

Supplementary to:

Lysmeral Exposure in Children and Adolescents Participating in the German Environmental Survey (2012-2015): Integrating Sex/Gender into Analysis

Authors

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Table S1 *Variables considered for extended sex/gender analysis*

| Facet | Variable name |
|--|---|
| Individual sex/gender self concept | |
| Sex assigned at birth | Sex assigned at birth |
| Phenotype at birth | NA |
| current sex phenotype | NA |
| current sex/gender identity | NA |
| internalised sex/gender roles | NA |
| externalised sex/gender expressions | NA |
| Items contributing to explain structural sex/gender relations | |
| Income | Monthly net income |
| Social Status | SES-Subscore: occupational status (GerES) |
| | SES-Subscore: education/training (GerES) |
| | SES-Subscore: income (GerES) |
| | SES total score (GerES) |
| Family situation | Family situation: With whom does the child mainly live? (GerES) |
| | Number of persons per household (GerES) |
| | Only child (GerES) |
| | Permanent partner: mother/father (GerES) |
| | Cohabitation with permanent partner of mother/father (GerES) |
| | Civil status (mother/father) (GerES) |
| | Scale value family ties |
| Disability | Officially recognized disability |
| | Degree of disablement categorized (GerES/KFB) |
| <i>Sexual Orientation</i> | <i>Derived from variable Discrimination: Sexual Orientation</i> |
| <i>Religion</i> | <i>Derived from variable Discrimination: Religion/Faith</i> |
| Ethnicity | Migration Status |
| | Migrant Group (mother) (GerES; KiGGS0 + KiGGS2) |
| | Migrant Group (father) (GerES; KiGGS0 + KiGGS2) |
| | Length of residency (parents) |
| | Length of residency (parents) kat. |
| | Country of Origin |
| | Country of Origin (by Region) |
| | Immigration Generation |
| | Residential Status (parents) |
| | Region of Birth (UN) |
| | Region of Birth (WHO) |
| | Region of Birth (Destatis) |
| | Region of Origin (UN) |
| | Region of Origin (WHO) |

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| | |
|-----------------------------------|---|
| | Region of Origin (Destatis) |
| Child's Education | Which school (GerES) Highest degree of child (expected) |
| Expectations of child's education | Aspired level of degree (school) Which school performance do you expect from your child? (passing) (GerES) Which school performance do you expect from your child? (effort) (GerES) Which school performance do you expect from your child? (learning targets) (GerES) |
| Education of parents | Highest school degree (mother) (GerES) Highest school degree (father) (GerES) |
| Occupation | Current main occupation (coded) Highest professional qualification (mother) (GerES) Highest professional qualification (father) (GerES) Professional Position (mother) (GerES) Professional Position (father) (GerES) Employment (mother) (GerES) Employment (father) (GerES) |
| Employment | Degree of Employment (mother) (GerES) Degree of Employment (father) (GerES) |
| Care activities | Current main occupation (coded) Housekeeping load (GerES) |

Lifestyle and Psychological Factors

| | |
|--------------------------------|---|
| Perception of stress | Financial Worries (GerES) Strain b/c care work in the family (GerES) Strain b/c sole responsibility parenting (GerES) Strain b/c sick family members/ family members in need of care (GerES) Strain b/c conflicts with children/problems with raising children (GerES) Strain b/c conflicts with (former) partners Strain b/c other family members (GerES) Strain b/c living alone/loneliness (GerES) Strain b/c employment situation or unemployment (GerES) Strain b/c little appreciation of house/family work (GerES) Strain b/c chronically ill child/child with disability (GerES) Strain b/c difficulties with compatibility work and family (GerES) Overall strain in everyday life (GerES) |
| Parents on emotional situation | SDQ emotional problems, German standardization (GerES) SDQ behavioral problems, German standardization (GerES) SDQ inattention/hyperactivity, German standardization (GerES) SDQ Peer problems, German standardization (GerES) SDQ pro-social behavior, German standardization (GerES) |

