Types of Parental Psychosocial Stress Associated with Asthma Symptoms in Urban Children with Asthma

Erin M. Rodríguez[1], Craig Pollack[2], Corinne Keet[2], Roger D. Peng[2], Susan Balcer-Whaley[2], & Elizabeth C. Matsui[1]

[1]University of Texas at Austin, Austin, TX, [2]John Hopkins University, Baltimore, MD

Background

- Low-income urban youth are at elevated risk for poorly controlled asthma
- Neighborhood characteristics such as neighborhood safety are associated with asthma morbidity in these youth
- Parental stress and depressive symptoms are also linked to asthma morbidity in this population
- However, existing research has not considered the role of parental stress in the association between neighborhood safety and asthma outcomes or examined these processes across different types of parental stress.

Objectives

- To determine the association between parents' perceptions of neighborhood safety and asthma outcomes
- To examine associations between types of parental psychosocial stress (parental depression and urban stress) and asthma outcomes.
- To examine whether parental stress mediated associations between neighborhood safety and asthma outcomes.
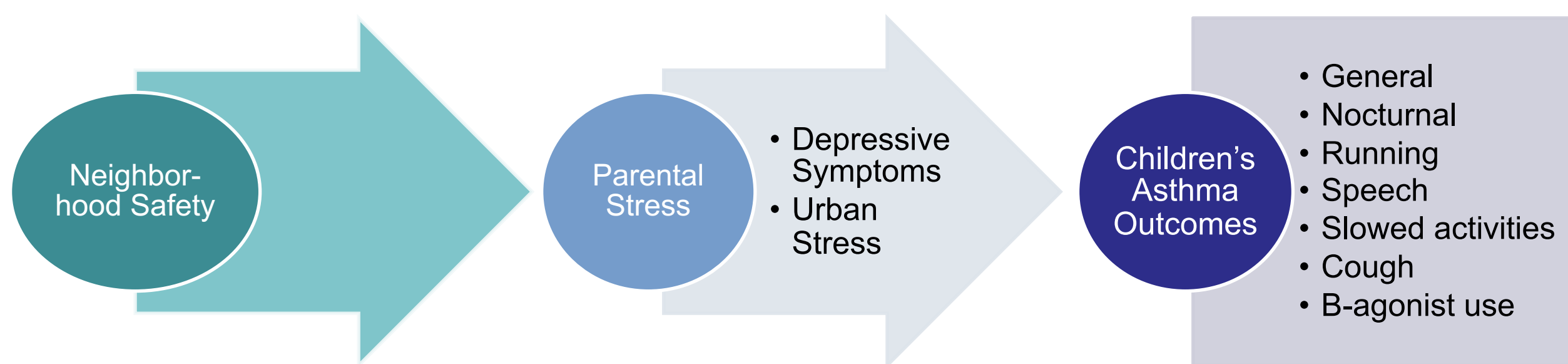
Methods

Study Population & Design: 140 parents/caregivers of low-income children ages 5-17 years old with persistent asthma participated in the **Mobility Asthma Project (MAP),** a prospective cohort study of the effects of the Baltimore Housing Mobility Program on children's asthma morbidity. The purpose of **MAP** is to determine the effect of moving from a high-poverty to a low-poverty neighborhood on asthma-related outcomes, including exacerbations, symptoms, and medication use.

- Participants enrolled at a baseline home visit and had repeated home visits every 6 months with phone calls every 3 months for assessment of asthma outcomes, home environmental exposures, neighborhood characteristics, and parental stress.
- The current analyses use baseline data from the study to understand the associations of neighborhood safety and stress with asthma morbidity.

Measures:

- Depression: Parents completed the **Patient Health Questionnaire (PHQ-8)[1]**, an 8-item validated measure of depressive symptoms (e.g., feeling down, insomnia, trouble concentrating) in the general population. Scores are out of a total of 24.
- Urban Stress: Parents completed a modified 5 item version of the **Urban Stress Scale[2]** to capture stress associated with living in an urban neighborhood. We selected five items (of 22) that assess stress about raising a child, the neighborhood environment, physical health, and housing. Scores are out of a total of 25.
- Neighborhood Safety: Parents reported their perception of their neighborhood's safety during the day on a 5-point Likert scale.
- Asthma Symptoms & Medication Use: Parents reported their child's asthma symptoms and medication use as the number of days the symptom or medication use was present in the past 2 weeks (general symptoms, nocturnal symptoms, symptoms while running, symptoms limiting the ability to speak, slowed activity, cough symptoms not related to a cold, and short term beta-agonist use).

Statistical Analyses: Analyses were performed in R. We used quasibinomial regression models to examine associations among neighborhood safety, types of stress, and asthma outcomes to account for overdispersion and control for child sex and age. Odds ratios (ORs) reported indicate the odds of experiencing an asthma outcome (e.g., general symptoms) given a 1 point increase in the predictor variable (i.e., neighborhood safety or parental stress). Results in Tables 4 and 5 report ORs using 1) each predictor in its own model (first and second rows), and 2) using both predictors in the model (third row).

