

ASTHMA AND INTIMATE PARTNER VIOLENCE: MORBIDITY AND MECHANISMS



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BACKGROUND: INTIMATE PARTNER VIOLENCE (IPV)

- Population-based studies of men and women have shown increased prevalence of asthma among those with experience of IPV as opposed to those without.

TABLE 3. Association between lifetime history of intimate partner violence* victimization and selected health conditions and risk behaviors among adults aged ≥ 18 years, by sex — Behavioral Risk Factor Surveillance System, United States, 2005

Health condition/ Risk behavior	Women		Men	
	AOR [†]	(95% CI) [§]	AOR	(95% CI)
Health condition				
Diabetes [¶]	1.1	(0.9–1.3)	1.1	(0.9–1.4)
Current use of disability equipment ^{**}	1.5 ^{††}	(1.3–1.8)	1.5 ^{††}	(1.2–1.9)
Arthritis ^{¶§§}	1.7 ^{††}	(1.6–1.9)	1.4 ^{††}	(1.2–1.6)
Current asthma [¶]	1.6 ^{††}	(1.4–1.8)	1.4 ^{††}	(1.2–1.8)
Current activity limitations ^{¶¶}	2.1 ^{††}	(1.9–2.3)	1.8 ^{††}	(1.6–2.1)
Stroke [¶]	1.8 ^{††}	(1.4–2.2)	1.4 ^{††}	(1.0–2.0)
High blood cholesterol [¶]	1.3 ^{††}	(1.1–1.4)	1.1	(1.0–1.3)
High blood pressure [¶]	1.1	(1.0–1.2)	1.1	(1.0–1.3)
Heart attack [¶]	1.4 ^{††}	(1.1–1.7)	1.2	(0.9–1.6)
Heart disease [¶]	1.7 ^{††}	(1.4–2.1)	1.2	(0.9–1.6)

GENDER DISPARITIES

- **Gender Differences in IPV**
 - United National Office on Drugs and Crime (UNODC) 2018 report: women and girls account for 82% of victims of intimate partner homicides.
 - In the Americas, intimate partner homicide accounted for 35% of all female homicides in 2017
- **Gender Differences in Asthma**
 - In comparison with men, women have higher asthma prevalence, severity, exacerbation rates, hospitalizations, mortality
 - Based on CDC National Vital Statistics Reports on Deaths in 2006, women account for 2/3 of asthma deaths

UNODC. Global Study on Homicide: Gender-related Killing of Women and Girls. Vienna 2018.

