

# Pilot study of consumer product chemicals measured using silicone wristband monitors

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# Disclaimer

*The views expressed in this presentation are those of the authors and do not necessarily represent the views or the policies of the U.S. Environmental Protection Agency.*

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# Background

- Household and personal care products increasingly recognized as major sources of chemical exposure
- Increasing public awareness of chemical ingredients
- Vast array of products with considerable variability in formulations
- Use and co-use patterns can vary greatly
- Effective exposure assessment strategies call for novel and non- traditional methods





# Traditional exposure assessment strategies





National Institute of  
Environmental Health Sciences



# Are you absorbing chemicals from beauty products, cleaning supplies, and food packaging?

Healthy stay-at-home women, 35-74 years old, are needed for a new study on measuring chemicals in the body.

This study of exposure to consumer products is being conducted by the National Institute of Environmental Health Sciences, part of the U.S. Department of Health and Human Services, and the U.S. Environmental Protection Agency.

## What's required?

Volunteers will be in the study for 10 days. During that time, you will:

- Wear 5 small devices that measure air pollution, chemicals, and location



# Pilot Study Participants



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- Wear 5 small devices that measure air pollution, chemicals, and location
- Record the products you use in a diary and photograph them on an iPad (provided)
- Take iPad videos of requested products
- Answer questions about chemical ingredients in your personal care products
- Collect daily urine samples

Volunteers will be compensated between \$100 and \$1,500, depending on completion of study activities.

Before the start of the study, a researcher will come to your home to install air samplers inside and outside of your home and record all consumer products in the house. The researcher will also return to your home every other day to collect samples.

### Who can participate?

Healthy women aged 35-74, who:

- Are not currently pregnant
- Use consumer products daily
- Spend a majority of time at home
- Live in or around Raleigh, Durham, and Chapel Hill, North Carolina

The definition of healthy for this study means that you feel well and can perform normal activities. If you have a chronic condition, such as high blood pressure, healthy can also mean that you are being treated and the condition is under control.

Call 1-855-696-4347.

Ages ~36 to 45

Daily product users

At home > 16 hours/day

Not pregnant

Non-smokers

# Intensive Monitoring

## **What's required?**

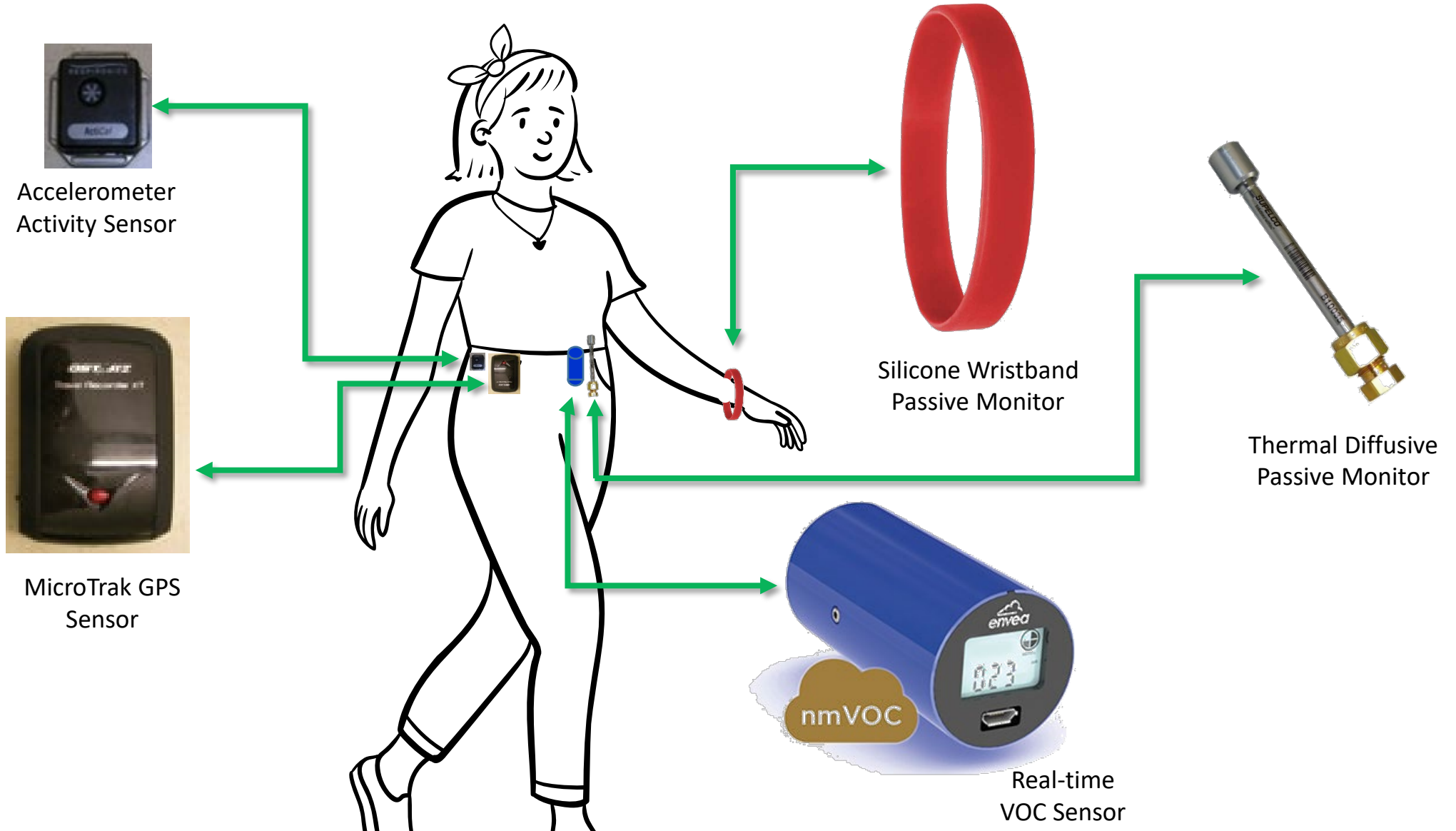
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# 5 small devices to measure chemicals & location



