

Association of Asthma Illness Representations and Reported Controller Medication Adherence Among School-Aged Children and Their Parents

Jennifer Sonney, PhD, APRN, PPCNP-BC, Kathleen C. Insel, PhD, RN, Chris Segrin, PhD, Lynn B. Gerald, PhD, MSPH, & Ida M. Ki Moore, DNS, RN, FAAN

ABSTRACT

This study examined the relationship between asthma illness representations and reported controller medication adherence of school-aged children (6–11 years) with persistent asthma and their parents. Thirty-four parent–child dyads independently reported on asthma controller medication adherence and asthma illness representations. Hierarchical regression analyses were used to test parent and child illness representation domain variables as predictors of reported medication adherence. Parent beliefs about medication necessity versus concerns was a significant predictor of parent-reported adherence ($\beta = .55, p < .01$), and child treatment control was also a significant predictor of parent-reported adherence ($\beta = -.50, p < .01$). Child beliefs about

medication necessity versus concerns was a significant predictor of child-reported adherence ($\beta = .50, p < .01$), and no parent variables reached significance. Although there are similarities between parent and child asthma illness representations, findings indicate that school-aged children develop illness representations somewhat independently from their parents and, therefore, are critical participants in both asthma care and research. *J Pediatr Health Care.* (2017) ■, ■-■.

KEY WORDS

Adherence asthma, controller medication, illness representation, shared management

Jennifer Sonney, Assistant Professor, Department of Family and Child Nursing, School of Nursing, University of Washington, Seattle, WA.

Kathleen C. Insel, Professor, Biobehavioral Health Science Division, College of Nursing, University of Arizona, Tucson, AZ.

Chris Segrin, Professor and Department Chair, Department of Communication, University of Arizona, Tucson, AZ.

Lynn B. Gerald, Professor/Canyon Ranch Endowed Chair, Mel and Enid Zuckerman College of Public Health and Associate Director for Clinical and Health Outcomes Sciences, Arizona Respiratory Center, University of Arizona, Tucson, AZ.

Ida M. Ki Moore, Anne Furrow Professor and Director, Biobehavioral Health Science Division, College of Nursing, University of Arizona, Tucson, AZ.

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Correspondence: Jennifer Sonney, PhD, APRN, PPCNP-BC, Department of Family and Child Nursing, School of Nursing, University of Washington, 1959 NE Pacific St., Box 357262, Seattle, WA; e-mail: jsonney@uw.edu.

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INTRODUCTION

Asthma is one of the most common chronic diseases of childhood, affecting an estimated seven million children (0–17 years) in the United States (Bloom, Jones, & Freeman, 2013). Children ages 5 to 11 years are disproportionately represented, with an estimated 11% currently diagnosed with asthma (Bloom et al., 2013). Standard asthma medication management for children with persistent asthma includes daily controller medications to reduce and prevent airway inflammation (National Asthma Education Prevention Program (NAEPP), 2007). Despite strong evidence supporting the safety and efficacy of controller medications in the prevention of asthma morbidity, estimates place adherence to these medications below 50% (Herndon, Mattke, Cuellar, Hong, & Shenkman, 2012; Morton, Everard, & Elphick, 2014). Children who are nonadherent to controller medications experience lower quality of life and increased disease morbidity including asthma symptoms, exacerbations, sleep disruption, and school absences (NAEPP, 2007; Walders, Kopel, Koinis-Mitchell, & McQuaid, 2005). Responsibility for pediatric asthma management, particularly medication adherence, is best conceptualized as parent–child shared management, reflecting the shared responsibility among parents/caregivers and the child (Kieckhefer & Trahms, 2000). Predictors of parent-reported asthma medication adherence include observable symptoms, perceived symptom severity, and medication efficacy beliefs (Ringlever, Otten, van Schayck, & Engels, 2012; Yoos et al., 2007), but less is known about the effect of child beliefs about medications and asthma on asthma medication adherence and whether parent and child beliefs are similar.

