/2561), and the hospital's Research Ethics Committee prior to study implementation.

## **3. Results**

The majority of participants (53.33%) were boys with a mean age of 9.6 years (SD = 1.4 years). Nine of the 15 children were 9–12 years old. All of them were studying in primary school, with 66.7% of them studying in Grade 4–6. The duration of illness after the first diagnosis was 6.4 years on average, with most of them (73.3%) having had asthma for more than five years.

According to the medical records, nine (60.0%) of the participants were categorized as having well-controlled asthma, whereas six (40.0%) were in the group with uncontrolled asthma.

Two major themes emerged from this study: (1) perspectives on managing asthma and (2) facilitators in asthma self-management.

### *3.1 Perspectives on managing asthma*

Four subthemes emerged in this area: (1) emphasizing the use of an inhaler for asthma, (2) self-monitoring for symptoms, (3) difficulties with the daily regimens and (4) family support for asthma self-management (Table 1).

*3.1.1 Emphasizing use of an inhaler for asthma.* The school-age children in this study were told that they needed to follow the treatment plan, especially taking their medications in order to decrease their symptoms. The findings from the interviews showed that nearly all the participants had experience of administering inhalation controller asthma medicines to prevent the symptoms by themselves. Participants reported that their mothers or caregivers assisted in their daily practice to help them develop their own ability to take asthma medications starting at the age of 7. Participants perceived that using asthma inhalers correctly was an important component in being healthy and reducing asthma attacks.

*3.1.2 Self-monitoring for symptoms.* Symptom monitoring can significantly improve the management of asthma and the reduction of asthma morbidity. The children in this study knew that asthma is a problem with breathing. Several participants were also able to monitor the symptoms of asthma since family caregivers had educated and provided them with the information regarding the symptoms of worsening asthma (coughing, wheezing, weakness, chest tightness, shortness of breath) in order to start rescue medications when the symptoms occurred.

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Perspectives on managing asthma	Exemplar quotes	Frequency of response n (%)
Emphasizing use of an inhaler for asthma	<p>(1) “I have been taking medicine by myself in combination with purple medicine since I was in the first year of kindergarten. Mom said that I used the medicine correctly. Mom doesn’t have to warn me to take medicine. But if I go to sleep, I sometimes forget to take arias, so my mother would wake me up. I Never forget to take inhaled medicine in the morning because I have to inhale medicine before brushing my teeth in the morning every day until it becomes a habit” – ID 15</p> <p>(2) “I have to take medicine. It’s a medicine for treating asthma. It seems to be spray used by spraying in the mouth at bedtime . . . pressing once. Another medicine is used by opening the cap and twisting, taking deep and rapid breathing while inhaling the drug. Then I count from one to twenty. . .then I have to drink or gargle” – ID 9</p>	14 (93.3%)
Self-monitoring for symptom	<p>(1) not often. It had occurred just a few days; then the symptoms disappeared. In one month, I had asthmatic symptoms two or three times. Since I was young, I had asthma so often that I couldn’t remember how often the symptoms occurred. But it does not occur so often now” – ID 10</p> <p>(2) “before suffocating, there will be a headache. The second episode will feel tight, before I sneeze then suffocate. It’s probably because my study desk is not clean. . .I often have symptoms at school, but only have a little bit at home, particularly when I go up to the room upstairs because it is not clean. But, I like to play with my aunt in that room. Once, I accidentally touched the dust and sneezed. Then, I had asthma attacks twice in one week. . .there were symptoms at night and at school” – ID 5</p>	10 (66.7%)
Difficulties with the daily regimens	<p>(1) “It’s difficult, difficult to use an inhaler and take medicine every day. And I have to stay away from dust, cannot have pets, and need to avoid exposure to furry animals because I like cats but can’t play with cats. . .I think my control of asthma is at a moderate level because I sometimes forget to take medicine at bedtime. I Forget around twice a week” – ID 11</p> <p>(2) “it is difficult to control my asthma and have no symptoms. It is difficult to clean the house and use a nasal spray every day. I Have to wash my nose with a normal saline solution around ten times before going to bed. It takes around one or two minutes, then I can go to sleep”– ID 4</p>	6 (40.0%)

