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## **Stress and Negative Affect as Mediators in the Association between Parental Social Support and Lung Function in Adolescents with Asthma**

### **Comments**

Presented at the 2020 SURF Virtual Summer Research Conference.

### **Authors**

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# Stress and Negative Affect as Mediators in the Association between Parental Social Support and Lung Function in Adolescents with Asthma

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CHOC Children's



## INTRODUCTION

- Asthma is the leading chronic condition in childhood with 7.5% of children in the United States having an asthma diagnosis<sup>1</sup>. Adolescents suffering from asthma, an inflammatory disease of the respiratory airways, cannot outgrow this disease and suffer more exacerbations compared to younger children<sup>2</sup>.
- Social determinants, like a supportive family, are a strong predictor of a child's physical health and improve children's health conditions<sup>3</sup>. Research has shown that positive social support is associated with positive asthma management<sup>4</sup>.
- Stress and negative affect have been shown to be associated with asthma diagnosis, as well as exacerbation of symptoms<sup>5</sup>. Stressful situations, such as the death of a family member, unemployment, and familial tensions have been shown to increase asthma symptoms caused by a release of hormones<sup>6</sup>. Similarly, negative affect has been analyzed as a causal factor for worsening asthmatic symptoms. When inducing negative affect through writing paradigms, and asking participants to expand on negative events, we see that asthma symptoms are made worse<sup>7</sup>.
- Although much research has been done on the associations between parental social support and negative affect and stress, no physiological markers have been evaluated in these relationships.
- Lung function is typically measured by a spirometer, a device used to measure the quality, speed, force, and volume of an exhale. A spirometer can measure Forced Expiratory Flow in the first second (FEV1) and Peak Expiratory Flow (PEF) which are common measures used to evaluate lung function.
- Given that social support may directly impact adolescent stress and negative affect and that stress and negative affect may directly impact lung function, these affective processes might serve as mediators in the association between social support and lung function.
- This pilot study analyzes how parental social support impacts lung function in adolescents with asthma and the mediating role stress and negative affect play in this association.

## METHOD

**Participants** (n = 21) : Male = 57.3%, Female = 42.8%; Ages 12-17 (μ=14); Hispanic = 47.6%, Non-Hispanic White = 28.6%, African American = 14.3%, Asian American = 9.52%.

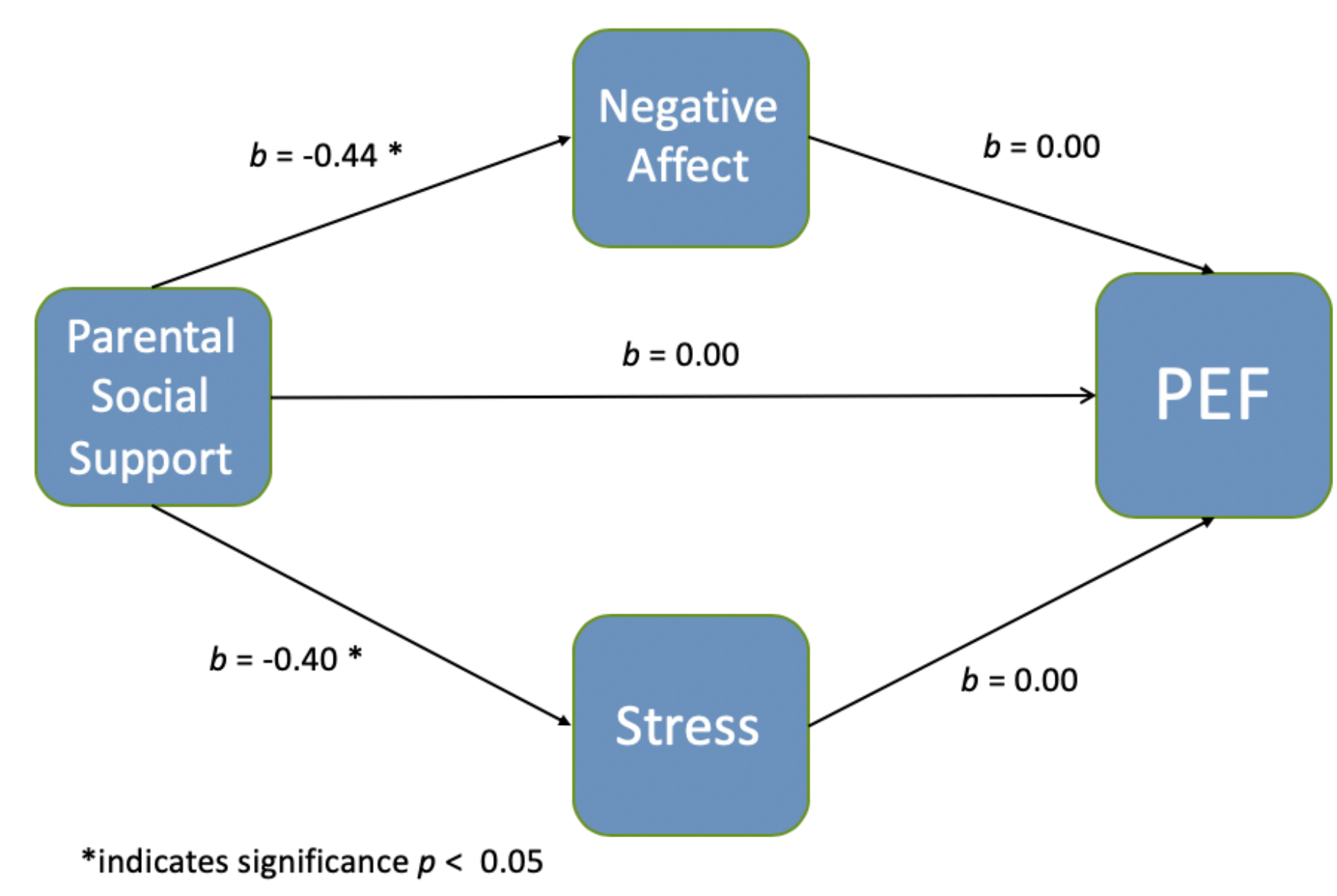
Participants were recruited at CHOC Children's in Orange County at the pediatric asthma clinic. They were asked to complete a baseline survey upon recruitment and answer four surveys a day for seven days.