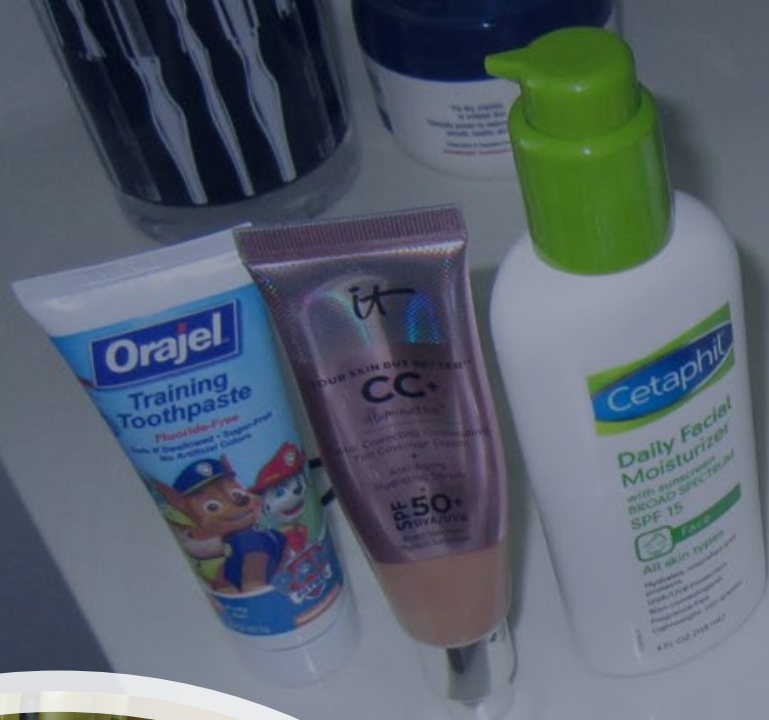


# Silicone Wristband Passive Monitor



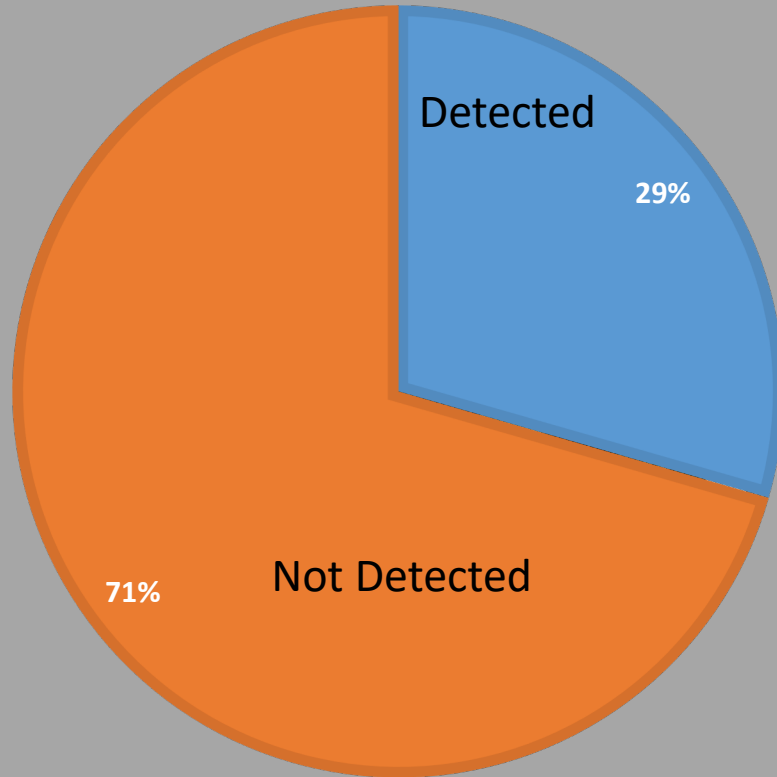
- Developed by Oregon State University
- Commercial wristbands cleaned using solvent extraction
- Targeted MS methods for 340 compounds
- “Many Analyte Screen” by GC-MS and deconvolution software (>1400 compounds)
- Predicts compound specific response factor from each chemical’s physchem properties
- Standards limited to a few check compounds