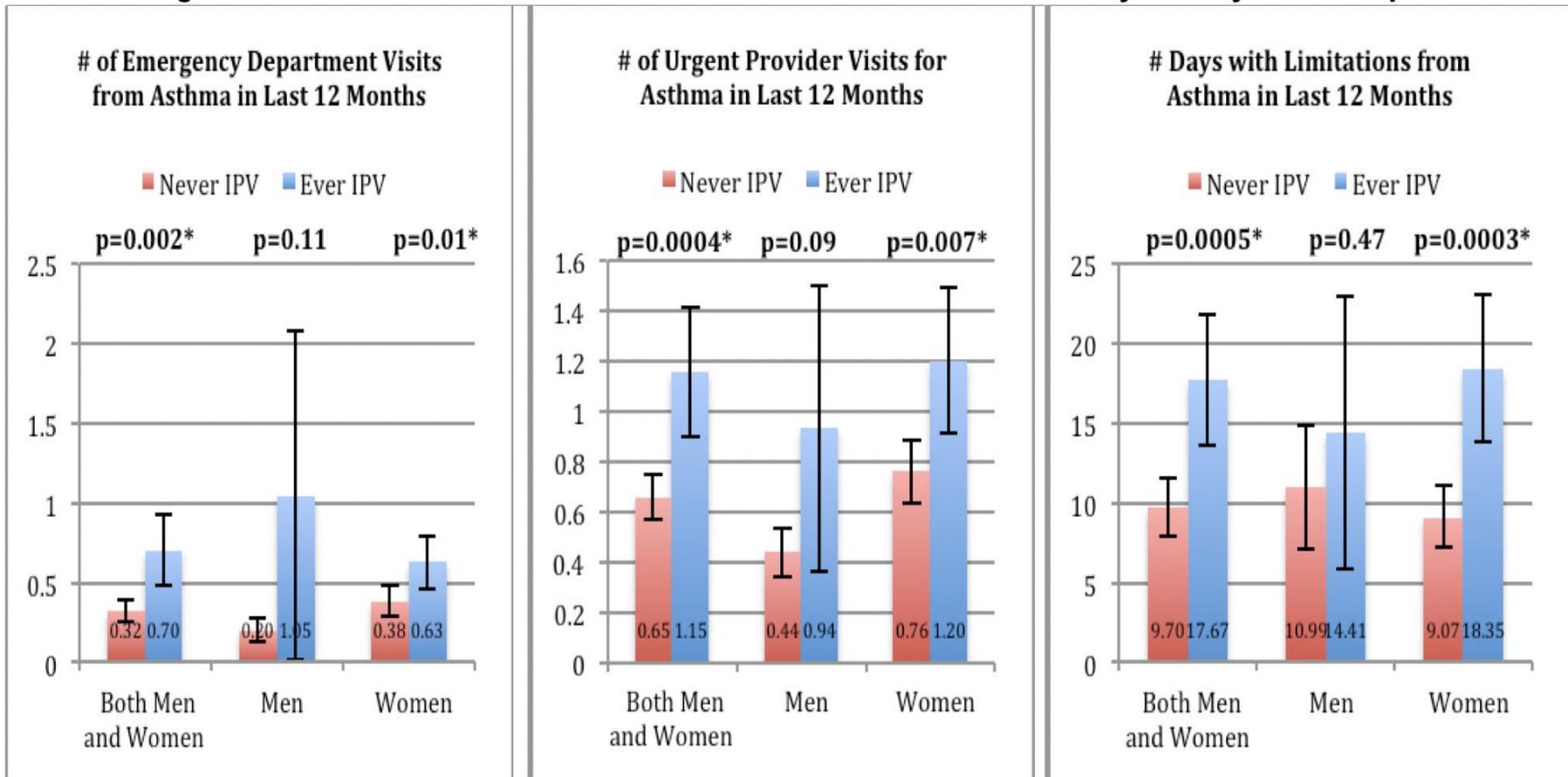
Zein JG, Erzurum SC. Curr Allergy Asthma Rep 2015.

Heron MP, Hoyert DL, et al. National Center for Health Statistics 2009.

PRELIMINARY DATA

Figure 1: Asthma-Related Health Outcomes in the Last 12 Months by History of IPV Exposure

in 12 months/person



Key: * p < 0.05

n for Never IPV of 1904, n for Ever IPV of 899 (32% prevalence)

METHODS

- **Longitudinal cohort study**
- **Adult asthmatics**
 - **Comparing those with and without a history of IPV**
- **Utilizing**
 - **Questionnaires**
 - **Biomarkers**
 - **Mobile health technology**

CENTRAL HYPOTHESES

- **Increased severity of IPV is associated with worsened asthma control and morbidity, and contributes to gender asthma health disparities.**

CENTRAL HYPOTHESES CONTINUED

- **IPV impacts asthma outcomes both indirectly and directly.**
 - **Indirect impact through development and/or exacerbation of:**
 - 1. Psychosocial comorbidities
 - 2. Interference with adherence and patient-provider relationships
 - 3. Disruption of sleep.
 - **Direct impact by altering stress responses and inflammatory indices through the neuro-endocrine-immune axis.**

SPECIFIC AIM 1

- **Examine the association of IPV severity with asthma outcomes in adults.**
 - **Hypothesis 1:** Increased IPV severity is associated with worsened asthma outcomes.

SPECIFIC AIM 1 CONTINUED

- **Objective 1:** We will assess the association of level of IPV exposure with:
 - Asthma symptom control
 - Frequency of asthma exacerbations
 - Urgent provider visits
 - Emergency department visits
 - Hospitalizations for asthma
 - Perceived limitations on daily activities from asthma.

