Jentashapir J Health Res. 2017 April; 8(2):e60163. doi: 10.5812/jjhr.60163.

Published online 2017 April 30. **Research Article**

Reliability and Validity of the Persian Version of Child Asthma Self-Efficacy Scale

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Received 2016 July 03; **Revised** 2017 January 24; **Accepted** 2017 February 07.

Abstract

Background: This study aimed at assessing psychometric properties of the Iranian version of child asthma self-efficacy scale.
Methods: The present study was a descriptive-survey research. The community sample included healthy and asthmatic children and adolescents, aged 8 to 18 years old from the city of Ahvaz. The sample consisted of 261 children, 61 patients referred to clinics of asthma and allergies and 200 healthy children that were selected by the random cluster sampling method. Child Asthma Self-Efficacy scale and child general self-efficacy questionnaire were used. Chronbach's alpha coefficient, Pearson correlation, two sample t test, and confirmatory factor statistical analyses were applied.
Results: Internal consistency for total scale score ($\alpha = 0.82$), attack prevention subscale score ($\alpha = 0.704$), and attack management subscale score ($\alpha = 0.70$) were acceptable for this scale. Validity was demonstrated using correlation of total score and two subscales with child general self-efficacy and its academic and social subscale, indicating that all correlations were acceptable at 0.05 level. Two sample t test was used between patient sample and healthy sample that showed a significant difference between 2 subject groups. As a result of confirmatory factor analysis, it seems that it is better to use total score of this questionnaire in the Iranian sample.
Conclusions: The results demonstrated allowable reliability and validity of the child asthma self-efficacy scale. The child asthma self-efficacy scale could be applicable in clinical trials, research, and clinical practice for more improvement and committed behavior regarding treatment regimes in children with asthma.

Keywords: Asthma, Self-Efficacy, Child, Adolescence, Psychometrics

1. Background

The bio psychosocial (BPS) model is a iteration of general system theory that was named by Angel (1977), in which physicians collect information at a biological level, psychological level, and social level to create a BPS description of each patient (1). On the other hand, biological factors, psychological factors (such as feedbacks, beliefs, and behaviors), and social factors (cast, occupation, and ethnicity) may effect the health of a person. Over the past 10 years, attempts have been made to identify behavioral health psychology and individual life styles that could effect a person's physical health, to determine prevention and treatment strategies, and identify risk factors that are associated with the disease, improving health care systems through the identification of good practice and by shaping public opinion (1). Asthma is one of the diseases that can be considered in health psychology. Asthma is an inflammatory disease of the airways. It is the most common chronic disease during childhood. Asthma is a chronic, progressive disease of childhood and is a major cause of disability in this age group (2). Nine million people (7% to 17% of children) in America have asthma diagnosed under the age of 18 years, and more than 4 million children (6%) experience acute asthma over a period of at least one year (3). The cause of asthma is not understood and there is no consensus about its etiology (4). It's symptom include wheezing, chest tightness, shortness of breath and coughing, particularly at night and early morning (5). Asthma attacks can be triggered by different stimuli such as allergens, strong fragrances, perfumes, weather (such as low temperature and high humidity), sports, air quality, colds, infections, flu, and intense emotions (6). Onset and frequency of asthma attacks due to a variety of drivers, is somewhat unpredictable. This can be particularly challenging and stressful for child patients (7). Li et al. (8) showed that asthma control is associated with pediatric quality of life, daytime sleep, and many aspect of social and physical limits of life.

Psychological factors may in many respects effect symptoms, management, and treatment of asthma in children (9). Among factors, as indicated by Rhee et al., (10) self-efficacy was an important predictor of adherence and low levels acted as a barrier to the treatment of adolescents with asthma. It could promote health by increasing barriers to mitigate the impact of the disease. Asthmatic children and adolescents have limited regimens to follow. As a result of their disease, they experience social isolation (11). Furthermore, despite the findings of non-coherence, some evidence, suggests that they have a low self-esteem, while they have to find compatibility with a variety of emotional responses (12). According to the cognitive-social theory of Bandura, the variable self-efficacy or self-confidence influences feelings of adequacy. Competence and ability to cope with life (13) are affected by asthma in children and adolescents.