*(continued)*

**Table 1.**  
Exemplar characterizing the theme of perspectives on managing asthma

Perspectives on managing asthma	Exemplar quotes	Frequency of response n (%)
Family support (1) Teaching children to take medicine	(1) "I had taken medicine by myself from the age of six to seven years. My mother taught me, and the doctor also taught me about taking medication. I understood. . . I like the way my mother taught me. I Understood about taking medication" – ID 7 (2) "My mother taught me by holding my hand to use inhaler medication, and teaching how to hold the inhaler canister correctly" – ID 8	10 (66.7%)
(2) Monitoring and reminding children to take medications	(1) "now, I don't forget to take medicine because I use my inhalers every day. My grandma also likes to remind me to frequently take medicine" – ID 1 (2) "at bedtime, Mom asked me if I was still inhaling the medicine. And when I said I had forgotten, my mother would remind me that I should do it before going to bed. She would remind me to do it again if I hadn't done it correctly or forgotten" – ID 8	8 (53.3%)
(3) Maintaining a positive attitude toward asthma and treatment	(1) "My mother said it must be done in order to improve asthma so that I didn't have to go to the hospital again. So, I have to see the doctor every month. I Used to feel bored when going to see the doctor because there is a lot of work each day and it takes me about 3–4 hours to arrive at the hospital. . . My mother said that I had to come to the doctor to inject the immune therapy in order to treat my asthma and be able to resist it" – ID 3	7 (46.7%)

Table 1.

*3.1.3 Difficulties with daily regimens.* Children in this study are able to participate in various asthma management tasks, including avoiding triggers, identifying the symptoms of an acute attack, handling asthmatic episodes and using asthma medications correctly. All participants described performing these tasks to decrease their symptoms, but some of the children stated that managing their asthma was difficult for them to perform correctly and they had trouble remembering the treatment. Six participants, particularly in the uncontrolled asthma group, reported difficulties with daily regimens for asthma and had negative experiences upon taking on the role of asthma self-management. They reported specific difficulties in taking medications, avoiding asthma triggers, exercising regularly, monitoring symptoms and using nasal irrigation. Children who were having difficulties with the regimens often perceived difficulty in controlling asthma, thus failing to actively engage in the role of managing asthma.

*3.1.4 Family support on asthma self-management.* The participants showed that perspectives on managing asthma began with family support in sharing appropriate responsibility as the children became older. Three forms of family support for children with asthma were identified: (1) teaching children to take medicine, (2) monitoring and reminding children to take medications and (3) maintaining a positive attitude toward asthma and treatment.

*3.1.4.1 Teaching children to take medicine.* The children stated that family members were important role models in terms of how to manage asthma. They also said that the family was the main source of guidance for learning experiences related to medication-taking practices.

Several participants explained that their family caregivers, particularly mothers, took responsibility for handling medications, teaching them to take on this role as well as enabling skills in using asthma inhalers. At the age of 7, children generally started to develop the ability to take medication independently and engage in healthcare practices by themselves. Teaching children how to take prescription medications was one of the topics that mothers discussed with their children in daily life.

3.1.4.2 Monitoring and reminding children to take medications. In order to develop the responsibility of children in controlling their asthma, the children indicated that it was necessary to have their family monitor or check their skills in asthma management. Some of the participants showed that their perception of incorporating management into daily care was difficult for them to perform. Although older children were able to take their own asthma medicine, they frequently forgot to take their medications. Eight school-age children described their parents as being most likely to help, monitor or remind them to take the medicines. Specifically, parents also checked to see if the children understood how and when to take their medications properly.

3.1.4.3 Maintaining a positive attitude toward asthma and its treatment. The family is directly involved in encouraging their children to engage in self-management behaviors and to promote their capacity to control the disease. Nearly half of the participants stated that their parents also provided emotional support when the children were worried about asthma, disliked their medications, felt bored or overwhelmed with the responsibility of asthma care or felt anxious about going to the hospital. The parents in this study promoted positive attitudes by providing them with reasons for the treatment and setting goals to motivate them to recover from asthma according to the goals of the children in terms of playing sports and living a normal life (i.e. raising a pet, eating ice cream). In addition, the children often benefited from positive feedback from family members, giving them verbal praise and encouragement to reinforce their good behavior.

### *3.2 Facilitators in asthma self-management*

Two subthemes emerged from the second major theme related to facilitators in asthma self-management including (1) confidence in performing asthma care behaviors and (2) asthma communication (Table 2).