Results

Table 1. Child Demographic Characteristics (N=140)

	n (%) or M (SD)
Age	9.0 (3.3)
Male	74 (53%)
Cockroach or mouse sensitized*	90 (64%)
Race	
Black	137 (98%)
Multiracial	3 (2%)
Ethnicity	
Hispanic/Latino	8 (6%)
Household Income	
< $25,000	64 (46%)
$25,000-$49,000	37 (26.5%)
> $50,000	2 (1%)
Don't know/refused to answer	37 (26.5%)

*Defined as a positive skin prick test or positive serum IgE test

Table 4. Adjusted models predicting asthma outcomes from neighborhood safety, depressive symptoms, and both (N=139).

Asthma Outcome	Predictor	
	Neighborhood Safety	Depressive Symptoms
	OR [95% CI]	OR [95% CI]
Max symptoms	**1.45 [1.10-1.94]**	
		1.05 [1.00-1.11]
	1.42 [1.08-1.90]	1.05 [1.00-1.10]
General symptoms	**1.43 [1.08-1.91]**	
		1.05 [1.00-1.10]
	1.40 [1.05-1.87]	1.04 [0.99-1.10]
Nocturnal symptoms	**1.45 [1.05-2.02]**	
		1.08 [1.02-1.14]
	1.39 [1.00-1.93]	**1.07 [1.01-1.13]**
Running symptoms	**1.58 [1.16-2.18]**	
		1.06 [1.00-1.12]
	1.53 [1.12-2.11]	1.05 [1.00-1.11]
Speech symptoms	0.92 [0.51-1.60]	
		1.10 [1.00-1.21]
	0.87 [0.49-1.49]	**1.10 [1.01-1.21]**
Slowed activities	1.38 [1.00-1.92]	
		1.06 [1.01-1.12]
	1.33 [0.96-1.84]	1.06 [1.00-1.12]
Cough symptoms	1.34 [0.98-1.85]	
		1.05 [0.99-1.11]
	1.30 [0.95-1.79]	1.04 [0.99-1.10]
B-agonist use	1.12 [0.83-1.51]	
		1.00 [0.94-1.05]
	1.13 [0.83-1.53]	0.99 [0.94-1.05]

Statistically significant ORs [95%CI] indicated in bold. Models adjusted for child age and sex.

Table 4 results summary

In models predicting symptoms and medication use from neighborhood safety and depressive symptoms:
- Perception of worse neighborhood safety remained a significant predictor of max symptom days, general symptoms, and running symptoms after including depressive symptoms in the model.
- Greater depressive symptoms reflected by a higher PHQ8 score remained a significant predictor of nocturnal symptoms and speech symptoms after including neighborhood safety in the model.

Table 2. Stress and Neighborhood Characteristics

Parental Stress	M (SD) or N (%)
Depressive Symptoms (PHQ-8)	5.8 (5.3)
N (%) Depression high risk* (PHQ-8)	29 (21%)
Urban Stress	12.4 (4.2)
Neighborhood Safety (Daytime)	
Neighborhood Safety mean score (SD)	2.3 (0.9)
N (%) Very Safe	26 (19%)
N (%) Safe	63 (45%)
N (%) Unsafe	31 (22%)
N (%) Very Unsafe	20 (14%)

*High risk defined as a score of ≥10, which indicates increased risk for depressive disorder.

Table 3. Asthma Symptoms & Medication Use, days/2 wks

	M (SD)
Maximum symptom days*	7.1 (5.3)
General symptoms	6.5 (5.4)
Nocturnal symptoms	3.2 (4.5)
Symptoms when running	3.4 (4.6)
Speech symptoms**	0.3 (0.8)
Slowed activities	2.9 (4.2)
Cough symptoms	3.7 (5.1)
B-agonist use	4.1 (4.8)

*Largest value across 3 types of symptom outcomes (slowed, nocturnal, and general).
**symptoms limiting the ability to speak

Table 5. Adjusted models predicting asthma outcomes from neighborhood safety, urban stress, and both (N=140).