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| | |
|-------------------------|--|
| Parents on difficulties | SDQ total problem score, German standardization (GerES) |
| | SDQ impact score (GerES) |
| | SDQ impact score categorized (GerES) |
| | SDQ impact score – high-risk group (GerES) |
| | SDQ internalizing problems (GerES) - Cutoff (analog Haller et al 2016) |
| | SDQ externalizing problems (GerES) - Cutoff (analog Haller et al 2016) |
| Emotional difficulties | Scale value SDQ emotional difficulties (GerES) |
| | SDQ emotional difficulties, German standardization (GerES) |
| | SDQ behavioural problems, German standardization (GerES) |
| | SDQ inattention/hyperactivity, German standardization (GerES) |
| | SDQ peer-Problems, German standardization (GerES) |
| | SDQ pro-social behavior, German standardization (GerES) |
| | SDQ total problem score, German standardization (GerES) |
| Quality of Life | Quality of Life: feeling well |
| | Quality of Life: energy |
| | Quality of Life: sadness |
| | Quality of Life: loneliness |
| | Quality of Life: time |
| | Quality of Life: leisure time |
| | Quality of Life: being treated fairly |
| | Quality of Life: fun with friends |
| | Quality of Life: school |
| | Quality of Life: concentration |
| | Quality of Life: exercise |
| | Quality of Life: running |
| | Quality of Life: liking life |
| | Quality of Life: being in good mood |
| | Quality of Life: fun |
| | Quality of Life: feeling bad |
| | Quality of Life: being satisfied with oneself |
| | Quality of Life: time with mother/father |
| | Quality of Life: talking to mother/father |
| | Quality of Life: money to spend with friends |
| | Quality of Life: money to spend on things |
| | Quality of Life: time with friends |
| | Quality of Life: friends helping each other |
| | Quality of Life: being able to rely on friends |
| | Quality of Life: happy at school |
| | Quality of Life: teachers |
| | Body Perception |
| | Self-image |
| Diet | Vegetarian |

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Operationalization of Sex/Gender

Children/adolescents on social support

- Someone who listens
- Someone who shows love/affection
- Someone for having fun with
- Someone who offers information
- Someone who hugs you
- Someone to relax with
- Someone to find a distraction for you
- Someone who needs/loves you
- Scale value social support

Exposition

- Use of sanitary cleaners
- Use of fabric softeners
- Use of floor cleaners
- Use of textile protectants
- Use of air sprays
- Use of fragrances and flavourings
- Use of sunscreen
- Use of body wash/shower gel
- Use of body lotions and creams
- Use of deodorant
- Use of shampoo
- Use of hair styling products
- Use of perfumes
- Use of nail polish
- Use of eye make up
- Use of face make up

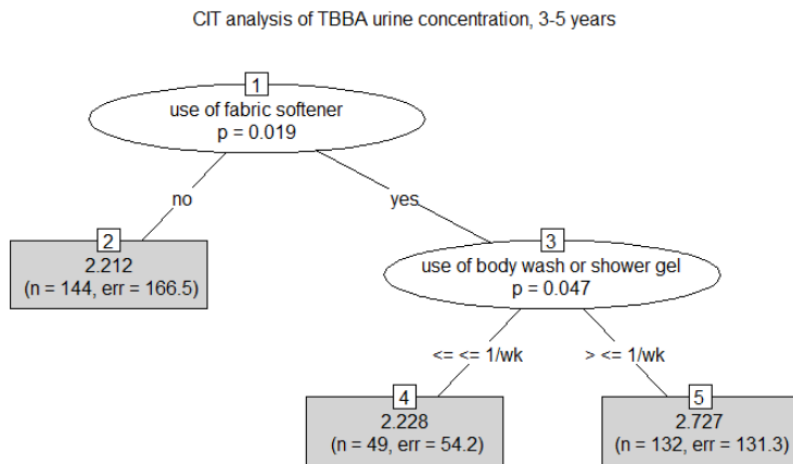
Standard variables of GerES V (if not covered under previous dimensions, Murawski et al. 2020)

- Municipality Size
- East Germany/West Germany (Berlin divided)

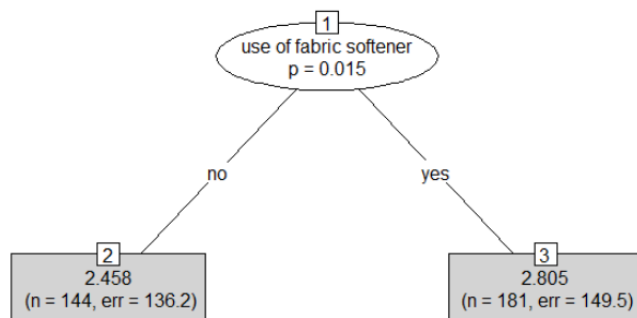
Biological variables

- Size
- Weight
- BMI (Kromeyer-Hauschild)
- Body surface (Mosteller, 1987)
- Body surface (Du Bois & Du Bois, 1989)
- Creatinine