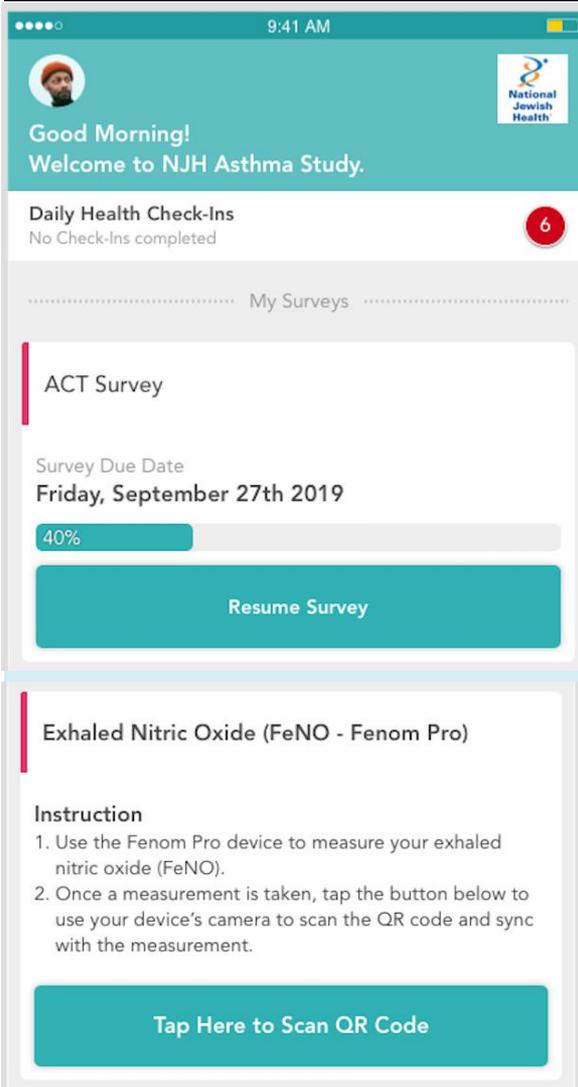
SPECIFIC AIM 2

- **Examine potential biopsychosocial and physiological mechanisms of IPV-related worsened asthma outcomes**
 - **Hypothesis 2:** The impact of IPV on asthma outcomes is influenced by modifiable biopsychosocial and physiological factors.

SPECIFIC AIM 2 CONTINUED

- **Objective 2: We will assess the relationship between:**
 - Anxiety
 - Depression
 - PTSD
 - Perceived stress
 - Adverse childhood experiences
 - Substance abuse
 - Health care access
 - Adherence to medications
 - Impairment of trust in providers
 - Sleep disturbance

Health Storylines™ Smartphone App



Symptom Tracker

COUGH

Drag side to side



CHEST TIGHTNESS

Drag side to side



WHEEZING

Drag side to side



In partnership with



SPECIFIC AIM 3

- **Investigate the role of neuro-endocrine-immune indices in IPV-induced worsened asthma outcomes.**
 - **Hypothesis 3:** IPV elicits an abnormal neuro-endocrine-immune response to stress in asthmatic patients.
 - The normal stress response: cortisol^{high} IL-6^{low} hsCRP^{low} in healthy subjects
 - Switched to cortisol^{low} IL-6^{high} hsCRP^{high} in asthmatic patients with IPV.
 - **Objective 3:** We will assess these biomarkers, their relationship to IPV exposure, and their temporal relationship to perceived stress.

SPECIFIC AIM 4

- **Examine gender differences of the impact of IPV exposure on asthma outcomes**
 - **Hypothesis 4:** IPV and alterations in stress responses contribute to known gender asthma disparities.
 - **Objective 4a:** We will assess the degree that increased stress in women with IPV exposure, as compared to men, contribute to worsened asthma outcomes.
 - **Objective 4b:** We will assess whether there is differential expression of pituitary adenylate cyclase-activating polypeptide 38 (PACAP38) between women and men.

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QUESTIONS OR SUGGESTIONS?



“Can you help me get a **Grant** ?
You’re better at begging than I am!”

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- UNODC. Global Study on Homicide: Gender-related Killing of Women and Girls. Vienna 2018.