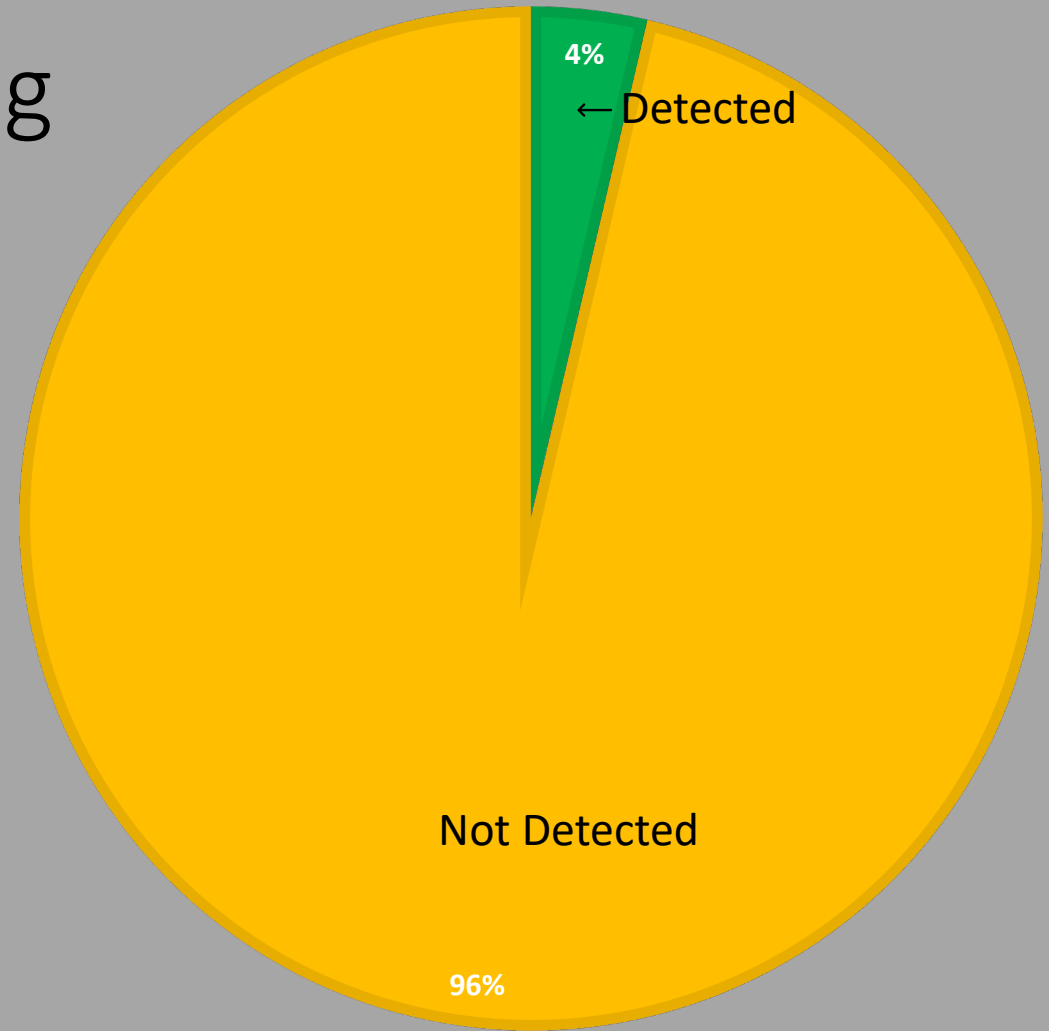


# Chemical detection rate: Much lower with screening

TARGETED