Leventhal's Common Sense Model of Self-Regulation (Leventhal, Brissette, & Leventhal, 2003) may be a useful framework for understanding child asthma medication adherence (Sonney & Insel, 2016). Within the Common Sense Model of Self-Regulation, the illness representation construct provides the framework for self-management practices. Illness representations are composed of five interrelated domains: *identity*, or symptoms an individual associates with illness; *time-line*, or individual expectations related to the duration of the illness; *consequences*, or perceived severity of the illness; beliefs about *causes* of illness; and *controllability*, referring to the perceived efficacy of available treatments. Illness representations develop through an iterative process whereby individuals use common sense to appraise episodes or events that arise related to their illness.

Illness representation domains have been reported to be predictive of asthma controller medication adherence in both adults with asthma (Clifford, Barber, & Horne, 2008; Federman et al., 2013; Halm, Mora, & Leventhal,

2006; Sofianou et al., 2013) and parents of children with asthma (Klok, Brand, Bomhof-Roordink, Duiverman, & Kaptein, 2011; Peterson-Sweeney, McMullen, Yoos, & Kitzman, 2003; Yoos et al., 2007). To our knowledge, however, there are no studies describing school-aged child asthma illness representations (Sonney, Gerald, & Insel, 2016). Among adolescents with asthma and their parents, dissimilar illness representations have been reported (Heyduck, Bengel, Farin-Glattacker, & Glattacker, 2015). Incongruence of parent and child illness representations is also evident in studies of children with Type 1 diabetes, another common chronic condition of childhood (Law, 2002; Olsen, Berg, & Wiebe, 2008). Thus, understanding child asthma illness representations and their respective roles in parent–child shared management of asthma is an important gap in our current knowledge.

The theoretical framework for this study was the Common Sense Model of Parent–Child Shared Regulation, a reformulation of Leventhal's Common Sense Model of Self-Regulation (Leventhal et al., 2003; Sonney & Insel, 2016). The Common Sense Model of Parent–Child Shared Regulation conceptualizes parent and child illness representations as separate constructs, which allows for individual differences. Parent and child illness representations together form a shared overall illness representation that reflects parent–child shared asthma management.

The purpose of this study was to (a) describe asthma illness representations of school-aged children with persistent asthma and their parents, (b) examine the interdependence between parent and child asthma illness representations, and (c) examine the relationship between controller medication adherence and asthma illness representations of both school-aged children and their parents.

METHODS

Sample

Thirty-four 6- to 11-year-old children with persistent asthma and one of their parents participated in this cross-sectional study. The 6- to 11-year age range was selected (a) to include children with sufficient literacy levels to participate and (b) to represent the age range of children with the highest prevalence of asthma. The sample was recruited between February

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and July 2015 from the Arizona Respiratory Center research database of children with asthma who have expressed interest in participating in asthma research. Criteria for inclusion were English-speaking children ages 6 to 11 years at the time of data collection who were prescribed a daily asthma controller medication; the parent/caregiver needed to be able to speak and read English and reside with the child. Exclusion criteria for children included parent report of developmental delay or traumatic brain injury, attention deficit hyperactivity disorder, obstructive sleep apnea, or a recent (within 30 days)/active asthma exacerbation (defined as requiring oral corticosteroids). Children were also excluded if they had participated in an asthma medication adherence intervention study in the past 30 days.

Procedures

Parents and school-aged children with persistent asthma were recruited from the (blinded for review) Respiratory Center research database. Potential participants were contacted by research personnel using a script to describe the study and review eligibility criteria. Those interested in participating were referred to the principal investigator, who followed up with the families by phone to discuss the study, verify inclusion and exclusion criteria, and schedule a data collection session. Data collection took place during a one-time session at the University of Arizona College of Nursing. After obtaining informed consent (parents) and minor assent (children), parents were given paper-and-pencil study instruments to complete independently in a waiting room. In an adjacent conference room, study personnel read all instruments and questionnaires to the child participants and assisted with completion. Sessions lasted approximately 1.5 to 2.0 hours. After completing all study materials, each parent-child dyad was given one \$50 Visa gift card. The University of Arizona Institutional Review Board and Human Subjects Committee approved all procedures.