- At baseline, parent social support and stress were evaluated. Participants were also given a spirometer, a device used to measure lung function, and taught how to use the instrument.
- The daily diary surveys included measures evaluating negative affect and lung function. Using the spirometer given at baseline, participants entered values from the instrument (FEV1 and PEF) to provide quantitative values of lung function. After the seven days of data collection, participants were rewarded a \$50 Target gift card.

## MEASURES

- Childhood Child and Adolescent Social Support Scale (CCASS)**<sup>8</sup>: CCASS is a scale used to evaluate levels of social support by parents, peers, friends, and teachers. For the purposes of this study we focused on parental social support measured by the CCASS. Participants were asked to evaluate 12 phrases like "My parents understand me", "My parents give me good advice", and "My parents listen to me when I talk" on a 6-point Likert Scale from 1 (Not important) to 6 (Always). The 12 phrases were aggregated, where higher scores reflect higher levels of parental social support.
- State Adjective Questionnaire (SAQ)**<sup>9</sup>: Participants were asked to rate the extent to which they were currently experiencing a list of negative emotions from 1 (Never) to 5 (Always), using the SAQ, to evaluate negative affect four times a day for seven days. Emotions included on edge, depressed, hostile, nervous etc. These emotions were aggregated at each time point. All surveys were then averaged to reflect negative affect emotionality throughout the study.
- Perceived Stress Scale for Children (PSS-C)**<sup>10</sup>: The PSS-C evaluates the amount of perceived stress a child experiences. Questions like, "In the last week, how often did you feel happy?" and "In the last week, how often did you feel rushed or hurried" are evaluated on a 4-point Likert Scale from 1 (Never) to 4 (A lot) at baseline. The 14 questions were aggregated, where higher scores reflect higher levels of stress.
- Lung Function**
  - FEV1 (Forced Expiratory Volume)** FEV1 is the amount of air forcefully exhaled in one second.
  - PEF (Peak Expiratory Flow)**: PEF is the total amount of air exhaled in one breath.
  - FEV1 and PEF are measures used to evaluate lung function in adolescents. These values were averaged across 28 time points to reflect average lung function during the week of the study.
  - Predicted FEV1 and PEF values were abstracted from medical record data.
  - The averaged FEV1 and PEF values from the daily diary surveys were divided by the predicted values to provide a percent value. The percent value "controlled" for any age, ethnicity, sex and height differences between participants.
- Mediation analysis** was conducted using the statistical software R<sup>11</sup>.