This claim has been confirmed by studies, which shows that a high level of self-efficacy in children and adolescents are associated with greater use of asthma management strategies (14) and compliance of treatment (15). Self-efficacy can be an important objective for behavioral interventions.

Halimi et al. (16) reported that patients, who had trouble controlling their asthma compared to those with controlled asthma, had different control beliefs that may present optimal management of the disease. The group with trouble controlling their asthma were compared to external controls, and poor adherence to treatment and higher rates of hospital admissions were found.

Indicators of self-control were associated with higher self-efficacy for managing asthma (17), and higher level of self-efficacy perception in young people with asthma was associated with prevention, management of asthma, and treatment compliance (18).

Due to its structural importance in enhancing and improving quality of life and compliance with treatment, and the need for management of this disease in children and adolescents, it is essential to design a measure with adequate reliability and validity, that could assess certain aspects of the management and prevention of diseases and related health-related self-efficacy allergens in children and adolescents with asthma. This tool could be used by scholars and researchers in various fields of medicine and mental health to measure the efficacy and effectiveness of their interventions. There are several self-efficacy scales for children with asthma. One of them is an efficacy scale for children with asthma (19), including 37 items that only relies on three factors, namely medical treatment, environmental, problem solving aspects. The disadvantage of this scale is that self-management specific behaviors related to the prevention or control of symptoms (e.g., proper use of inhalation medicine) are not included in this tool. The self-efficacy asthma scale that was made by researchers (20) included 21 items and evaluated 5 dimensions, including acute attack management, asthma control, environment and emotions, communication with doctor, and regularity in use of medicine. This scale is long, specially items related to attack, and triggers of prevention are a few. Unfortunately, there was not any child asthma self-efficacy scale that has been translated and validated in Iran. Therefore, the aim of this study was validation of child asthma self-efficacy scale for 8- to 17-year-old children (21), in a sample of Iranian children in Ahvaz city. This scale has fewer questions, more direct items related to attack prevention, use of medicine, social behaviors related to disease, such as asking others for smoking, attack management, and symptoms control. The aim of this study was to determine whether the child asthma self-efficacy scale has favorable psychometric properties in Iranian children and adolescents.

2. Methods

The present study was a descriptive- survey research. The community sample included 8- to 18-year old healthy and asthmatic children and adolescents in the city of Ahwaz during year 2013. The sample consisted of 261 children (61 patients with asthma symptoms and 200 healthy children and adolescences). Symptoms of asthma in the patient sample were confirmed by: a) a physician and b) International Study of Asthma and Allergies in childhood questionnaire (ISAAC). Children with asthma were selected from Golestan hospital clinics for asthma and allergies, and a child allergic asthma specialist confirmed their symptoms. Next, these children filled the ISAAC, child asthma self-efficacy scale and general self-efficacy questionnaire for children and adolescents. Number of healthy children was 200, which were selected by the multi stage random sampling method (from four regions of the Ahwaz education districts, two regions were selected randomly). Among elementary, middle, and high schools in each region, one girl's school and one boy school was selected randomly. From each school, students were randomly selected. These children filled the General Self-Efficacy Questionnaire for Children and Adolescents.

The sampling method was convenience. According to the book of research methods in psychology by Ali Delavar in correlation studies, the minimum number of subjects was 30. Because in the current study, the correlation method was used for assessment validity, it seems that the number of subjects (260 children) was adequate.

2.1. Entry and Exit Criteria

Entry criteria for the patient sample were asthma symptoms and age of 8 to 17 years old. Exit criterion for this sample was the lack of physician or psychiatry disorder. Entry criteria for healthy sample were lack of any other disorder and age range of 8 to 17 years old. The current study was performed according to 1, 2, 3, 4, 5, 7, 10, 11, 17, and 20 ethical code and was approved in Khordad of 2013. Topic and goals of study were explained for children and their parents or managers of schools. The first step of study was coordination and obtaining permission of educational organization, schools and health care systems in asthma and allergy clinics of Golestan hospital.

