

A photograph of a woman and two children washing their hands at a kitchen sink. The woman is in the background, smiling, and the children are in the foreground, focused on the task. The scene is brightly lit, suggesting a clean and healthy environment.

FLAME RETARDANT EXPOSURE ASSESSMENT: Findings from a Behavioral Intervention Study

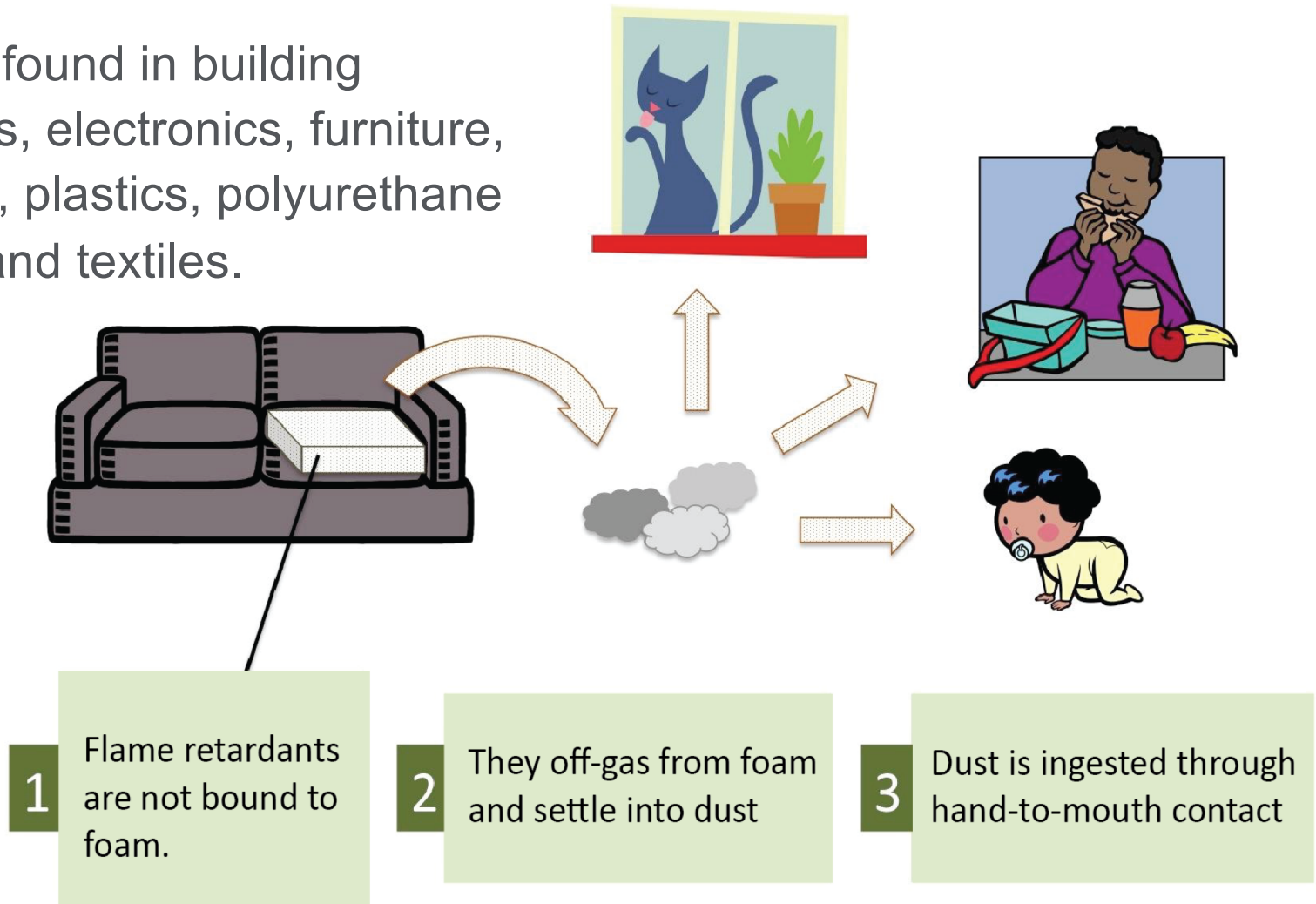
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Background: Flame Retardants