Measures

Parents and children each completed questionnaires with measures described below. The parents also completed a questionnaire on demographic information and child asthma history.

Childhood Asthma Control Test

Childhood Asthma Control Test (C-ACT; [Liu et al., 2010](#)) is a validated seven-item parent and child report tool for classifying asthma control in children ages 4 to 11 years. There are four child-reported items and three caregiver-reported items. Scores range from 0 to 27, with higher scores indicating better asthma control. Cut-points have been validated and align with National Heart, Lung, and Blood Institute (NHLBI) asthma guidelines

([Liu et al., 2010](#)). Scores of 20 or greater indicate well-controlled, 13 to 19 indicate not well controlled, and 12 or lower indicate very poorly controlled asthma.

Brief Illness Perception Questionnaire

The Brief Illness Perception Questionnaire (BIPQ) is a nine-item self-report questionnaire that assesses cognitive and emotional illness representations ([Broadbent, Petrie, Main, & Weinman, 2006](#)). BIPQ Items 1 through 5 were used in this study, those representing *symptom/identity*, *timeline*, *consequences*, *personal control*, and *treatment control*. Items are rated on a 10-point response scale, with each item reflecting one illness representation domain. Items are individually scored, with higher scores indicating a more negative effect of the illness representation domain on the individual's life. Several modifications were made to the BIPQ. For clarity, *asthma* was substituted for *your illness*. The literacy level for the original BIPQ scale was fourth grade; therefore, simplified language substitutions were also made to the BIPQ to lower the literacy level for child subjects. Modifications include substituting *how long your asthma will last* instead of *how long your asthma will continue*, *medicine* versus *treatment*, *have symptoms* versus *experience symptoms*, and *how much does asthma affect your feelings* versus *your emotions*. The modified BIPQ had a second grade literacy level. For parents, the modified BIPQ was used with only language modifications for proxy versus self-reporting (e.g., *your child* substituted for *you*). The BIPQ has been validated for use in adults ([Broadbent et al., 2006](#)). To our knowledge, this is the first time the BIPQ has been used in children.

Beliefs About Medicines Questionnaire

The Beliefs About Medicines Questionnaire (BMQ)–Specific is a 10-item self-report questionnaire that assesses individual perceived medication necessity and medication concerns ([Horne, Weinman, & Hankins, 1999](#)). Using a 5-point response scale (1 = *strongly disagree*, 5 = *strongly agree*), five items assess perceived medication necessity and five items assessing medication concerns. Scores for Items 1 through 5 are summed to reflect perceived medication necessity, with higher scores indicating a higher perceived necessity. Scores for Items 6 through 10 are summed to reflect concern about medications, with higher scores indicating higher concerns. The Necessity–Concern differential is calculated by subtracting the concern score from the necessity score; a negative score indicates that concerns outweigh necessity beliefs, whereas a positive score indicates that necessity is higher than concern ([Horne et al., 1999](#)).

The BMQ-Specific has been validated in adults ([Horne et al., 1999](#)), as well as in parents and children down to age 7 years ([Yilmaz, Eroglu, Ozalp, & Yuksel, 2012](#)). Despite prior use of the BMQ in children

down to age 7 years, the literacy level of the original scale was at the sixth grade level. Therefore, similar modifications were made to the BMQ to lower the literacy level to ensure child understanding and participation. Substitutions included *my life would be hard* instead of *my life would be impossible*; *worry about staying on my medicines for a long time* instead of *worry about the long-term effects of my medicines*; *worry about always needing my medicines* instead of *worry about becoming dependent on my medicines*. The modified BMQ had a literacy level of second grade. The BMQ-Specific (Parent) is based on the BMQ-Specific (Child), but replaces language to reflect proxy versus self-reporting.