The Child Asthma Self-Efficacy scale was designed by Bursch, Schwankovsky, Gilbert, and Zeiger (21) for children and adolescents aged 8 to 17 years old with asthma. The scale had 14 items in a 5-scale Likert from 1 (not at all sure) to 5 (completely sure). The scale had 2 subscales named attack prevention (items1 to 8) and attack management (items 9 to 12). Bursch et al. (21) reported psychometric properties for original child asthma self-efficacy scale. According to this report, the scale had high internal consistency so Cronbach's alpha coefficient for total score was 0.87, attack prevention subscale was 0.75 and attack management was 0.82 (21). Correlation coefficient between Child Asthma Self-Efficacy scale and general self-efficacy questionnaire was 0.28. The correlation between attack prevention and attack management with health state scale was 0.24 ($P \leq 0.01$) and 0.26 ($P \leq 0.01$), which was statistically significant. Correlation of child asthma self-efficacy scales with asthma symptom was -0.22 ($P \leq 0.05$), and attack prevention and attack management with asthma symptom was -0.19 and -0.20 ($P \leq 0.05$), respectively, all being significant. The correlation between attack prevention and attack management with family effect questionnaire was -0.12 and -0.23, respectively ($P \leq 0.05$). This result showed that the scale had good validity. This study examined the psychometric properties of the child asthma self-efficacy scale. After translation of asthma self-efficacy scale to Persian and assessment with 10 pediatric children and adolescents to examine fluency and formal validity and use of their suggestions, the final version was completed by 61 children and adolescents with asthma.

General self-Efficacy Questionnaire for Children and adolescents was designed and validated by Muris (22) to assess the self-efficacy of children and adolescents. The Questionnaire contains 23 items and 3 subscales (social, academic, and emotional factors). General self-efficacy score is the sum of 3 subscales (social, academic, and emotional items). Social self-efficacy includes the first 8 i tems and measures the ability to communicate with peers, assertiveness, and achievement of social norms. Academic self- efficacy subscale includes 8 items and measures ability to manage learning behavior, dominance on academic topic, and attainment to academic expectations. Emotional self-efficacy subscale includes the last 7 items and measures child ability to cope with negative emotions. Items are arranged in a 5-point Likert scale from 1 (not at all) to 5 (very well). Muris reported that the reliability for the total score is 0.80 and for 3 social, academic, and emotional scores was 0.78, 0.87, and 0.80, respectively. The colorations of the Questionnaire with negative attribute and coping style questionnaire were 0.29 and 0.49, respectively ($P \leq 0.05$) that indicates the high validity of the questionnaire. In an Iranian sample, reliability for total score of general self-efficacy was calculated with Cronbach's alpha of 0.73 and for the subscales (social, academic, and emotional), the scores were 0.66, 0.73, and 0.84. The validity of the questionnaire was calculated by correlation with children depression inventory that was -0.36 and significant at 0.01. Finally, it can be concluded that validity and reliability of the questionnaire was satisfactory (23).

The researchers used this questionnaire, and its social and academic subscales to evaluate the validity of the child asthma self-efficacy scale.

2.2. International Study of Asthma and Allergies in Childhood Questionnaire (ISAAC)

This questionnaire is used for prevalence of asthma and allergy, allergic rhinitis, and eczema. In this study, the subscale of asthma and allergy with 8 questions was used to measure asthma symptoms. This questionnaire was used to confirm symptoms of asthma in children.

3. Results

In the present study, 61 children and adolescents with pediatric asthma symptoms and 200 healthy children were selected for comparison. Children with asthma, 16 females and 45 males, were included in this study (Mean = 12.50 and Standard Deviation = 2.40). Healthy children, 70 females and 130 males, were also included (Mean = 12.99, Standard Deviation = 2.36). In this study, for assessment of reliability of child asthma, self-efficacy scale Cronbach's alpha was used. The validity of this scale was assessed by calculating the correlation coefficient between a) asthma self-efficacy and general self-efficacy questionnaire, b) item-subscale correlations of the child asthma self-efficacy, and c) comparison of asthmatic children and healthy children in general self-efficacy questionnaire.