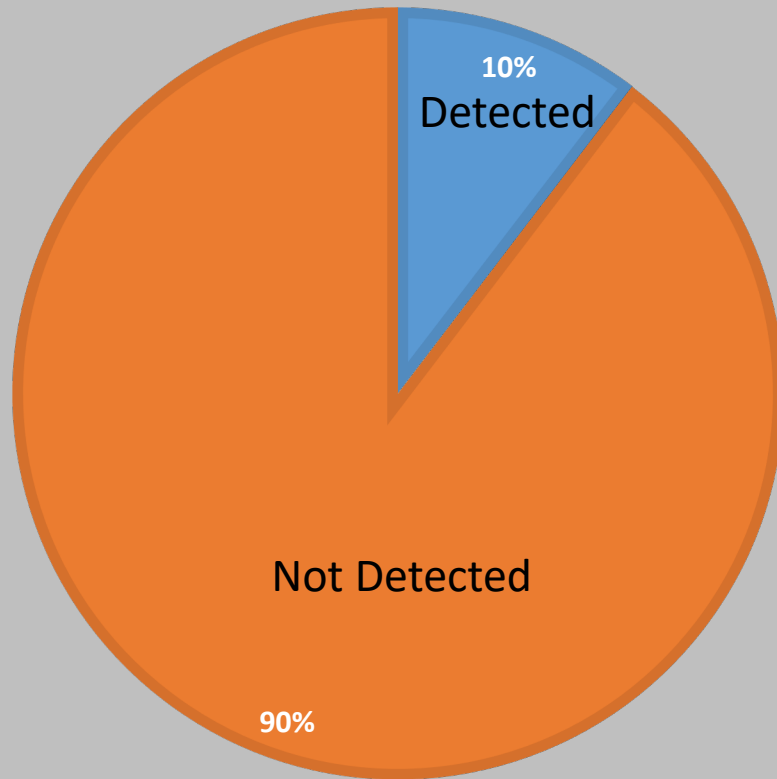
SCREENING



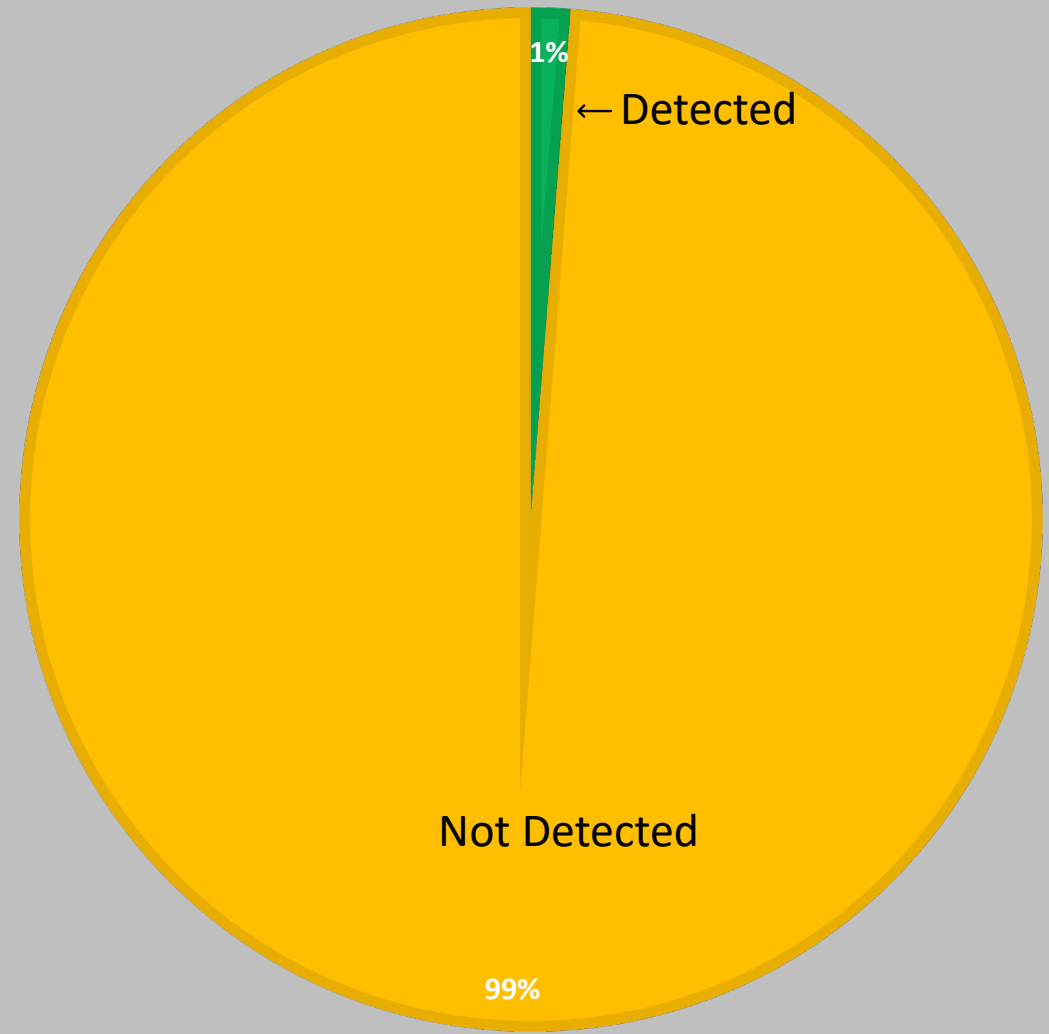


