

The Adaptive Effect of Illness-Specific Panic-Fear on Asthma Outcomes in Mexican and Puerto Rican Children

Journal of Pediatric Psychology, Volume 44, Number 1, February 2019

($\beta = 0.30$; $P = .02$) and Puerto Rican ($\beta = 0.19$; $P = .05$) children. Panic-fear was not related to medication adherence. **C** Illness-specific panic-fear had beneficial effects on asthma outcomes in both groups of Latino children. The heightened vigilance associated with illness-specific panic-fear may lead children to be more aware of their asthma symptoms and lead to better strategies for asthma management. (*J Pediatr* 2019; ■:1-9).

The largest ethnic disparity in asthma prevalence and control exists between 2 Latino subgroups: Puerto Rican children and Mexican children. Puerto Rican children exhibit the highest rates of asthma prevalence and morbidity, whereas Mexican children have the lowest rates.^{1,2} Poor adherence to inhaled corticosteroid therapy is common,^{3,4} especially in Puerto Rican and Dominican children.⁵⁻⁷ Fewer than 50% of prescribed doses are taken,^{8,9} and inhaled corticosteroid adherence rates as low as 28% were found in a sample primarily consisting of Puerto Rican children with electronic monitoring devices.¹⁰ A sample of primarily Mexican children with asthma had high controller medication adherence rates (87%), although these data were based solely on self-report.¹¹ Identifying predictors of positive asthma management behaviors (eg, attention to asthma symptoms, inhaled corticosteroid adherence, avoidance of asthma triggers) may play a key role in reducing these ethnic disparities in asthma outcomes.

Illness-specific panic-fear is the level of anxiety experienced specifically during asthma exacerbations. This construct is different from general anxiety or anxiety disorders, as illness-specific panic-fear may be adaptive for asthma. At 6 months after discharge, adult inpatients with asthma and high illness-specific panic-fear were rehospitalized for asthma 50% less frequently than patients. Supported by the National Center for Complementary and Integrative Health (Grant 1R01 AT005216, to K.A.) and the National Institutes of Health (Clinical and Translational Science Award 1UL1 TR001073). The authors declare no conflicts of interest.

ACT	Asthma Control Test
CASCL	Childhood Asthma Symptom Checklist
FEV ₁	Forced expiratory volume in 1 second
SEM	Structural equation model

Theoretical models for the perception of asthma symptoms highlight the importance of recognizing a physical sensation as threatening and then mobilizing attentional resources toward this threat.¹⁷ Social and contextual factors also play roles in models of asthma disparities that examine asthma symptom interpretation and treatment decisions for asthma.¹⁸ One key input affecting the interpretation of asthma symptoms is the emotional component, such as anxiety, which can heighten the perceived threat level (Figure). Anxiety elicited specifically within the context of asthma attacks may lead to appropriate preventative asthma management behaviors, including trigger avoidance, medication adherence, and compliance with asthma action plans. We hypothesized that illness-specific panic-fear would prospectively have an adaptive effect on longitudinal asthma outcomes (ie, better asthma control assessed by pulmonary function and symptom report, less acute healthcare utilization, and better inhaled corticosteroid adherence) in both Puerto Rican and Mexican children over a 1-year period.

Methods

The overarching aim of the larger study was to understand the existing pediatric asthma disparities between Puerto Ricans and Mexicans using a longitudinal, observational design.¹⁹ The focus is on the illness-specific panic-fear measure. This multisite study recruited participants from asthma/allergy clinics from 2 inner-city hospitals in the Bronx, New York (n = 110) and 2 school-based health clinics in Phoenix, Arizona and Phoenix Children's Hospital

Child panic-fear predicted less acute asthma-related healthcare utilization in both Puerto Rican and Mexican children. The Puerto Rican model accounted for a greater amount of explained variance compared with the Mexican model on acute healthcare utilization ($P < .0001$). Child illness-specific panic-fear did not predict inhaled corticosteroid adherence in Mexicans or Puerto Ricans. The other emotional CASCL subscale of irritability during asthma attacks predicted the opposite direction from panic-fear: worse asthma control and lower FEV₁ in Mexican children.

Child panic-fear reported by caregivers also predicted higher FEV₁ (Table III) in both groups of children. The model for Mexican children explained more variance compared with the model for Puerto Rican children ($P < .0001$). Caregiver report of panic-fear did not predict asthma control, acute healthcare utilization for asthma, or controller medication adherence. Caregiver-reported child irritability predicted lower FEV₁ in Mexican children, less acute healthcare utilization for asthma in Puerto Rican children, and better inhaled corticosteroid adherence in both groups.

