Manuscript title

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**Conflicts of interest:** The authors declare they have no conflicts of interest related to this work to disclose.

**Abstract**

Background:

Objectives:

Methods:

Results:

Discussion:

**Introduction**

First citation test1.

* background: introduce exposure-mixtures
* gap in literature: no simulation study looking at interactions
* what we did: compare current methods for detecting interactions using simulation and a real-world study
* goals
  + benchmark current methods for detecting interactions
  + provide guidance about analytical approaches

**Models**

BKMR

BSR

GQCOMPINT

**Simulation example**

**Methods**

*NHANES data.* In order to make our simulations comparable to real-world exposure mixture studies, we based our simulation data on the XX. [Discuss the NHANES dataset.]

We followed the approach by XX for preparing the data for analysis.

*Simulating predictor data.* We simulated exposure and covariate data using a multivariate *t*-copula.

*Simulating predictor-response relationships.* Health outcome responses were simulated under several different scenarios, each of which included different effect sizes and functional forms for the interactions.

*Fitting models.* We ran four methods on our simulated datasets.

*Model assessment.* We assessed model performance based on detection of significant univariate chemicals as well as detection of interactions.

**Results**

X

**Application example**

**Methods**

X

**Results**

X

**Discussion**

X

**Conclusions**

X

**References**

1. National Academies of Sciences, Engineering, and Medicine, Division on Earth and Life Studies, Board on Environmental Studies and Toxicology, Committee on Incorporating 21st Century Science into Risk-Based Evaluations. *Using 21st Century Science to Improve Risk-Related Evaluations*. National Academies Press; 2017:24635. doi:10.17226/24635