The role of house dust in exposure to flame retardants

A study among Dutch toddlers

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Hypothesis

Personal exposure to house dust marks an increased risk of exposure to flame retardants

Observational cohort study

... using a pre- and post-measurement

The home visit

LINC-cohort

Children 9 – 14 months old

5 minutes	5 minutes	30 minutes	5 minutes	10 minutes	5 minutes
Introduction *(Researcher)*	Handwipe Mouthwipe Backwipe *(Parent)*	Observation *(Researcher)* Questionnaire *(Parent)*	Handwipe Mouthwipe Backwipe Saliva swab *(Parent)*	Vacuuming 1. Floor 2. Surface 3. Electronic devices *(Researcher)*	Finishing up *(Researcher)*

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Hand, mouth & backwipes

5x5 cm gauze pads

3% isopropanol

Non-latex gloves

Parent collected

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Observation

Hand – object frequency

Mouth – object frequency

Hand – mouth frequency

Object	Hand-object	Mond-object
Dier		
Elektronica	III	
Handen – mond	*(hand-hand)*	*(hand-mond)*
Hout		
Kleding/handdoek		
Lichaam/persoon		
Metaal		
Meubilair		
Papier		
Plant		
Plastic		~~IIII~~ IIII
Schoeisel		
Speelgoed(anders)		
Steen/muur		
Vloer		
Vloerkleed		
Voedsel		
Water/drinken		

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Questionnaire

Home characteristics

floor type (e.g. wood, tiles, carpet)

Electronic equipment characteristics

number, brand name and year of purchase

Psycho-motor development

crawling, object-mouth behavior

Cleaning

frequency of vacuuming and dusting

Hand washing/use of lotions

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Saliva swab

Salimetrics Children Swab

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Vacuuming

Vacuum cleaner present

DUSTREAM filter and collector

***Floor**: depending on type: 1 – 4 m^2 ; or more*
***Surface**: diner table, coffee table, side table, other*
***Electronic devices**: on and around equipment*

All dimensions recorded

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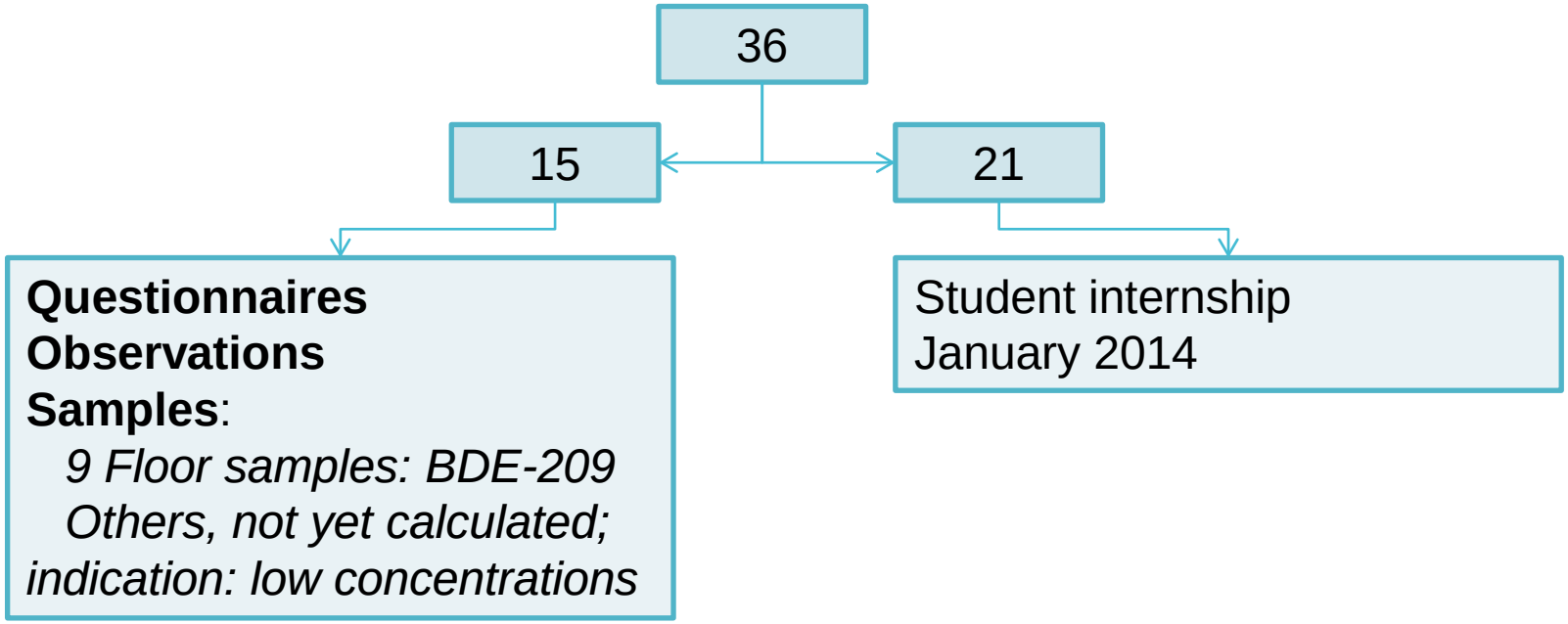
Status