Table 1 shows descriptive results of variables in healthy and patient groups. As indicated, mean and standard deviation in asthmatic children in total score of asthma self-efficacy scale and its subscales were 40 + 8.79, 23.88 + 5.19,

and 16.11 + 4.24, respectively, and in total score of general self-efficacy and its subscales these were 66.40 + 8.30, 23.88 + 5.19, and 24.62 + 3.79, respectively. The measure of mean and standard deviation of general self-efficacy for total score and 2 subscales were 89.9 + 11.05, 31.05 + 5.32, and 33.49 + 4.84, respectively. The Cronbach's alpha coefficient of the scale for total score was 0.82. Internal consistency of the subscales was also high, with coefficient alphas of 0.70 for attack prevention and 0.70 for attack management. Pearson correlation coefficients between items and subscale scores are presented in Table 2. The result showed that items had moderate to strong correlations with their hypothesized subscales, which were higher than those with other subscales. Therefore, correlation coefficient for items 1 to 8 with attack prevention subscale was changeable between 0.5 to 0.6 and correlation coefficient for items 9 to 14 with attack management subscale was changeable between 0.6 and 0.7. Table 3 indicates the correlation between subscales and total score of asthma self-efficacy with general self-efficacy score, social and educational subscale of general self-efficacy scale at 0.05 levels. According to this table, the correlation between total score of general self-efficacy and total score of asthma self-efficacy was 0.83, with attack prevention and attack management being 0.83 and 0.73. The correlation between social self-efficacy and total asthma self-efficacy, attack prevention and attack management was 0.94, 0.1, and 0.72, respectively. As indicated, the correlation between gradual self-efficacy and total score of asthma self-efficacy, attack prevention, and attack management was 0.61, 0.44, and 0.71, respectively. The correlation of total score of asthma self-efficacy with attack prevention and attack management was 0.94 and 0.92, respectively. The Correlation coefficient of the two subscales was 0.73, at 0.05 significance level. Table 4 illustrates the difference between healthy and patient groups with the general self-efficacy score. It is seen T-value (17.79) with P (0.000) is significant. Therefore, asthmatic children were different in terms of general self-efficacy in comparison with healthy children. One of the assumptions that confirm factor analysis is the Kaiser-Meyer-Olkin index. The KMO measure of sampling adequacy is an index used to examine the appropriateness of factor analysis. High values (between 0.5 and 1.0) indicate the appropriateness of factor analysis. Values below 0.5 imply that factor analysis may not be appropriate. Table 5 shows KMO results that indicate the suitability of data for structure detection. Bartlett's test of Sphericity is used to test the hypothesis that the correlation matrix is an identity matrix (all diagonal terms are one and all off-diagonal terms are zero). Bartlett's test of Sphericity results show the correlation matrix of the data was not zero (df = 91), and so performance factor analysis was justified. As indicated by Table 6, factor loading showed that confirmatory factor analysis determines 2 factors. However, these factors were not in accordance with factors in original child asthma self-efficacy. The results showed that the fit index of the original two-factors model were not satisfactory.

Table 1. Mean Scores and Standard Deviations of the Two Groups[a]

Variable	Patient	Healthy
Asthma self-efficacy		
Total score	61 (40 + 8.79)	
Attack prevention	61 (23.88 + 5.19)	
Attack management	61 (16.11 + 4.24)	
General self-efficacy		
Total	61 (66.40 + 8.30)	200 (89.9+11.05)
Social self-efficacy	61 (23.88 + 5.19)	200 (31.05+5.32)
Education self-efficacy	61 (24.62 + 3.79)	200 (33.49+4.84)

[a]Values are expressed as No. (mean + SD).

Table 2. Item-Subscale Correlations Of Asthma Self-Efficacy

Item	Attack Prevention Subscale	Attack Management
1	0.528	0.322
2	0.589	0.569
3	0.655	0.534
4	0.381	0.321
5	0.620	0.443
6	0.633	0.397
7	0.517	0.471
8	0.644	0.336
9	0.437	0.642
10	0.509	0.632
11	0.402	0.676
12	0.511	0.670
13	0.471	0.701
14	0.425	0.475

4. Discussion

Different studies support the idea that self-efficacy is integral in performing specific behaviors, especially those that are complex or difficult to include the management of chronic disease (24). In fact, as noted in chronic disease, self-efficacy shows itself in discussion self-management behaviors. Although qualitative and quantitative research

Table 3. Correlation Terms of General Self-Efficacy and Subscale Variables

Variables	General Self-Efficacy	Social Self-Efficacy	Gradual Self-Efficacy	Attack Prevention	Attack Management
Asthma self-efficacy	0.83[a]	0.94[a]	0.61[a]	0.94[a]	0.92[a]
Attack prevention	0.83[a]	0.1[b]	0.44[a]	-	0.73[a]
Attack management	0.73[a]	0.72[a]	0.71[a]	-	-

[a] significant at 0.05 level.
[b] significant at 0.01 level.