Medication Adherence Reporting Scale for Asthma

The Medication Adherence Report Scale for Asthma (MARS-A) is a 10-item self-report questionnaire for assessing intentional reduction or avoidance of asthma controller medications (Cohen et al., 2009). The MARS-A is not an objective measure of medication adherence. Rather, the MARS-A reflects individual beliefs and behaviors related to controller medications, such as *I only use [my controller medication] when I need it* and *I take it less than instructed*. The MARS-A uses a 1-to-5-point response scale, with 1 indicating *always* to 5 indicating *never*. Scores are averaged, with high adherence defined as a MARS-A score of 4.5 or higher. The MARS-A is trademarked and modifications are not permitted. The literacy level, however, was at second grade. The MARS-A is validated for use in adults (Cohen et al., 2009), but to our knowledge it had not been validated for parent proxy or child self-reporting at the time of this study.

Data Analysis

Data analysis used the Statistical Package for the Social Sciences (SPSS) software version 23 (IBM Corp., 2015). All variables used in parametric testing were examined for assumptions. Variables were transformed if their absolute value of distribution skewness was greater than 1. Variables with positive skew were transformed using square root transformation. Variables with negative skew were reflected, then transformed using square root, and then back-reflected. Transformed variables with an absolute value of skewness still greater than 1 were then transformed using log10 transformation. The resulting variables met assumptions of parametric testing. A p value of less than .05 was used as the criterion for statistical significance.

Descriptive statistics (mean and standard deviation) were used to describe the parent/caregiver and child demographic information, asthma status (C-ACT), asthma illness representations (BIPQ and BMQ), and reported medication adherence (MARS-A). Internal consistency was assessed using Cronbach's α for the

C-ACT, BMQ, and MARS-A parent and child scales. Intraclass correlations (ICCs) were used to examine correlations between parent/caregiver and child asthma illness representation scores.

Hierarchical regression analyses were used to assess the relationship between controller medication adherence and asthma illness representations. When parent-reported medication adherence (MARS-A) was used as the dependent variable, the parent illness representation variable was entered on the first step, and the corresponding child illness representation variable was entered on the second step. Conversely, when the child-reported MARS-A was used as the dependent variable, the child illness representation variable was entered on the first step, and the corresponding parent illness representation variable was entered on the second step. This analysis is consistent with the Actor–Partner Interdependence Model used in dyadic analysis, whereby the actor effect is estimated while controlling for the partner effect and then the partner effect is estimated while controlling for the actor effect (Kenny, Kashy, & Cook, 2006).

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

RESULTS

Participants

The demographic characteristics of the sample are summarized in Table 1. Mothers made up 94% of the parent sample, and child participants were 64% male. All parent/caregiver participants were parents. Using a visual analog scale of 0 through 100, parents reported bearing most of the responsibility for the child's asthma care (mean [M] = 85, standard deviation [SD] = 3.44). Child participants ranged in age from 6 to 11 years (M = 8.7, SD = 1.67). Given the average age of child participants, as expected the average grade in school was third. Mean parent-reported child age at diagnosis was 31 months (SD = 23.2). All child participants in this study had insurance coverage for routine and urgent/emergent health care and for prescription medications.

Asthma status

Parent and child participants jointly reported on the child's asthma control using the C-ACT. The Cronbach's α for the total C-ACT is reported in Table 2. The total C-ACT scores (M = 22.4, SD = 3.1) indicate that 79% of the children had well-controlled asthma (C-ACT score ≥ 20) and that 21% had not well-controlled asthma (C-ACT score = 13–19). There were no children in this sample with very poorly

TABLE 1. Demographic characteristics of the sample

Parent demographic characteristics	n (%)	Child demographic characteristics	n (%)
Caregiver		Sex	
Mother	32 (94)	Female	12 (35)
Father	2 (6)	Male	22 (65)
Ethnic origin		Ethnic origin	
Hispanic or Latino	16 (47)	Hispanic or Latino	20 (59)
Not Hispanic or Latino	16 (47)	Not Hispanic or Latino	13 (38)
Prefer not to say	2 (6)	Prefer not to say	1 (3)
Race		Race	
American Indian or Alaska Native	2 (6)	American Indian or Alaska Native	2 (6)
Black or African American	2 (6)	Black or African American	2 (6)
Caucasian or White	21 (62)	Caucasian or White	21 (62)
Mixed race	4 (12)	Mixed race	3 (9)
Prefer not to say	4 (12)	Prefer not to say	5 (15)
Parent education		Asthma provider	
Some high school	3 (9)	Primary care provider	12 (35)
High school graduate or equivalent	1 (3)	Asthma specialist	13 (38)
Some college, no degree	8 (24)	Both	7 (21)
Vocational training	3 (9)	Other	1 (3)
Associate's degree	4 (12)		
Bachelor's degree	10 (29)		
Graduate or professional degree	5 (15)		