3.2.1 *Confidence in performing asthma care behaviors.* The children felt that implementing asthma management in routine care increased their confidence in controlling their asthma symptoms because they had played an active role in preventing exposure to allergens, assessing worsened symptoms and implementing health-promotion activities since they were young. Almost all the participants in the controlled asthma group felt that they were competent in managing their asthma and that it was not difficult to take responsibility for their asthma. When they perceived that they could successfully manage asthma, (i.e. taking asthma medications, avoiding triggers and engaging in regular physical activity), they substantially improved in their self-confidence.

3.2.2 *Asthma communication.* Most participants knew the name of their disease and symptoms. They perceived that communication enabled them to learn about their asthma. In this study, there were two forms of communication relating to asthma: (1) sharing asthma information with experienced family members and (2) communicating with healthcare providers.

3.2.2.1 *Sharing asthma information with experienced family members.* Some participants in the controlled asthma group reported frequent communication on asthma care with family members who had experience of asthma, particularly those who were healthcare providers (i.e. nurse, physician). This is considered an important source of asthma knowledge on issues such as taking medication, avoiding asthma triggers and relieving asthma symptoms. The

Asthma self-management facilitators	Exemplar quotes	Frequency of response n (%)
Confidence in performing asthma care behaviors	<p>(1) "I don't really have asthma attacks. I Think it's not so difficult to manage asthma. It's easy to take medicine, and inhalers are not difficult to use. And I can do it because I have used them since I was young, so I am familiar with the routine. I Do not want anyone to help, but grandmother had helped me when I was young. Now there is no need to help". . . "I think I can now take good care of asthma because I can start to take care of myself" – ID 10</p> <p>(2) "I think I have good control of asthma because I only have symptoms sometimes while other times I don't . . . I have a little breathlessness because I just played football. . . . I Had never played football before because I would become easily tired. Now, the symptoms occur less frequently and less severely. I can run longer, so playing football is not very tiring" – ID 2</p>	6 (40.0%)
Asthma communication		
(1) Sharing asthma information by experienced family members	<p>(1) "because my father and mother were nursing instructors, they frequently talked about symptoms of asthma with me and I would ask my parents when I had any problems. My brother has asthma as well, so we often talked about asthma" – ID 3</p> <p>(2) "My auntie, who is a doctor, taught me about medicine. My auntie frequently likes to talk to me about asthma" – ID 14</p>	4 (26.7%)
(2) Communicating with healthcare providers	<p>(1) "I never asked a question, because the doctor had already informed me about what asthma is and what to do to control asthma in addition to how to use medications. I remember what the doctor taught me". . . "Nurse taught me about inhaling techniques. She taught me a long time ago. Recently, she taught me to use the medicine that looks like an inhaler device and must be used at bedtime. She had taught me since the beginning of the year and I still remember" – ID 1</p> <p>(2) "The teaching methods that will help me understand must be done by practicing with demonstration and pictures of asthma symptoms" – ID 12</p>	4 (26.7%)

**Table 2.**  
Exemplar characterizing the theme of facilitators in asthma self-management

participants also reported that their family was more likely to have some asthma knowledge, particularly recognizing asthma symptoms, because someone else in the family (i.e. their parent or siblings) already had asthma, while families that did not have this experience were less likely to have heard about asthma. Therefore, previous knowledge of asthma was important for families in subsequently managing it.

3.2.2.2 Communicating with healthcare providers. Some of the participants mentioned that an important aspect of the learning experience with asthma was shaped by communication with healthcare providers. They also had an idea of what asthma was and what they could and could not do during an asthma attack. Four participants reported that they were able to manage their asthma and medications because they often had the opportunity to



communicate with healthcare providers during their routine follow-up visits. On the other hand, some of the participants commented that it was difficult to understand the asthma information from the healthcare providers because the doctors and nurses paid more attention to the asthma information aimed at their parents. Additionally, participants described the methods of communication by which they were able to increase their understanding of asthma and share ideas for effective ways of communication. They suggested that using simple language or age-appropriate communication, giving good demonstrations (e.g., comic books, pictures) and practicing with devices were helpful in promoting understanding and mastery of skills.

#### 4. Discussion

This study revealed that most participants were aware of asthma symptoms and care and could take on responsibilities for their asthma management, particularly related to taking regular inhalers and self-monitoring for symptoms. These two tasks are crucial to effective asthma control [2]. Healthcare providers and family caregivers tend to focus on asthma education on the use of asthma medications and symptom monitoring. It is not surprising that participants received information related to asthma from families or healthcare providers since the illness duration of this group is 6.4 years on average, and 73.3% of them had their asthma for more than five years.