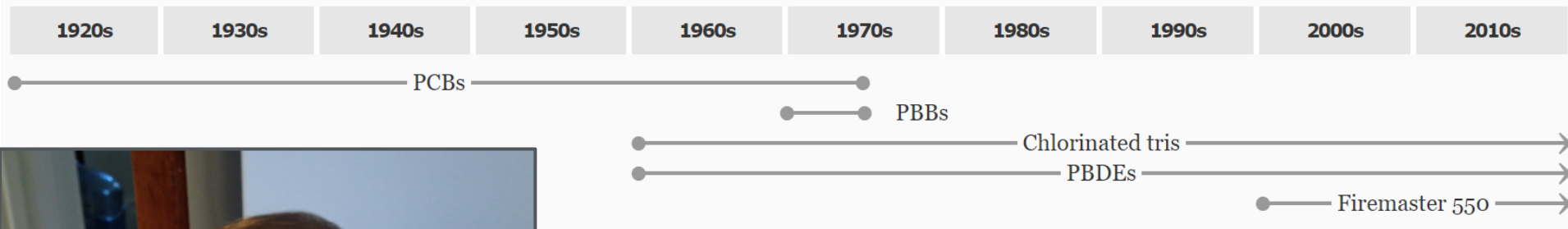
Chemicals found in building materials, electronics, furniture, vehicles, plastics, polyurethane foams, and textiles.



Exposure in Children is a Major Concern

New risks replace old ones

Records show that the U.S. government has allowed generation after generation of flame retardants onto the market without thoroughly assessing the potential health risks. Many of the chemicals remain in use today.



- Exposure constellation has changed over time.
- Children typically have more exposure than adults.
- Children are likely more sensitive to the effects of exposure
 - Developmental neurotoxicity



What does EPA say?



EPA-740-16-001
March 2016

REDUCING YOUR CHILD'S EXPOSURE TO FLAME RETARDANT CHEMICALS

- Wash your hands and your children's hands often, especially before eating.
- Dust frequently with a moist cloth.
- Wet mop or vacuum with a HEPA filter attachment often.
- Prevent small children from chewing on products that may contain these chemicals.
- Repair tears to upholstered furniture.
- Wipe and vacuum the interior of your car often as seats and dashboards contain flame retardant chemicals



Does it **WORK?**



Study Design

Study Population:

- Cohort: Sibling-Hermanos Study in Northern Manhattan/South Bronx

Study Sample:

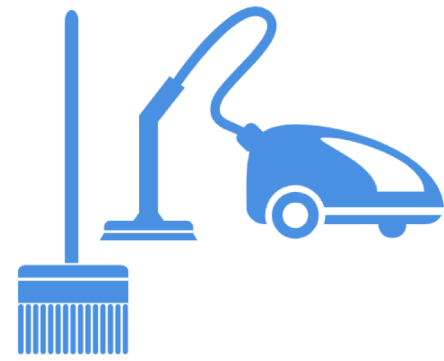
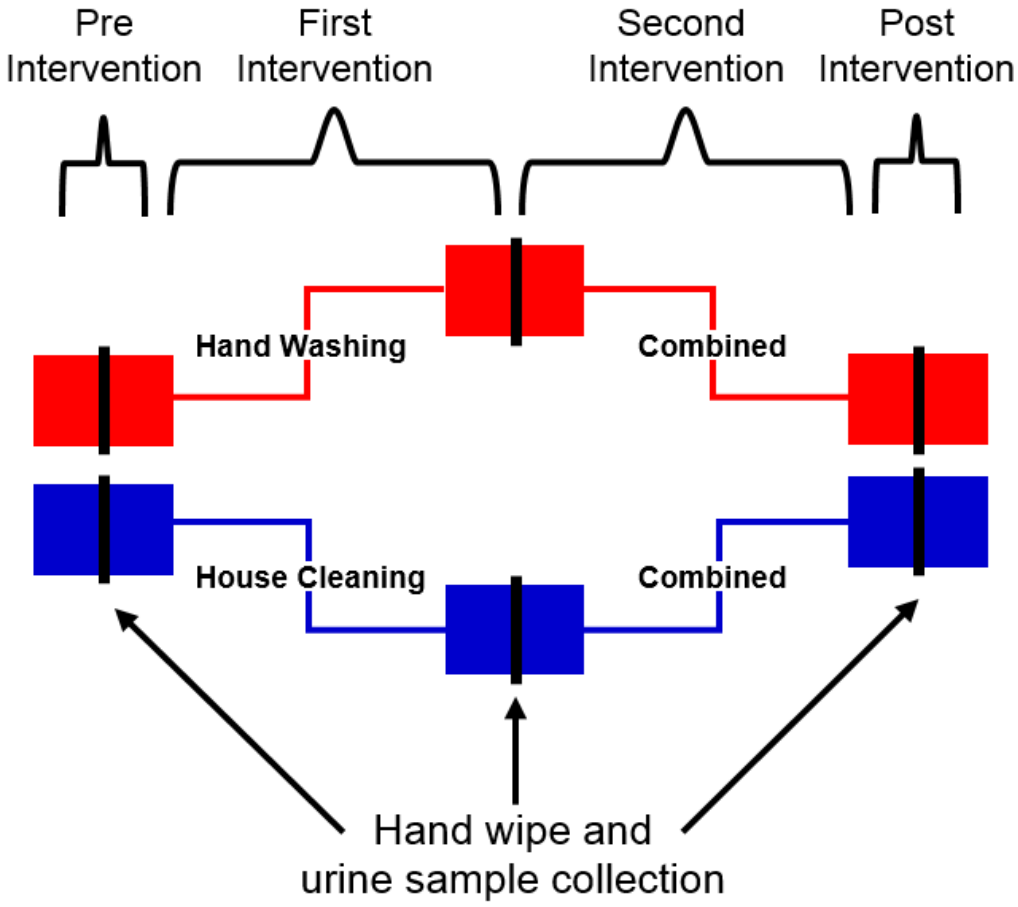
- 32 mothers and their 3-6 year old children
 - 16 African American
 - 16 Dominican

Timeframe:

- 2 weeks between December 2015 and May 2016



Study Design



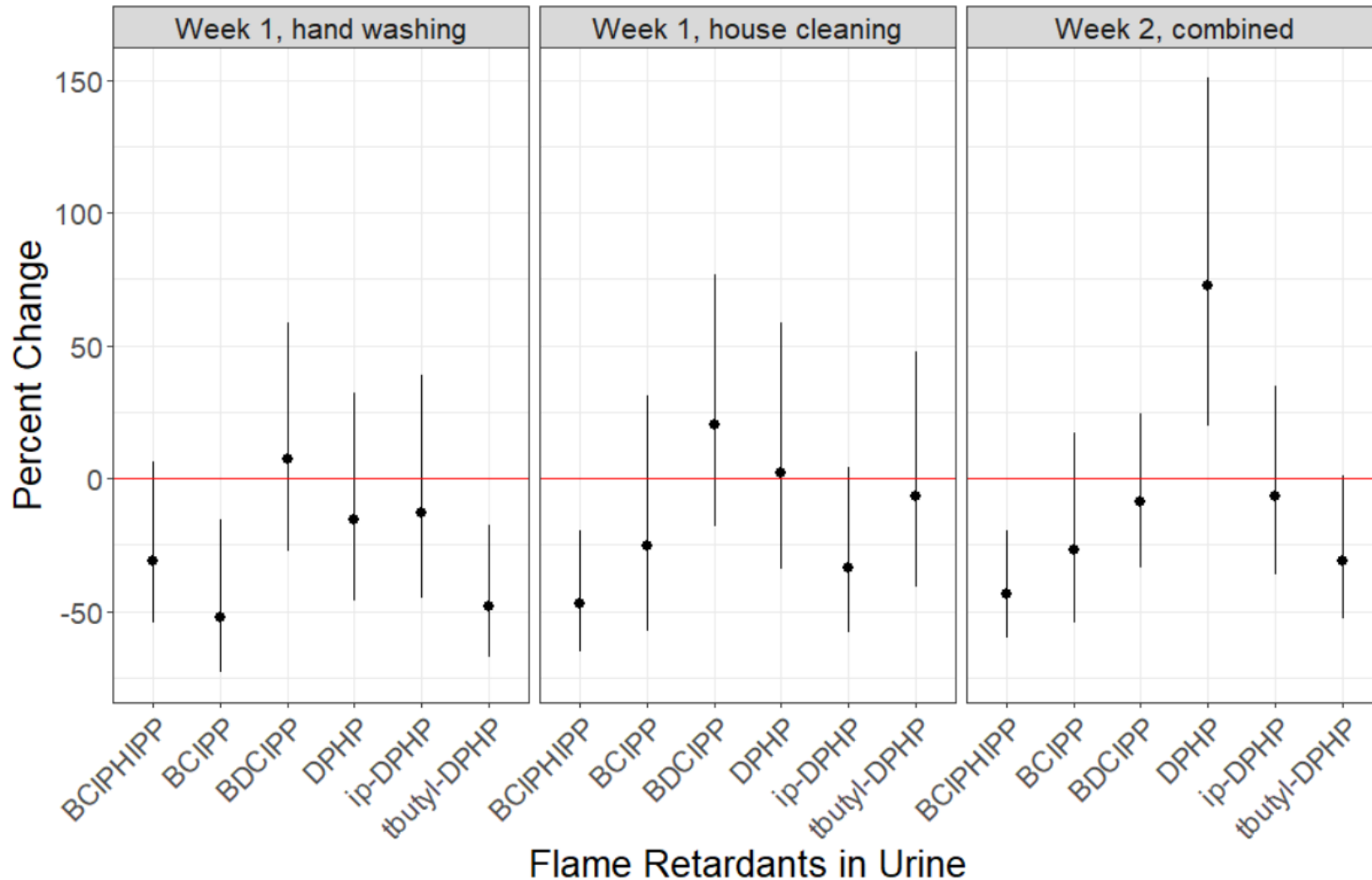
Measurements: only in mothers



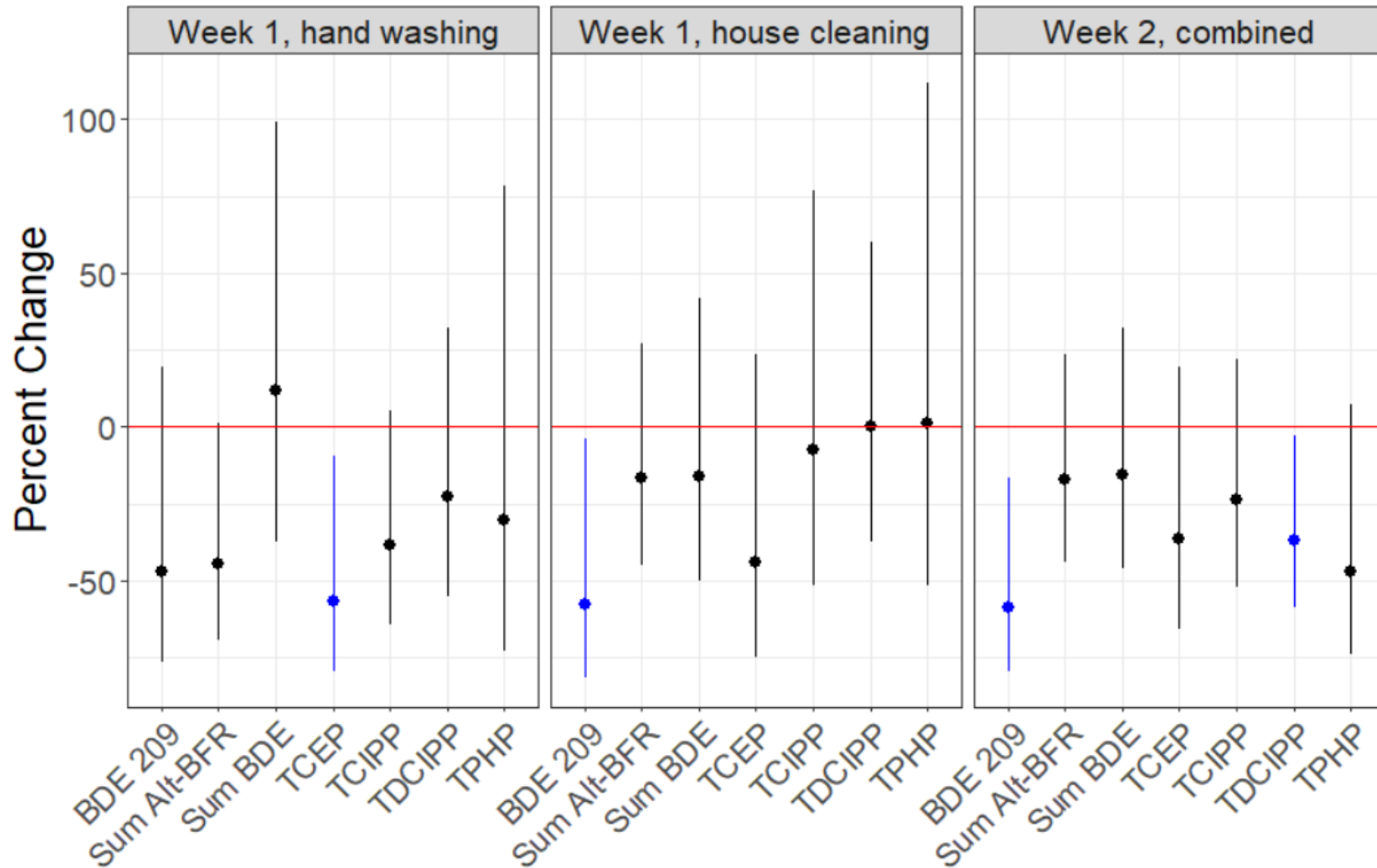
Parent compound on hand wipe	Urinary metabolite
TDCIPP	BDCIPP
TPHP	DPHP
TCIPP	BCIPP
	BCIPHIPP
TCEP	Not measured
Not measured	ip-DPHP
Not measured	tbutyl-DPHP
PBDEs	Not measured
Alt-BFRs	Not measured



Results: All women



Results: Baseline exposure above the median



Flame Retardants on Handwipes

Verified † No ‡ Yes



Conclusions

- 100% of participants had detectable levels of PBDEs, OPFRs, and Alt-BFRs at baseline.
- Both house cleaning and handwashing reduced exposure by up to 50%.
- This was most evident among individuals with "high" (above the median) exposure at baseline.
- No intervention reduced exposure below the limit of detection.
- Behavioral change can reduce but not eliminate flame retardant exposure.



Additional Thoughts/Caveats

- Only tested in mothers; does it also work in children?
- Evaluated only a 2 week period: are these behaviors sustainable?
- Hand washing is a habit that can be practiced anywhere; but house cleaning is only effective for exposure in homes.
- Given that exposure was reduced but not eliminated, this behavioral intervention is not a substitute for policy.



References

Full text (Open Access):

Gibson EA, Stapleton HM, Calero L, Holmes D, Burke K, Martinez R, Cortes B, Nematollahi A, Evans D, Herbstman JB. Flame retardant exposure assessment: findings from a behavioral intervention study. *J Expo Sci Environ Epidemiol*. 2019 Jan;29(1):33-48. doi: 10.1038/s41370-018-0049-6. Epub 2018 Jun 28.

<https://www.ncbi.nlm.nih.gov/pubmed/29950671>

Additional report comparing exposure in mothers and children:

Gibson EA, Stapleton HM, Calero L, Holmes D, Burke K, Martinez R, Cortes B, Nematollahi A, Evans D, Anderson KA, Herbstman JB. Differential exposure to organophosphate flame retardants in mother-child pairs. *Chemosphere*. 2019 Mar;219:567-573. doi: 10.1016/j.chemosphere.2018.12.008. Epub 2018 Dec 4.

<https://www.ncbi.nlm.nih.gov/pubmed/?term=30553217>



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