Note. N = 34 parent-child dyads.

controlled asthma (C-ACT score < 13). Although there was not a significant association between C-ACT total score and parent-reported oral corticosteroid prescriptions in the past year ($r(34) = -0.16, p = .39$), there was a negative association with C-ACT and number of parent-reported asthma exacerbations ($r(34) = -0.64, p < .01$).

Asthma illness representations

Both parent and child participants reported on asthma illness representations using the BIPQ and BMQ instruments. The Cronbach's α for the BMQ questionnaire and subscales are reported in Table 2. A Cronbach's α was not calculated for BIPQ items, because items were not expected to correlate because they measure different illness representation domains (Broadbent et al., 2006).

Paired t tests were used to compare the means for parent and child BIPQ and BMQ items (see Table 3).

There was a significant difference in the *consequences* (BIPQ 1) domain. Parents ($M = 4.8, SD = 2.44$) rated the child's asthma as significantly more disruptive to the child's life than did the children ($M = 2.7, SD = 2.44, t(33) = 3.16, p < .01$). Similarly, parent reports on *timeline* or duration of asthma (BIPQ 2) also shows a significant difference with parents believing asthma will last longer ($M = 6.4, SD = 2.98$) than children believe ($M = 5.0, SD = 3.95, t(33) = 2.18, p < .05$). There were no significant differences, however, between parent and child reports of perceived *personal control* (BIPQ 3), *treatment control* or efficacy (BIPQ 4), or *symptoms* (BIPQ 5; see Table 3). Parent and child responses to the BMQ subscales (perceived medication necessity, medication concerns) and necessity-concern differential were similar. The overall necessity-concern differential for parents ($M = 6.5, SD = 4.99$) and children ($M = 6.6, SD = 5.58$) indicates

TABLE 2. Cronbach's α for C-ACT, BMQ, and MARS-A instruments

Instrument	Component	Cronbach's α
Child Asthma Control Test (C-ACT)	All items	0.681
Beliefs About Medicines Questionnaire (BMQ)	BMQ Parent: All items	0.831
	BMQ Parent: Necessity subscale	0.825
	BMQ Parent: Concern subscale	0.802
	BMQ Child: All items	0.776
	BMQ Child: Necessity subscale	0.732
Medication Adherence Report Scale for Asthma (MARS-A)	BMQ Child – Concern subscale	0.728
	MARS-A Parent	0.738
	MARS-A Child	0.684

TABLE 3. Asthma illness representation variables

Item	Parent		Child		Paired <i>t</i> test (<i>p</i>)
	Mean/median (SD)	Range	Mean/median (SD)	Range	
Consequences (BIPQ 1)	4.8/5 (2.44)	1–10	2.7/2 (2.80)	0–10	3.16 (<.01)
Timeline (BIPQ 2)	6.4/7 (2.98)	0–10	5.0/5 (3.95)	0–10	2.18 (.04)
Personal control (BIPQ 3)	2.6/2 (1.76)	0–7	3.9/3.5 (3.51)	0–10	–1.83 (.08)
Treatment efficacy (BIPQ 4)	1.4/1 (1.69)	0–7	1.5/0 (2.67)	0–10	–.29 (.77)
Symptoms (BIPQ 5)	4.1/4 (2.39)	1–9	3.6/4 (3.11)	0–10	.65 (.52)
BMQ Necessity	20.1/20.5 (4.12)	7–25	20.4/21 (4.39)	7–25	–.35 (.73)
BMQ Concern	13.6/13.5 (4.88)	5–25	13.9/13 (5.57)	5–25	–.22 (.83)
BMQ Differential	6.5/7 (4.99)	–6 to 15	6.6/6 (5.58)	–3 to 16	–.07 (.94)

Note. BIPQ, Brief Illness Perception Questionnaire; BMQ, Beliefs about Medicines Questionnaire; BMQ Necessity, medication necessity subscale; BMQ Concern, medication concern subscale; BMQ Differential, difference between necessity and concern domains; SD, standard deviation.