The individual and family self-management theory identifies that family is instrumental in promoting self-management in those with chronic illnesses [11]. This study follows that theory because it shows that managing asthma requires family support. Between the ages of 7 and 12, the role of parents must be transitioned from controlling guardians to gentle supporters [13]. Findings from this study indicated that family support encouraged children's active engagement with self-management behaviors through teaching them about the use of inhalers, as well as supervising them to be responsible for their own medicine management. Parents need to share asthma management responsibility, provide children with opportunities to improve their abilities and show emotional support and motivation for children to take more responsibility. Cultural differences in child-rearing practices may cause different perspectives on disease management. For example, Asian school-age children are still dependent on parental supervision in terms of controlling their asthma, while Western children tend to be free of supervision and are independent and autonomous in controlling the disease [16]. Regarding child-rearing practices in Thai families, as indicated in a recent study, most parents tend to use an authoritative parenting style, using reasoning and having high expectations for their children and helping them to succeed, while the children are also raised under strict parental control [21]. Likewise, the findings from this study showed that the parents took responsibility for monitoring their children to regulate their behaviors in terms of being responsible for their continued asthma management.

These findings are consistent with international studies, indicating that school-age children aged  $\geq 8$  years can develop asthma self-management skills [10,13,16,22]. This ability to take responsibility for asthma management is likely to result from developmental changes. When children enter Piaget's concrete operational stage, they can read and use language to communicate. Their thinking becomes more logical and allows them to plan and engage in logical problem-solving [12]. These significant skills become a tool for developing necessary disease-management skills, including goal setting, self-monitoring, decision-making, planning and action and self-evaluation [10,11]. However, asthma management is a highly complex and challenging process; hence, some of the school-age children in this study had some difficulties with daily medical regimens.

As shown in these results from analyzing the perspectives of school-age children, two facilitators of asthma self-management are asthma communication and confidence in

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asthma care. The findings from this study point to the importance of asthma communication – that it enabled the children to learn about and understand the complexity of disease management. This is consistent with existing literature, which indicates that a lack of understanding and knowledge about using medications and regimens may cause difficulties for most school-age children [7,23]. In this study, some children reported that communication within the family, particularly with experienced family members, enabled them to obtain additional knowledge and experience related to asthma management [10]. Additionally, good communication with healthcare providers increases the opportunity for children to be fully involved in managing their asthma. This finding is consistent with a previous systematic review, which indicated that good communication with healthcare professionals leads to patient–clinician partnerships and improved continuity of care, as well as encouraging positive attitudes to overcome adherence barriers, which ultimately improves asthma outcomes [24].

The other facilitator of self-management is confidence in asthma care. As children reach school age, they attempt to master new skills, and therefore developing good performance habits might contribute to greater improvement in their self-confidence and as they develop self-esteem [12]. Confidence is an intrinsic motivation factor wherein children take responsibility for managing their own asthma and can also help change their negative attitudes into positive ones by further encouraging them to actively participate in managing their asthma [23].

The results of this study do differ from studies in Western countries where the emphasis is placed on school infrastructure to support asthma management in school-age children [7,25]. In contrast, this study did not report reliance on school support for asthma management. This study provides evidence that school-age children can develop the skills and abilities to control their asthma and engage in self-management when receiving support from the family.

## **5. Conclusion**

Thai school-age children with asthma described experiences with self-management that emphasize the need to teach family members how to develop and share asthma management responsibility. Study findings also support the importance of communication between patients, families and healthcare providers to promote asthma management.

## **6. Limitations**

This study has some limitations due to its qualitative methodology and small sample size. Although the findings of this study provide insights into self-management of asthma, the study cannot be generalized to a broader population. This study was based in Thailand with its own unique cultural and healthcare systems, thus limiting its ability to be applicable to other countries with different cultural and healthcare systems.

## **7. Recommendations**

The key findings from this study are useful for designing tailored asthma self-management programs for school-age children. Future interventions should focus on the facilitators for optimal asthma management, including asthma communication in the family, good communication between the child and healthcare professionals and the child's confidence in asthma care. Such programs would also need to focus on the family as a key part of developing children's self-management ability: using an inhaler regularly, avoiding triggers and symptom self-monitoring. Family-based programs would also be effective in achieving asthma outcomes, namely asthma control, pulmonary function and quality of life.

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