36
15
21
Questionnaires
Observations
Samples:
9 Floor samples: BDE-209
Others, not yet calculated;
indication: low concentrations
Student internship
January 2014

Characteristics study population

		Mean (*SD*)	N (%)
Gender infant	Male		10 (67)
	Female		5 (33)
Age infant (months)		12.4	
Education level parents	< Higher vocational education or university		4 (27)
	≥ Higher vocational education or university		11 (73)
Ethnicity	Dutch		13 (87)
	Non-Dutch *(≥1 parent born in other country)*		2 (13)

PBDE-209 floor concentrations

BDE-209 (ng/g)
345.9
122.1
119.0
92.7
67.0
60.1
56.0
29.2
27.3

Mean 102.1 ng/g

Median 67.0 ng/g

Germany:
median: 74 ng/g,
range: 17–550 ng/g dust [1]
Belgium:
median 313 ng/g,
range: 5–5295 ng/g dust [2]

[1] Sjödin A. et al, 2008; [2] D'Hollander W. et al, 2012

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Clean environment

Frequent vacuuming and dusting

73% ≥ 3 times a week

Clean environment

93% smooth floor

Age of electronics

Median year of purchase television 2008

Highest concentration measured in house with oldest television

Overall..

Amount of data still limited

Participants

- *Are frequently cleaning*
- *Live in a clean environment*
- *Are highly educated*
- *Have new electronic devices*

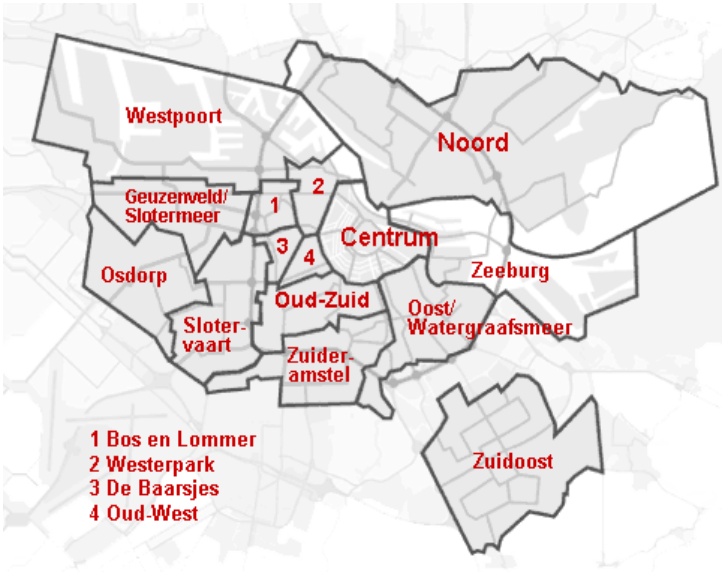
Therefore…

Novel flame retardants

- *Organophosphates*
  - resorcinol bis (diphenylphosphate) (RDP)
  - bis phenol A bis (diphenylphosphate) (BDP)

Further recruitment

Recruitment in Amsterdam (2013-2014)



1. Rich research potential
   1. Overall population heterogeneity
      1. *Size;*
      2. *National and Ethnic variability;*
      3. *Variable wealth distribution across the city;*
      4. *Diversity in building structures, age of/time of renovations*