N = 34 parent–child dyads.

that perceived medication necessity outweighs medication concerns.

Medication adherence

Both parent and child participants self-reported on the child's asthma controller medication adherence using the MARS-A. The Cronbach's α for parent and child MARS-A are presented in Table 2. Parent-reported controller medication adherence ($M = 4.3$, $SD = 0.6$) was significantly higher than child-reported adherence ($M = 3.5$, $SD = 0.7$, $t(33) = 6.39$, $p < .001$).

ICCs were calculated using two-way random single measures (Shrout & Fleiss, 1979). Moderate agreement was evident between the parent and child *timeline* domains ($ICC(2,1) = 0.414$), suggesting that parents and children are more consistent in agreement on timeline or duration of asthma. There was also a weak agreement between the parent and child *symptoms* domains ($ICC(2,1) = 0.129$). The remaining *personal control*, *treatment efficacy*, and *consequences* domains showed no significant agreement between parents and children (Table 4).

Hierarchical regression analyses were calculated first with parent-reported medication adherence as the dependent variable (Table 5). Parent beliefs about medication necessity versus concerns was a significant

predictor of parent-reported treatment adherence ($\beta = .55$, $p < .01$), with an overall model fit of R^2 equal to 0.30. A positive BMQ differential occurs when medication necessity scores outweigh medication concern scores. The addition of child treatment control was also predictive of parent-reported medication adherence ($\beta = -.50$, $p < .01$) and a change in R^2 equal to 0.30, indicating that children's perceived treatment efficacy is predictive of parental MARS-A above and beyond what is predicted by parental BMQ. When child-reported medication adherence was the dependent variable (Table 6), child beliefs about medication necessity versus concerns was the only significant predictor ($\beta = .50$, $p < .01$), with an overall model fit of R^2 equal to 0.25, and none of the parent variables reached significance.

DISCUSSION

To our knowledge, this is the first study to describe asthma illness representations of children and their parents, examine their interdependence, and describe the relationship between asthma medication adherence and illness representations of parents and school-aged children. Parent asthma illness representations indicate that asthma *severity*, *duration*, and *symptom* domains were the most problematic. Parents in this study believed that their child's asthma medications were efficacious, that medication necessity outweighed concerns, and that they had good control over their child's asthma. For children, asthma *duration* was the most problematic illness representation domain, followed by *personal control* and *symptoms*, such that children believed they had little control over their asthma duration and symptoms. Children had very little concern over their asthma severity and medication efficacy. Like their parents, children believed that medication necessity outweighed concerns.

With one exception, there were weak or no significant correlations between respective parent and child illness representation domains. These findings indicate

TABLE 4. Intraclass correlation coefficient (ICC) illness representation variables

Variable	ICC (2,1)	95% CI
Consequences (BIPQ 1)	–.044	[–.372, .294]
Timeline (BIPQ 2)	.414	[.093, .657]
Personal control (BIPQ 3)	–.082	[–.405, .259]
Treatment efficacy (BIPQ 4)	–.201	[–.502, .142]
Symptoms (BIPQ 5)	.129	[–.214, .444]
BMQ differential	.080	[–.261, .403]

Note. BIPQ, Brief Illness Perception Questionnaire; BMQ, Beliefs about Medicines Questionnaire; BMQ differential, difference between necessity and concern domains; CI, confidence interval.

