Risk Reduction Among Young Adults with Asthma in Response to Wildfire Smoke

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BACKGROUND

- Poor air quality (AQ) from wildfire smoke is associated with increased asthma attacks and emergency department visits.
- Young adults are less likely to adhere to AQ alerts than older adults.
- This study utilized data collected as part of a 2020 pilot study testing two smartphone application (app) interventions in young adults with asthma compared to a control group.

PURPOSE AND AIMS

The purpose of the study presented here is to explore:

1. Symptoms,
2. Exposure reduction behaviors, and
3. Symptom mitigating behaviors

during periods of poor air quality as compared to periods of healthy air quality.

METHODS

Design: Secondary analysis of data from an RCT

Sample: Participants were 18-26 years old with self-reported asthma. Convenience sample recruited using university list servs.

Data collection: Data was collected at baseline, and 2, 4, 8 weeks. Information collected, in part, included:

- Risk perceptions associated with wildfire smoke
- Exposure reduction behaviors
- Symptom mitigation behaviors
- Asthma Control Test (ACT) score
- Daily average $PM_{2.5}$ from Air Now, based on reported location.

Analysis

- Linear regression was used to determine the number of days spent in poor AQ ($PM_{2.5}$ > 35.5µg/m^3) that impacts participants' ACT score. An ACT score of <=19 was used as an indicator of uncontrolled asthma over the previous four weeks. Based on this analysis, exposure to poor AQ at least 9.7% of days in the prior 30 days could lead to poor asthma control.
- Cross tabulations were used to evaluate self-reported data on AQ, reduction behaviors, and symptom mitigating behaviors.
- All hypothesis testing was completed using the SAS software (version 9.4) at the 0.025 level (one-sided).

HIGHLIGHTS

Most participants reduced wildfire smoke exposure by not going outdoors. The results uncover protective behaviors that participants do not engage in, such as using daily controller medications or using an N95 mask.

RESULTS

67 participants enrolled in the study. Most respondents identified as:

- Female (n=52; 78.8%)
- Non-Hispanic (n=57; 87.7%) and white (n=59; 88.1%).
- Some as (n=8; 11.9%) identified as more than one race.

At baseline, most participants perceived their susceptibility to wildfire smoke and severity of health-related risks (Figure 1). Use and access to risk reduction resources varied (Figure 2).

Figure 1. Risk Perception

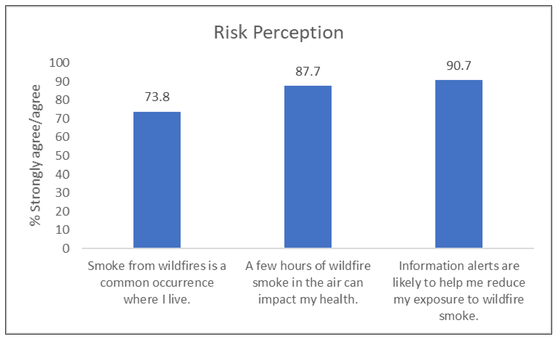
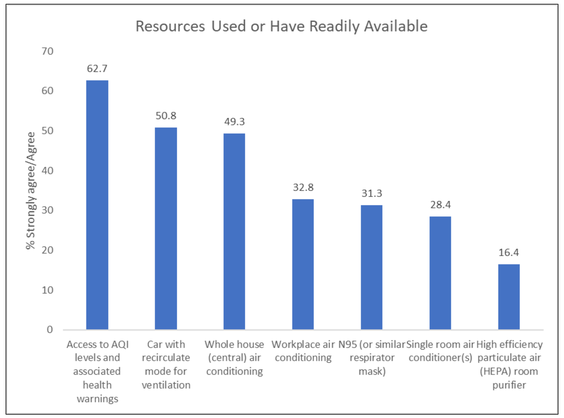


Figure 2. Resources Used or Readily Available



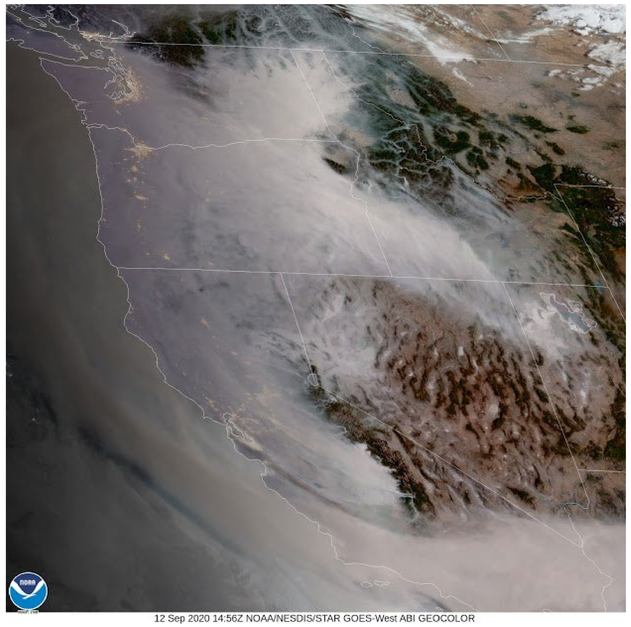


Figure 3. Satellite Image of Wildfire Smoke Plume over Western United States, 09/12/2020 (NOAA)

Aim 1. Association between Poor Air Quality and Symptoms

- A higher percentage of participants reported the following respiratory symptoms when exposed to poor air quality (71.9%) than when not exposed to poor AQ (53.5%; Chi-Square=5.36; p-value=0.0103)
  - Coughing, trouble breathing normally, shortness of breath
- Reported symptoms that were not significantly different when participants were exposed to poor AQ than when not exposed included:
  - Other respiratory symptoms: Scratchy throat, asthma attack and wheezing
  - Cardiovascular symptoms
  - Ear/nose/throat symptoms
  - Other symptoms (e.g. anxiety, trouble sleeping, other)

Aim 2. Association between Poor Air Quality and Exposure Reduction Behaviors

- A higher percentage of participants reported engaging in the following behaviors when exposed to poor AQ than when not exposed

	Chi-square, p-value
Cancelled outdoor events	(19.16; <0.0001)
Closed windows of the house	(19.06; <0.0001)
Exercised indoors instead of outdoors	(12.57; 0.0002)
Spent less time outdoors	(11.62; 0.0004)
Used or changes air filters/air cleaners	(4.49; 0.0171)

- Behaviors that were not significantly different when participants were exposed to poor AQ than when not exposed include:
  - Took medication
  - Wore a mask
  - Used buses
  - Did less strenuous activities
  - Avoided roads with traffic
  - Drove my car less

Aim 3. Association between Poor Air Quality and Symptom Mitigating Behaviors

- Symptom mitigating behaviors were not statistically significantly different when participants were exposed to poor AQ than when not exposed. These included:
  - Used controller medication
  - Used oral steroids
  - Have an unscheduled visit with a health care provider

DISCUSSION

- Young adults from a community-based sample were aware of risks associated with poor AQ.
- Nurses working with young adults should emphasize risk reduction behaviors, such as taking asthma controller medications as prescribed.
- Future research will sample adults with persistent asthma, recruited from a clinic setting, versus a community-based sample.

Limitations

- Exposure misclassification. Air quality measurements were based on outdoor air. We did not measure indoor air quality.
- No adjustments were made for correlations among measurements on same person.

Research reported in this poster was supported by the National Institute of Nursing Research of the National Institutes of Health under Award Number R21NR019071; ClinicalTrials.gov Identifier: NCT04724733