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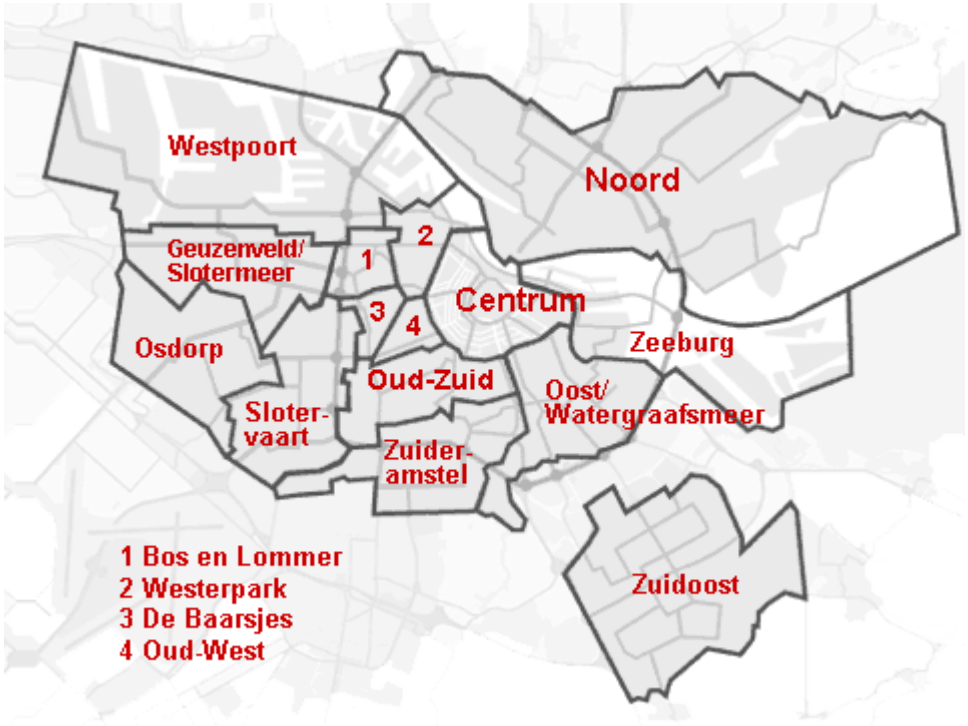
Areas of interest:



Amsterdam's neighbourhoods have differential socio-economic profiles, which we believe may reveal different flame retardant profiles related to a number of factors including (but not limited to):

1. Educational and income level;
2. Head of household;
3. Number of electronics;
4. Type of flooring;
5. Hand washing practices;
6. Knowledge of FR's
7. Age and materials of the home/last renovation;
8. Ethnic group membership

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Recruitment in Amsterdam (continued)….

…we hope that this will afford us more diversity and a greater depth of understanding in:

1. The types of flame retardants we observe-
   new vs. old use
2. Understanding the role that different hand-washing and house-keeping strategies play for mediating exposure (for larger Public Health Information/Health Policy)
3. Elucidating the differences of exposures across differential ethnic and socio-economic groups

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Recruitment Scheme (2013-2014)

Multiple strategies:

1. Recruitment through Youth Health Care (YHC)
   -Introduction through health care worker
   -Approach women during “well-checks” (rolling recruitment between scheduled visits) 6-11 months

3. Approach directly Turkish and Moroccan community members
   - Facilitate this through student association at the VU

2. Approach directly community members
   - Personal networking; convenience; word of mouth

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Research Methods

Same methodology used for the Zwolle cohort:

Multi-tiered approach:

-Observation

-post Hand-wipe, mouth-wipe, back-wipe measurement

-Rompers

-Electronic device sampling (*change*-via wipe)

-Floor sampling (via vacuum)

-Questionnaire (*change*-questions added about ethnicity/nationality; a multiple choice question regarding income; parent knowledge of FR's).

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Future Endeavours

-Will hire and supervise two students during spring 2014

-focus on research methods, data analysis, literature searching and scientific writing in English

-Recruit, collect data, analyse, write, and publish findings!

-Pursue either of the three following directions:

1. Post-doc: *continue research from an "environmental perspectives" point of view; interest in SES variations (and supporting theories of) differential patterns of environmental exposures).*

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Future Endeavours

2. Continue research from a Health Policy perspective with regards to environmental exposures and vulnerable groups

3. Lean towards the field of Science/Health Communication

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Thank you!!!!!