TABLE 5. Regression matrix: Parent medication adherence (MARS-A) as dependent variable

Independent variable	Depend: Parent MARS-A					ΔR^2
	Steps	B	SE B	β	R^2	
Consequences (BIPQ 1)						
Step 1	BIPQ P1	−0.01	0.04	−.02	.00	
Step 2	BIPQ P1	−0.01	0.04	−.03		.02
	BIPQ C1	−0.12	0.15	−.14		
Timeline (BIPQ 2)						
Step 1	BIPQ P2	0.04	0.04	.18	.03	
Step 2	BIPQ P2	0.02	0.04	.08		.04
	BIPQ C2	0.03	0.03	.23		
Personal Control (BIPQ 3)						
Step 1	BIPQ P3	−0.03	0.06	−.08	.01	
Step 2	BIPQ P3	−0.03	0.06	−.10		.04
	BIPQ C3	−0.04	0.03	−.21		
Treatment Efficacy (BIPQ 4)						
Step 1	BIPQ P4	−0.11	0.21	−.09	.01	
Step 2	BIPQ P4	−0.24	0.19	−.20		.30
	BIPQ C4	−0.90	0.29	−.50*		
Symptoms (BIPQ 5)						
Step 1	BIPQ P5	−0.05	0.04	−.21	.05	
Step 2	BIPQ P5	−0.05	0.04	−.21		.00
	BIPQ C5	0.00	0.03	.01		
BMQ Diff						
Step 1	BMQ Diff P	0.07	0.02	.55*	.30	
Step 2	BMQ Diff P	0.06	0.02	.53*		.02
	BMQ Diff C	0.02	0.02	.16		

Note. β , standardized beta; B, beta; BIPQ, Brief Illness Perception Questionnaire; BMQ Diff P/C, Beliefs About Medicines Questionnaire differential for parent/child; MARS-A, Medication Adherence Reporting Scale for Asthma; P1/C1, parent/child consequences domain; P2/C2, parent/child timeline domain; P3/C3, parent/child personal control domain; P4/C4, parent/child treatment efficacy domain; P5/C5, parent/child symptoms domain; SE B, standard error of beta.

* $p < .01$.

that parent and child asthma illness representations were not interdependent, as one might expect, but rather independent. The only known study that has previously described correlation between parent and child illness representation variables reported significant correlations for both parent and child BMQ necessity ($r = 0.74$, $p < .001$) and BMQ concerns ($r = 0.53$, $p = .009$; Yilmaz et al., 2012). The sample in Yilmaz et al. (2012), however, comprised 24 children and their parents presenting to the emergency department for an asthma exacerbation, and child respondents were 7 years of age or older. The present study showed a much weaker relationship, although the children in the present study had relatively well-controlled asthma and no exacerbations for at least 30 days.

Possible explanations for the independence of parent and child asthma illness representations found

Parent and child asthma illness representations were not interdependent, as one might expect, but rather independent.

in this study may relate to how one experiences childhood asthma and the cognitive capacity of the child. The inherent challenge in understanding parent–child asthma illness representations is that children subjectively experience their disease, whereas the parental perspective is more objective or based on observations (Sonney, Gerald, & Insel, 2016). By extension, these varied experiences with asthma may account for the differences in asthma illness representations. Another possibility relates to the cognitive capacity of the child. School-aged children may lack the capacity for appreciating the more abstract components of asthma, such as consequences of disease.

Predictors of reported medication adherence varied among parents and children. Parent medication necessity–concern differential and child beliefs about treatment efficacy were predictive of parent-reported medication adherence. The medication–concern differential has frequently been cited as predictive of controller medication adherence in adult asthma literature (Horne & Weinman, 2002; Menckeborg et al., 2008; Poniaman, Wisnivesky, Leventhal, Musumeci-Szabo, & Halm, 2009; Sofianou et al., 2013). No other parental illness representation variables were predictive of parent-reported medication adherence. This contrasts

TABLE 6. Regression matrix: Child medication adherence (MARS-A) as dependent variable

