

Stress and Physical Activity in Children with Asthma: An Ecological Momentary Assessment Study

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BACKGROUND

- Children with asthma are at greater risk of physical inactivity, obesity, and other chronic health conditions. Yet, little is known about the role that psychological stress plays in the relationship between asthma severity and physical inactivity.
- Children with greater severity of asthma symptoms may engage in less physical activity due to asthma-specific stress and worry (i.e., concern about having an asthma attack). Alternatively, elevated stress from other types of stressors (e.g., family, friends, financial) in children may independently increase asthma severity and decrease physical activity.
- To date, understanding how to promote physical activity among children with asthma has been limited by retrospective self-report methods. Ecological Momentary Assessment (EMA) is an emerging real-time data capture strategy that can measure stress and symptoms as they occur in naturalistic settings.

RESEARCH AIMS

This pilot study used EMA paired with accelerometers among adolescents with asthma to examine how daily stress, asthma worry, and asthma symptoms predict daily levels of physical activity. A secondary aim was to determine whether these relationships differed by sex.

PARTICIPANTS

- N = 20 adolescents with asthma
- Ages 12-17 years (M= 14.55, SD = 1.73)
- 55% Male
- 100% Hispanic
- 90% eligible for free school meals
- 45% diagnosed with asthma < 4 years old
- 35% hospitalized for asthma in past 12 months

PROCEDURES

- Monitoring occurred across 7 continuous days
- Average of 3 EMA prompts per day (at random times and after using an asthma inhaler)
- Auditory beep when time to complete an EMA survey
- Reminder prompts after 3- and 6-min for each missed entry

EQUIPMENT



Ecological Momentary Assessment (EMA)
data was collected through a Samsung Galaxy Y smartphone with a custom Android app installed.



Accelerometer
The Actigraph, Inc. GT2M model activity monitor provided a measure of activity that was time-matched to the EMA entries at the day level.

MEASURES

Ecological Momentary Assessment

- **Stressors** (e.g., from being teased, getting into an argument) (4 items, $\alpha = .90$)
- **Perceived stress** (1-item)
- **Asthma worry** (e.g., worry about having an asthma attack) (3 items, $\alpha = .64$)
- **Asthma symptoms** (e.g., wheezing) (4 items, $\alpha = .81$)

In the past four hours, has anyone teased you?

Yes, and caused very much stress
 Yes, and caused some stress
 Yes, and caused a little stress
 Yes, but not at all stressful
 No

How STRESSED were you feeling just before the phone went off?

Not at all
 A little
 Quite a bit
 Extremely

In the past four hours, have you worried about having an asthma attack?

Not at all
 A little
 Quite a bit
 Very much so

Since the last survey you answered, have you experienced WHEEZING?

Not at all
 A little
 Quite a bit
 Very much so

Accelerometer

- **Daily moderate-to-vigorous physical activity (MVPA) min** using age-specific cut-points (equivalent to 4 METs). (Freedson et al., 1997; Troiano, 2008).

DATA ANALYSES

• To adjust for clustering of days within subjects, data were analyzed using multilevel linear regression modeling in SUDAAN 10.0. Interactions between model variables and sex were tested. All models controlled for grade in school and day of the week.

RESULTS

- On average, participants answered 51% of EMA prompts. Mean daily MVPA = 29.05 min (SD = 26.75).
- On any given day, asthma worry ($B = 1.64, p = .65$) and asthma symptoms ($B = -1.00, p = .59$) were unrelated to MVPA that day.
- Daily stressors (Adj. Wald $F = 3.59, p = .07$) and perceived stress (Adj. Wald $F = 3.29, p = .08$) interacted with sex in predicting daily MVPA. For males, daily stressors and perceived stress on any given day were positively related to MVPA on that day. In contrast, daily stressors and perceived stress were unrelated to MVPA that day for females (See Fig. 1+2).

Fig. 1: Sex-Stratified Scatterplot for the Association Between Daily Stressors and MVPA

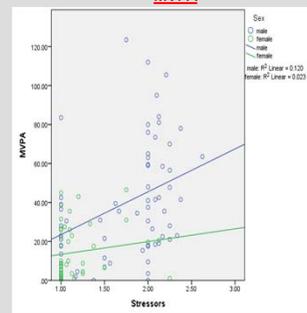
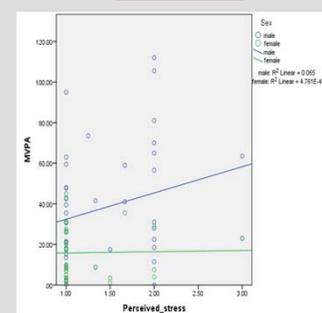


Fig. 2: Sex-Stratified Scatterplot for the Association Between Daily Perceived Stress and MVPA



CONCLUSIONS

- Real-time EMA methods showed that on any given day, elevated asthma worry and symptoms did not reduce adolescents' levels of physical activity that day.
- For boys, physical activity may create situations that induce stress such as getting teased or arguments. Future research should explore this potential barrier to physical activity for adolescent boys with asthma.

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