Table 4. T-Test Comparison of the Two Groups

Varible	No.	Patient	Mean of Pationt	Healthy	Mean of Healthy	T-Value	P Value
General self-efficacy	261	61	66.40	200	89.90	17.79	0.000

Table 5. Kaiser-Meyer-Olkin Measure of Sampling Adequacy[a]

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.686
Bartlett's Test of Sphericity	
Approx. Chi-Square	246.879
df	91
Sig.	0.000

[a] KMO and Bartlett's Test for suitability of data and sample size.

Table 6. Rotated Component Matrix of Factor Loading[a,b]

Rotated Component Matrix	Component	
	1	2
Asthma self-efficacy item 1	0.328	
Asthma self-efficacy item 2	0.716	
Asthma self-efficacy item 3	0.466	0.393
Asthma self-efficacy item 4	0.331	
Asthma self-efficacy item 5	0.314	0.497
Asthma self-efficacy item 6		0.890
Asthma self-efficacy item 7		0.457
Asthma self-efficacy item 8		0.412
Asthma self-efficacy item 9	0.464	
Asthma self-efficacy item 10	0.452	0.346
Asthma self-efficacy item 11	0.409	0.339
Asthma self-efficacy item 12	0.705	
Asthma self-efficacy item 13	0.441	0.382
Asthma self-efficacy item 14		0.336

[a] Extraction Method: Maximum Likelihood Analysis.
[b] Rotation Method: Varimax with Kaiser Normalization.

has shown, increasing self-efficacy has a strong association with improvement in health statues (25-27). Therefore, assessment and measurement of children's self-efficacy with chronic illness would be considerably important. To the best of our knowledge, there are no questionnaires that have been translated and validated for Children and adolescents with asthma in Iran.

The self-efficacy scale is related to Children and adolescences, and includes two subscales, including attack prevention and attack management. The aim of this study was to assess psychometric properties of the Iranian version of child asthma self-efficacy scale. The results of this research support validity and reliability of the self-efficacy scale related to asthma.

The reliability results of this scale were both in general and subscales using the ideal Cronbach's alpha coefficient and according to the psychometric criteria (28) and aligned to the research result of Bursch, Schwankovsky, Gilbert and Zeiger (21).

The outcomes of the correlations between items and their hypothesized subscales were higher than the other subscales and were significant; those between items and other subscales being weak indicated good scaling success for child self-reports.

The limits of activity were in conflict in school programs and affairs (29), so that this disease caused 14 million days of absence from schools, annually in the USA (30). Also, since these children are usually treated as outpatients, they are able to interact with their peers and others at their school and society (31), and all of these issues affect the social and educational self-efficacy of these children. Hence, for justifiability measurement of the self-efficacy questionnaire related to asthma, correlation coefficient between total score and its subscale using Pearson

correlation with total score of general self-efficacy, social and educational subscale of this scale, and the subscale of the questionnaire altogether were used, which reported ideal and expected results.

According to the significant difference between the 2 groups of healthy and asthmatic children, in the general self-efficacy score, it can be concluded that the self-efficacy questionnaire related to asthma is also ideal and efficient for measurement of self-efficacy related to disease management behaviors.

Finally, from the results of confirmatory factor analysis, 2 factors were extracted, the items of which differed with the two factors of the main questionnaire. According to these results, it seems that it is better to use total score of this questionnaire in an Iranian sample.

4.1. Conclusion

The results of this research could be used in measurement of child self-efficacy and for providing strategies for increasing ability and commitment of patients to treatment regimes, and for self-management behaviors of the disease. Some of the limitations are related to this research had a small sample size, lacked division of disease strength to mild, moderate and severe groups, and lacked self-efficacy measurement of children from the parent's point of view. It is recommended for future studies to be accomplish a greater number of patients in other cities and collaborate with medical specialists the grouping of disease strength. Also, a comparison between self-efficacy report of children and parents could be considered.

Acknowledgments

The authors sincerely thank all the children and adolescents, who contributed to this study. The assistance of the staff of asthma and allergy clinic in Golestan hospital of Ahvaz is also appreciated.

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