Independent variable	Depend: Child MARS-A					ΔR^2
	Steps	B	SE B	β	R^2	
Consequences (BIPQ 1)						
Step 1	BIPQ C1	0.15	0.19	.14	.02	
Step 2	BIPQ C1	0.14	0.18	.13		.06
	BIPQ P1	−0.08	0.05	−.25		
Timeline (BIPQ 2)						
Step 1	BIPQ C2	0.00	0.03	−.02	.00	
Step 2	BIPQ C2	−0.01	0.04	−.03		.00
	BIPQ P2	0.01	0.05	.03		
Personal control (BIPQ 3)						
Step 1	BIPQ C3	−0.07	0.04	−.31	.10	
Step 2	BIPQ C3	−0.06	0.04	−.31		.00
	BIPQ P3	0.02	0.07	.04		
Treatment efficacy (BIPQ 4)						
Step 1	BIPQ C4	−0.31	0.39	−.14	.05	
Step 2	BIPQ C4	−0.27	0.40	−.12		.00
	BIPQ P4	0.11	0.27	.07		
Symptoms (BIPQ 5)						
Step 1	BIPQ C5	0.00	0.04	−.03	.00	
Step 2	BIPQ C5	−0.02	0.04	−.07		.06
	BIPQ P5	−0.08	0.05	−.25		
BMQ diff						
Step 1	BMQ Diff C	0.07	0.02	.50*	.25	
Step 2	BMQ Diff C	0.07	0.21	.50*		.00
	BMQ Diff P	0.00	0.02	.00		

Note. MARS-A, Medication Adherence Reporting Scale for Asthma; BIPQ, Brief Illness Perception Questionnaire; P1/C1, parent/child consequences domain; P2/C2, parent/child timeline domain; P3/C3, parent/child personal control domain; P4/C4, parent/child treatment efficacy domain; P5/C5, parent/child symptoms domain; BMQ Diff P/C, Beliefs About Medicines Questionnaire Differential for Parent/Child; B, beta; SE B, standard error of beta; β , standardized beta.

* $p < .01$.

with the adult asthma literature, where self-reported *timeline*, *identity*, and *consequences* domains have all been described as predictors of adherence (Horne & Weinman, 2002; Sofianou et al., 2013). These findings suggest that there may be important differences between predictors of adult self-management and parent–child shared management of asthma. To our knowledge, the only published study that described parental asthma illness representations reported that illness representation domains had direct effects on medication adherence, but the respective effects of each illness representation domain were not described (Yoos et al., 2007).

Although there are some similarities between parent and child asthma illness representations, parents do not appear to influence children's estimation of controller medication adherence. The only predictor of child-reported medication adherence was child medication necessity–concern differential. This finding suggests that BMQ differential is an important predictor of asthma controller medication adherence regardless of age or respondent type (self or proxy).

There are several important limitations to this study that may limit the generalizability of findings. First, the convenience sample recruited from a respiratory

center may not be representative of all school-aged children with persistent asthma and their parents/caregivers. The sample was recruited from the Tuscon area, and most the children had well-controlled asthma. Self-report instruments were used to assess asthma illness representations, medication adherence, and asthma control, which risks potential reporting bias. The sample size limited the power of the available statistical analyses, although it was sufficient for regression analyses with two predictor variables. It is possible, however, that a Type I error led to some of the reported significant correlations. When available, citations from existing literature were used to corroborate findings; however, the pool of relevant literature is extremely limited.

Findings from this study indicate that there is little interdependence between parent and child asthma illness representations, nor do parent or child illness representations predict the other's estimation of asthma controller medication adherence. Although the parental representations of asthma severity and duration may be more aligned with the professional model, failure to account for the child perspective is a critical omission. School-aged children spend increasing amounts of time away from their parents (e.g., school, friends) and therefore assume increasing responsibility

for their asthma management. Given that asthma illness representations are potentially modifiable (Klok et al., 2011; Ponienman et al., 2009), improved understanding of parent and child asthma illness representations may inform future medication adherence interventions. It is possible that interventions may need to target different illness representation domains for parents and children.

There are no other known studies describing child asthma illness representations with which to compare these findings; therefore, results of this study highlight an opportunity for further investigation of the role of parent and child asthma illness representations on controller medication adherence. Importantly, findings from this study indicate that school-aged children develop illness representations somewhat independently from their parents and, therefore, are critical participants in asthma care and research.

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