## RESULTS

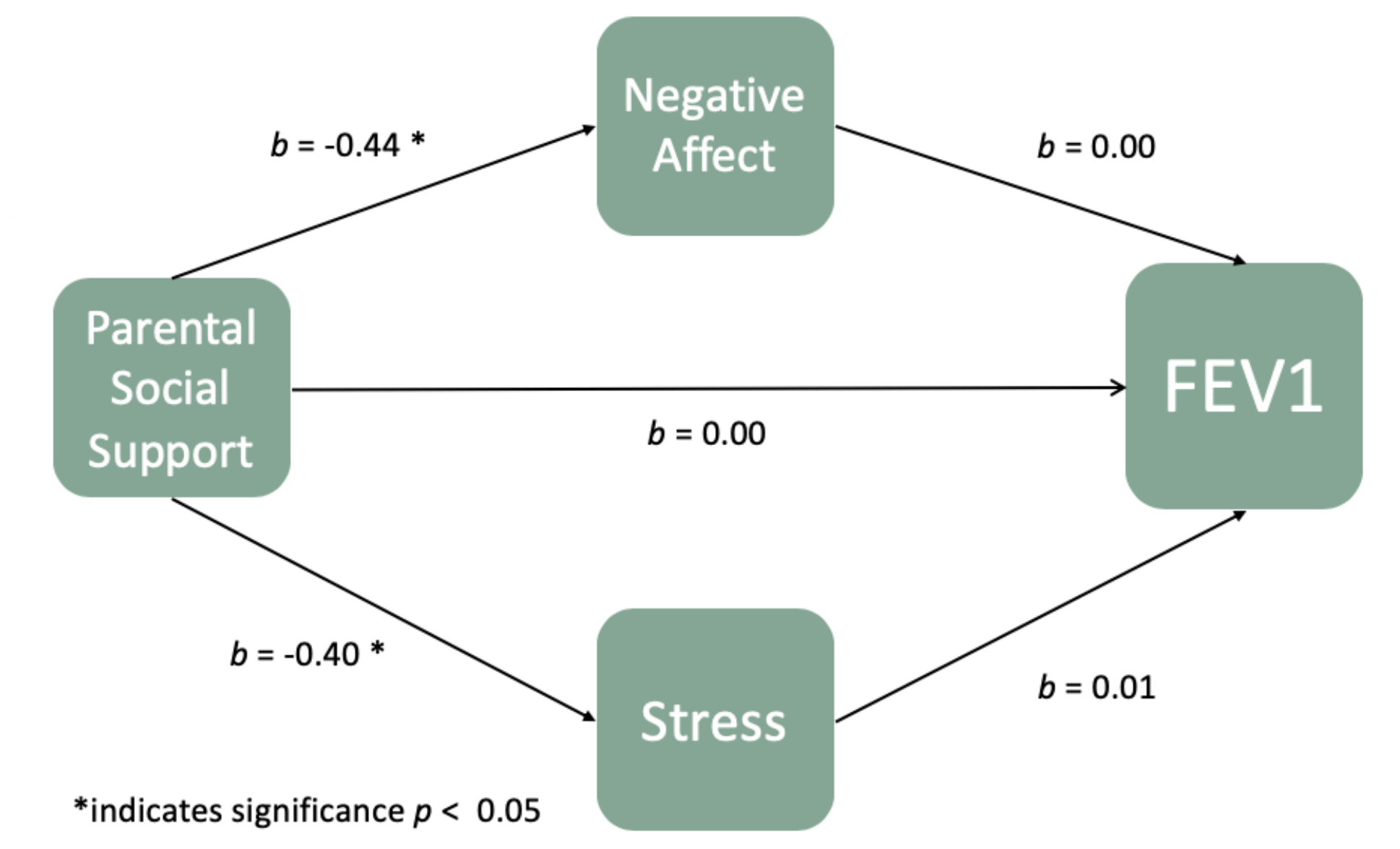


**Mediation Model 1:** Negative affect and stress are not mediators in the relationship between parental social support and percent PEF values.

IV	DV	t	b
Parental Social Support	PEF	t = -0.31	b = 0.00
Parental Social Support	Negative Affect	t = -3.73	b = -0.44 *
Negative Affect	PEF	t = 0.32	b = 0.00
Parental Social Support	Stress	t = -5.95	b = -0.40 *
Stress	PEF	t = -0.45	b = 0.00

\* indicates significance p < 0.05

## RESULTS



**Mediation Model 2:** Negative affect and stress are not mediators in the association between parental social support and percent FEV1 values.

IV	DV	t	b
Parental Social Support	FEV1	t = -0.36	b = 0.00
Parental Social Support	Negative Affect	t = -3.73	b = -0.44 *
Negative Affect	FEV1	t = -0.10	b = 0.00
Parental Social Support	Stress	t = -5.95	b = -0.40 *
Stress	FEV1	t = 0.34	b = 0.01

\* indicates significance p < 0.05

## DISCUSSION

- Evidence in the study shows that higher levels of parental social support are associated with lower levels of negative affect and stress in adolescents with asthma.
- While it is possible that negative affect and stress do not directly relate to biological markers, research shows that these emotions do impact asthma management<sup>6,7</sup>.
- The model should be further tested with other asthma outcomes (e.g. other lung function metrics such as predicted expiratory rate flow (PERF) or FEV1/forced vital capacity ratios (FVC), emergency department visits, self-reported asthma symptoms, and asthma triggers).
- Next steps in this work are to use this pilot data to conduct a large-scale daily diary investigation.

## REFERENCES

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