Discussion

Child illness-specific panic-fear prospectively predicted better pulmonary function and asthma control, and less acute healthcare utilization for asthma across a 1-year follow-up period. Mexican children reported higher levels of illness-specific panic-fear and better asthma control compared with Puerto Rican children. Given the adaptive nature of illness-specific panic-fear, these findings highlight a potential mechanism to reduce disparities in asthma outcomes that merits further exploration. Child self-report of panic-fear was a stronger predictor across several positive asthma outcomes than caregiver report of the child's panic-fear, which predicted 1 measure, FEV₁. Children are likely more aware of their internal state of how much anxiety they experience during asthma attacks, and thus asking the child directly may be the best assessment of the panic-fear construct. Support was not found for the hypothesized association between panic-fear and inhaled corticosteroid medication adherence. This suggests that other potential pathways besides medication adherence might explain the adaptive nature of panic-fear, such as avoidance of asthma triggers, perception of asthma symptoms, and timely management of asthma exacerbations.

The heightened vigilance associated with illness-specific panic-fear may lead children to be more aware of their asthma symptoms and lead to better strategies for asthma management. In contrast, low illness-specific panic-fear

Table III. Caregiver-reported child illness-specific panic-fear as a longitudinal predictor of FEV₁, asthma control, acute healthcare utilization, and controller medication adherence

Variables	FEV ₁ % predicted				Asthma control				Acute healthcare utilization				Controller medication adherence			
	Mexican		Puerto Rican		Mexican		Puerto Rican		Mexican		Puerto Rican		Mexican		Puerto Rican	
	67%		64%		38%		12%		38%		38%		43%		46%	
Model R ²	β (SE)	P value	β (SE)	P value	β (SE)	P value	β (SE)	P value	β (SE)	P value	β (SE)	P value	β (SE)	P value	β (SE)	P value
Child sex	-0.06 (0.08)	.02	-0.003 (0.14)	.11	-0.03 (0.09)	.79	-0.23 (0.13)	.09	-0.07 (0.14)	.60	-0.03 (0.24)	.90	-0.47 (0.13)	<.0001	0.35 (0.25)	.16
Marital status	-0.06 (0.08)	.02	-0.004 (0.15)	.02	-0.14 (0.10)	.14	-0.07 (0.14)	.62	0.39 (0.14)	.006	0.08 (0.23)	.72	-0.05 (0.15)	.73	0.12 (0.24)	.61
Poverty	0.05 (0.08)	.03	0.18 (0.15)	.06	0.04 (0.10)	.66	0.33 (0.14)	.02	0.19 (0.14)	.20	-0.07 (0.19)	.72	0.21 (0.14)	.13	-0.38 (0.27)	.16
Caregiver education	-0.01 (0.08)	.03	-0.20 (0.13)	.05	-0.13 (0.09)	.18	0.24 (0.13)	.06	-0.12 (0.14)	.41	0.11 (0.19)	.57	-0.05 (0.13)	.72	-0.13 (0.21)	.54
Child age	-0.33 (0.08)	.01	-0.25 (0.15)	.22	-0.03 (0.11)	.81	0.18 (0.17)	.31	-0.57 (0.17)	.001	-1.21 (0.33)	<.0001	-0.10 (0.16)	.53	-0.28 (0.31)	.37
Caregiver age	-0.13 (0.08)	.06	-0.08 (0.14)	.09	0.008 (0.10)	.94	0.18 (0.14)	.17	-0.21 (0.14)	.13	0.39 (0.20)	.05	-	-	-	-

illness-specific panic-fear in other pediatric chronic conditions to assess whether these findings are replicated.

In Latinos, there are culturally sanctioned ways of expressing distress and anxiety, which can be part of the context of asthma attacks.^{51,52} An *ataque de nervios* is a cultural idiom of distress characterized by intense emotional reactions in connection to stressful events.⁵³ Such *ataques* can provide Latino patients with a normalized venue to express anxiety and panic and in some cases might help children and adults cope with the source of trauma or stress, such as an asthma attack.^{51,54,55} A recent cultural adaptation of a behavioral treatment for anxiety in Latinos emphasized encouraging patients to discuss intense emotional reactions to asthma.⁵⁶ In the present study, the beneficial effects of illness-specific panic-fear in Mexican and Puerto Rican children might represent an adaptive expression of anxiety that is a culturally normative source for channeling panic and stress associated with asthma attacks.

The irritability subscale of the CASCL had mixed effects on asthma outcomes, and no a priori hypotheses were formulated for this subscale. Greater child-reported irritability during asthma attacks predicted lower FEV₁ and worse asthma control in Mexican children. Given that irri-



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