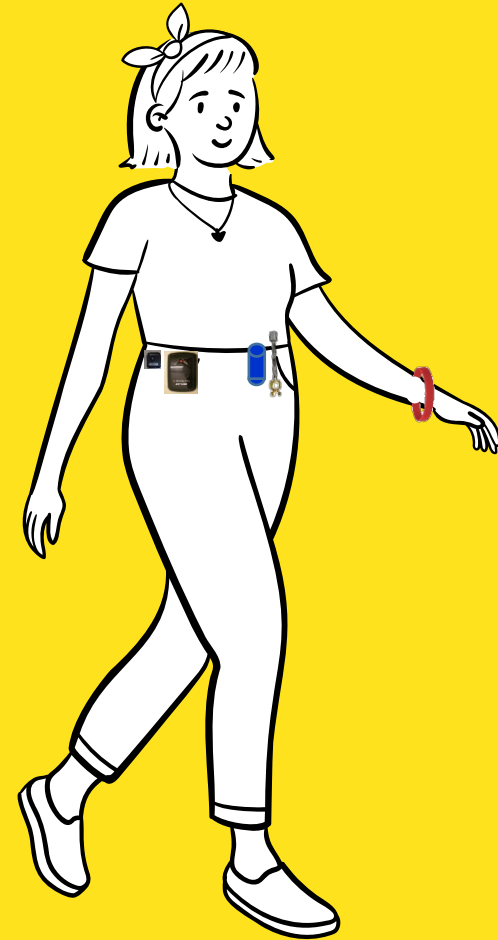
# Individual measurements: Again, screening is lower