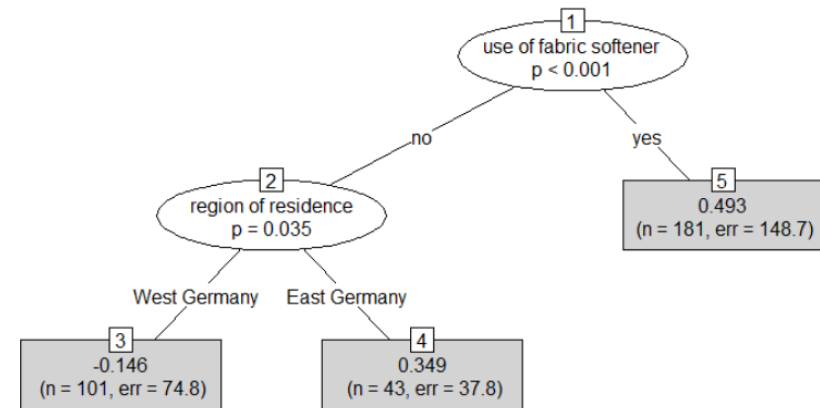
Figure S1 CIT analysis of metabolites urine concentration in 3-5-year-olds



CIT analysis of TBBA urine concentration (creatinine-adjusted), 3 bis 5 Jahre



CIT analysis of lysmerol urine concentration, 3-5 years



CIT analysis of lysmerol urine concentration (creatinine-adjusted), 3 bis 5 Jahre