Asthma Outcome	Predictor	
	Neighborhood Safety	Urban Stress
	OR [95% CI]	OR [95% CI]
Max symptoms	**1.41 [1.07-1.88]**	
		1.08 [1.01-1.15]
	1.28 [0.94-1.75]	1.05 [0.98-1.13]
General symptoms	**1.38 [1.05-1.84]**	
		1.08 [1.01-1.15]
	1.26 [0.92-1.72]	1.05 [0.98-1.13]
Nocturnal symptoms	1.37 [0.99-1.90]	
		1.13 [1.05-1.22]
	1.12 [0.78-1.61]	**1.11 [1.03-1.21]**
Running symptoms	**1.56 [1.15-2.15]**	
		1.08 [1.01-1.16]
	1.44 [1.03-2.04]	1.04 [0.97-1.13]
Speech symptoms	0.93 [0.51-1.62]	
		1.11 [0.98-1.25]
	0.72 [0.38-1.31]	1.14 [1.00-1.31]
Slowed activities	1.37 [1.00-1.90]	
		1.07 [1.00-1.15]
	1.26 [0.88-1.79]	1.05 [0.97-1.14]
Cough symptoms	1.36 [0.99-1.87]	
		1.06 [0.98-1.14]
	1.28 [0.90-1.83]	1.03 [0.95-1.12]
B-agonist use	1.08 [0.80-1.45]	
		1.00 [0.93-1.07]
	1.10 [0.79-1.53]	0.99 [0.92-1.07]

Statistically significant ORs [95%CI] indicated in bold. Models adjusted for child age and sex.

Table 5 results summary

In models predicting symptoms and medication use from neighborhood safety and urban stress (Table 5):
- Perception of worse neighborhood safety remained a significant predictor of running symptoms after including urban stress in the model.
- Greater urban stress remained a significant predictor of nocturnal symptoms after including neighborhood safety in the model.

Conclusions

- Parent perceptions of neighborhood safety were associated with children's asthma symptoms in low-income urban families.
- Parental depressive symptoms and urban stress were also associated with children's asthma symptoms.
- In models adjusted for child age and sex, we did not find consistent evidence that parental depressive symptoms or urban stress mediated the association between neighborhood safety and children's asthma outcomes.

Implications

- These results suggest that the association between parental psychosocial stress and children's asthma morbidity is independent of the perception of neighborhood safety.
- The current findings support previous work suggesting that asthma symptom outcomes are associated with parental psychosocial stress and neighborhood safety, but the potential mediators of these stress factors remain unclear.
- If neighborhood stressors as well as individual-level parental stress factors are causally related to asthma symptoms, low-income urban children with asthma may benefit from a multi-level approach that addresses multiple systems of risk to mitigate asthma morbidity.

References

1. Kroenke K, Strine TW, Spitzer RL, Williams JBW, Berry JT, and Mokdad AH. The PHQ-8 as a measure of current depression in the general population. Journal of Affective Disorders. 2009; 114(1-3): 163-173.
2. Jaffee KD, Liu GC, Canty-Mitchell J, Qi RA, Austin J, and Swigonski N. Race, Urban Community Stressors, and Behavioral and Emotional Problems of Children With Special Health Care Needs. Psychiatric Services. 2005; 56: 63-69.
3. Krieger N, Smith K, Naishadham D, Hartman C, and Barbeau EM. Experiences of discrimination: Validity and reliability of a self-report measure for population health research on racism and health. Social Science and Medicine. 2005; 61(7): 1576-1596.

Acknowledgements

Abstract

Rodríguez EM, Pollack C, Keet C, Peng RD, Balcer-Whaley, S, & Matsui, EC. (2020). Types of parental psychosocial stress associated with asthma symptoms in urban children with asthma. *Journal of Allergy and Clinical Immunology, 145 (2),* AB114. **Abstract ID 12037.**

Rationale: Parental stress is linked with children's asthma symptoms, but the independent associations of co-occurring types of stress (e.g., depression, contextual/environmental stress, discrimination) with asthma is less understood.
Methods: 102 children (5-17y) with asthma participated in an observational study on asthma and housing mobility. Parents/guardians reported their own depressive symptoms (on the PHQ-8), contextual stress (e.g., parenting, neighborhood stress) and discrimination stress (e.g., experiencing discrimination at work), as well as children's asthma symptoms (e.g., days of cough, wheezing, nighttime waking in the previous 2 weeks). We used binomial regression models with a robust variance estimator to examine associations among types of stress and asthma symptoms.
Results: The sample was 53% male, 100% Black/African American, and 99% received public insurance. Children had 6.2 asthma symptom-days (SD=5.2). Parents' average PHQ-8 score was 13.9 (SD=5.3), representing elevated risk for depression. Parental depressive symptoms and contextual stress, but not discrimination stress, were significantly correlated with asthma symptoms in separate, unadjusted models (r's=0.20 to 0.33, p's <. 05). When all three types of stress were included in a single model controlling for age and sex, parental depressive symptoms were associated with child cough (OR=1.09, 95% CI [1.01, 1.18]), nocturnal symptoms (1.08 [1.00-1.16]), overall symptoms (1.05 [0.98-1.13]), and symptoms limiting the ability to speak (1.12 [0.96-1.30]), but not slowed activity, exercise-related symptoms, or rescue medication use.
Conclusions: Parental depressive symptoms may be a more important risk factor for asthma symptoms in low-income urban children with asthma than contextual stress or discrimination stress.