TARGETED

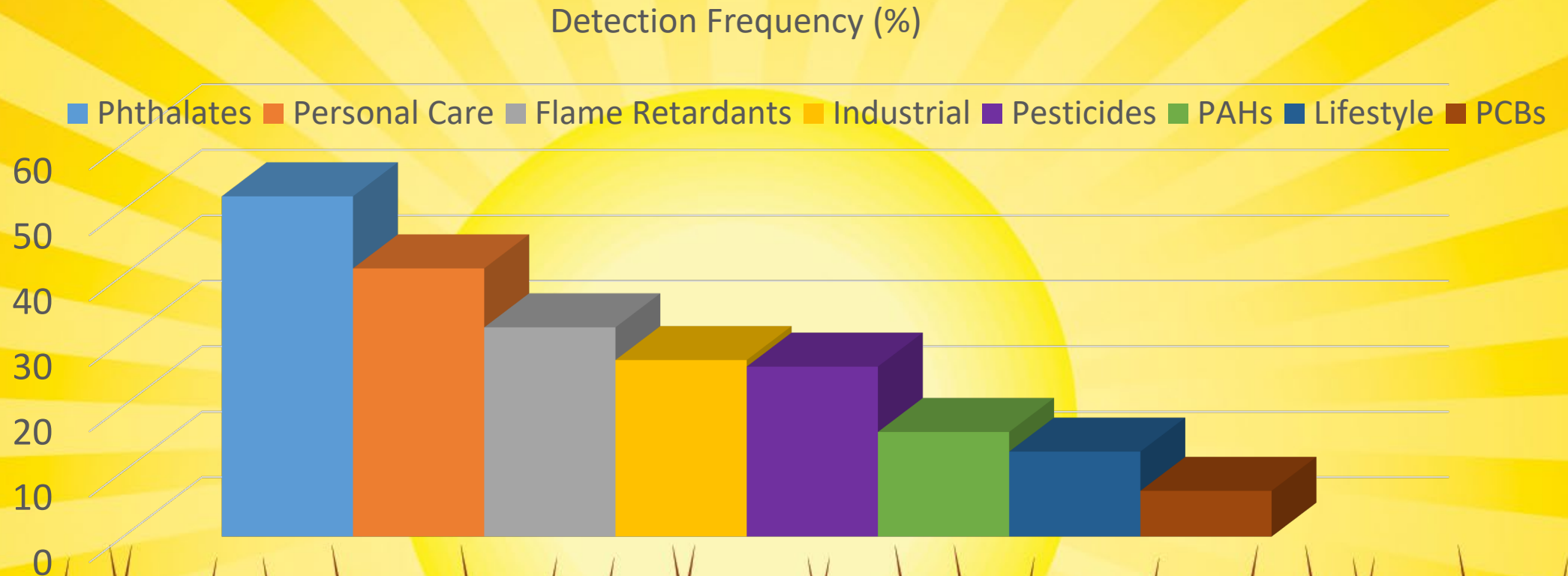


SCREENING





# Types of chemicals detected





# Specific chemicals detected

## PHTHALATES

Bis(2-ethylhexyl)phthalate

Butyl benzyl phthalate

Di-n-butyl phthalate

Di-n-hexyl phthalate

Di-n-nonyl phthalate

Dicyclohexyl phthalate

Diethyl phthalate

Diisobutyl phthalate

Dimethyl phthalate

## PERSONAL CARE PRODUCTS

Amyl cinnamal

b-Citronellol

Benzyl salicylate

Celestolide

Cinnamaldehyde

Cinnamyl alcohol

Coumarin

Ethylene brassylate

Galaxolide

Hydroxy-citronellal

a-Ionone

b-Ionone

d-Limonene

Linalool

Tonalide

## FLAME RETARDANTS

PBB-1

TCPP

Triphenyl  
phosphate (TPP)

Triethyl phosphate  
(TEP)

# Specific chemicals detected

## PERSONAL CARE PRODUCTS

Amyl cinnamal

Ethylene brassylate

b-Citronellol

Galaxolide

Benzyl salicylate

Hydroxy-citronellal

Celestolide

a-Ionone

Cinnamaldehyde

b-Ionone

Cinnamyl alcohol

d-Limonene

Coumarin

Linalool

Tonalide



# Summary

- Silicone wristband passive samplers provide *opportunity* to measure substances
- Low hit rate suggests need for longer sampling periods
- Categories of chemicals with highest detection frequencies correspond to expectations
- Results suggest exposure to personal care product ingredients not typically targeted in residential exposure studies
- It is easy to get carried away with PowerPoint's "morph" feature



# Acknowledgements

- Kris Thayer
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- NIEHS Clinical Research Unit
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