MY QUESTIONS

- **Too many aims?**
 - Aim 1 is slightly redundant but meant to support our preliminary data
- **Colleague doing asthma gene expression and microbiome**
 - Add in microbiome as a way, with FeNO, to link stress expression with inflammation?
- **Cost of getting biomarker data on all participants in the cohort. Options to decrease cost:**
 - **Having a 2 part study:**
 - 1. Longitudinal cohort study with questionnaires
 - 2. Nested Case-Control Biomarker Study
 - Could take a long time to recruit enough participants to match. More logistically complicated.
 - **Decrease the biomarker selection**

Activities	Enrollment	4 months	8 months	12 months
QUESTIONNAIRES				
Demographics	√			
BRFSS Asthma				√
ACT	√	√	√	√
BRFSS IPV	√			√
The Revised Conflict Tactics Scale (CTS2)	√			√
Patient Health Questionnaire for Depression and Anxiety (PHQ-4)	√			√
PTSD Checklist (PCL)	√			√
Perceived Stress Scale (PSS-10)	√	√	√	√
Adverse Childhood Experiences Questionnaire (ACE)	√			
General Trust in Physician Scale	√			√
Exacerbations	√	√	√	√
BIOMARKERS				
hs-CRP	√	√	√	√
IL-6	√	√	√	√
PACAP38	√	√	√	√
Salivary cortisol	√	√	√	√
Hair cortisol	√	√	√	√
FeNO (possible home use linked to smartphone app)	√	√	√	√
SMARTPHONE APP AND MOBILE HEALTH	Daily		Biweekly	
FitBit activity tracking	√			
Fitbit sleep tracking	√			
Digital inhaler for controller and reliever inhaler use	√			
Asthma, stress, anxiety, depression symptoms			√	

Table 1: DEMOGRAPHICS OF THOSE WITH CURRENT ASTHMA

	Never IPV	Ever IPV	p-value
N	1904 (67.9%)	899 (32.1%)	
Female	1280 (63.2%)	745 (36.8%)	
Male	624 (80.2%)	154 (19.8%)	
AGE*	Mean 51.2	Mean 45.4	p<0.00001
RACE			
White, Non-Hispanic*	82.1% (CI 80.4-83.8)	77.8% (CI 75.1-80.5)	p<0.01
Black, Non-Hispanic*	8.3% (CI 7.1-9.5)	11.3% (CI 9.2-13.4)	p=0.01
Asian, Non-Hispanic	0.6% (CI 0.3-0.9)	0.1% (CI -0.1-0.3)	p=0.06
Native Hawaiian or Pacific Islander, Non-Hispanic	0.2% (CI 0-0.4)	0% (CI 0-0)	p=0.18
American Indian, Alaskan Native, Non-Hispanic	1.5% (CI 1.0-2.0)	1.7% (CI 0.9-2.5)	p=0.69
Other, Non-Hispanic	1.1% (CI 0.6-1.6)	0.8% (CI 0.2-1.4)	p=0.46
Multiracial, Non-Hispanic*	1.7% (CI 1.1-2.3)	4.0% (CI 2.7-5.3)	p<0.0005
Hispanic	3.4% (CI 2.6-4.2)	3.1% (CI 2.0-4.2)	p=0.68
MARITAL STATUS			
Married*	54.7% (CI 52.5-56.9)	35.6% (CI 32.5-38.7)	p<0.00001
Divorced*	12.7% (CI 11.2-14.2)	27.9% (CI 25.0-30.8)	p<0.00001
Widowed*	12.0% (CI 10.5-13.5)	7.3% (CI 5.6-9.0)	p<0.0005
Separated*	1.9% (CI 1.3-2.5)	7.1% (CI 5.4-8.8)	p<0.00001

*** statistically significant at p< 0.05**

**Table 2: CORRELATION WITH ASTHMA-RELATED OUTCOMES
IN THE LAST 12 MONTHS**

	Spearman's ρ	p-value
Emergency Department Visits		
Ever IPV*	0.131	p<0.0001
IPV Risk Index*	0.138	p<0.0001
Perceived General Health*	0.185	p<0.0001
Perceived Mental Health*	0.139	p<0.0001
Urgent Provider Visits		
Ever IPV*	0.124	p<0.0001
IPV Risk Index*	0.133	p<0.0001
Perceived General Health*	0.208	p<0.0001
Perceived Mental Health*	0.141	p<0.0001
Days with Limitations		
Ever IPV*	0.138	p<0.0001
IPV Risk Index*	0.145	p<0.0001
Perceived General Health*	0.227	p<0.0001
Perceived Mental Health*	0.136	p<0.0001

**Key: Ever IPV= any history of IPV; IPV Risk Index= Ever IPV + IPV in last 12 months;
* Statistically significant at p<0.05**