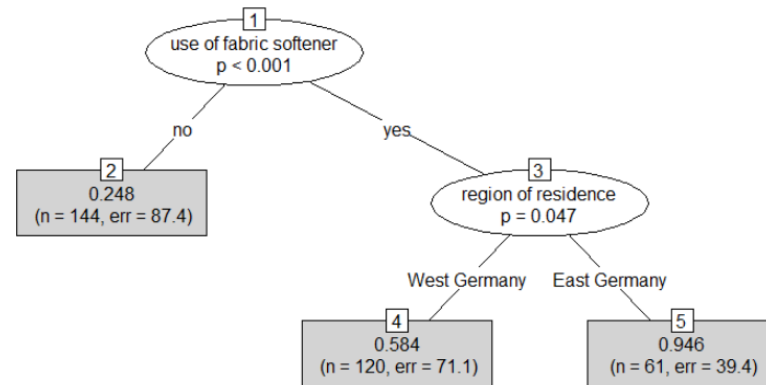
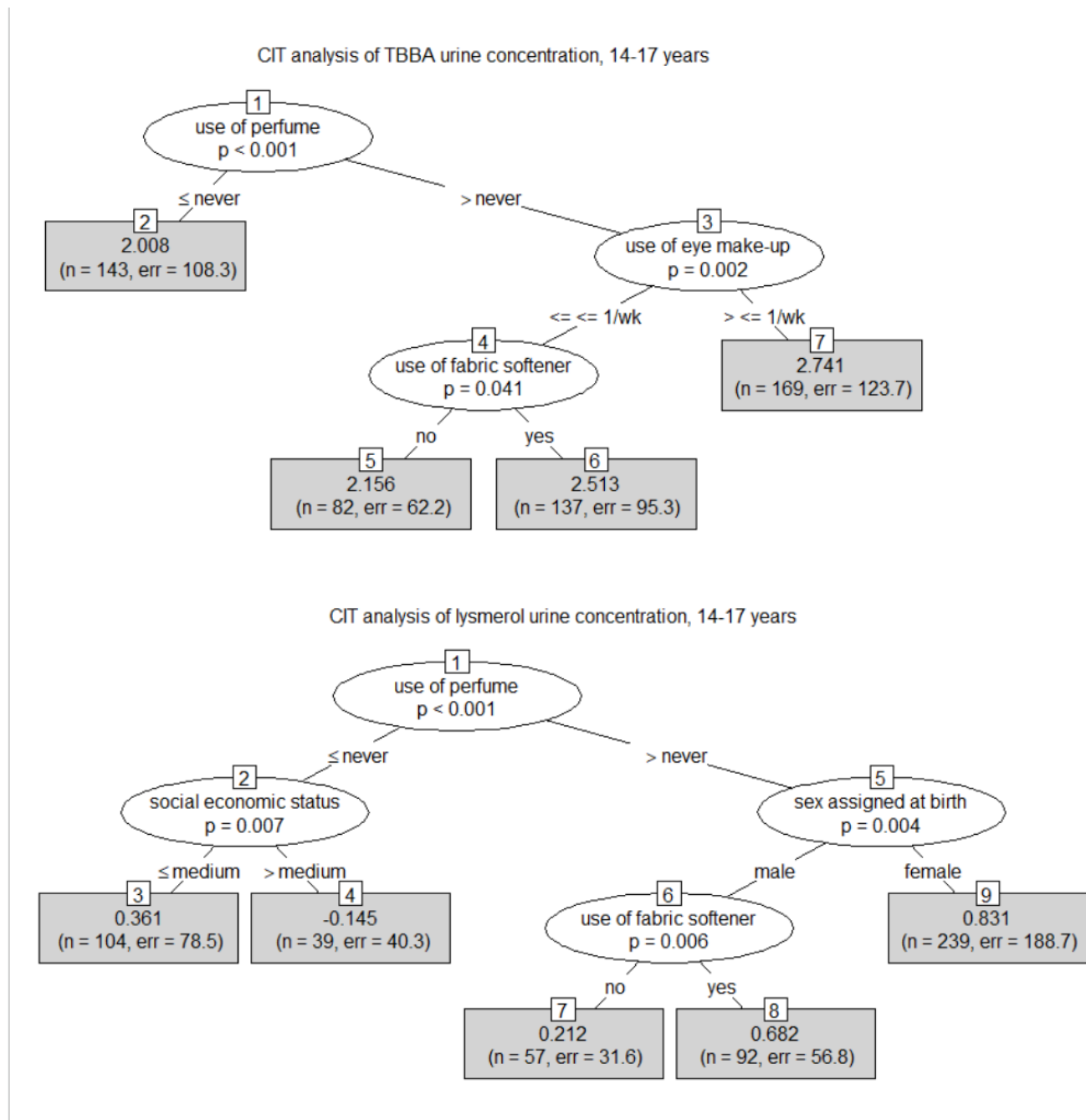
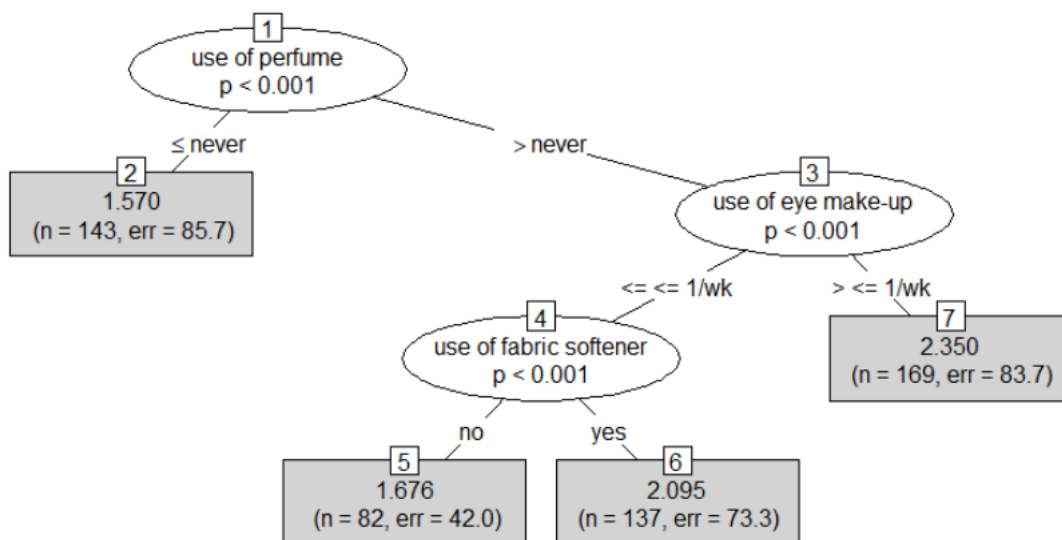


Figure S2 CIT analysis of metabolites urine concentration in 14-17-year-olds



Supplementary to: Lysmeral exposure in Children and Adolescents participating in German Environmental Survey (2012-2015): Operationalization of Sex/Gender

CIT analysis of TBBA urine concentration (creatinine-adjusted), 14 bis 17 Jahre



CIT analysis of lysmerol urine concentration (creatinine-adjusted), 14 bis 17 Jahre

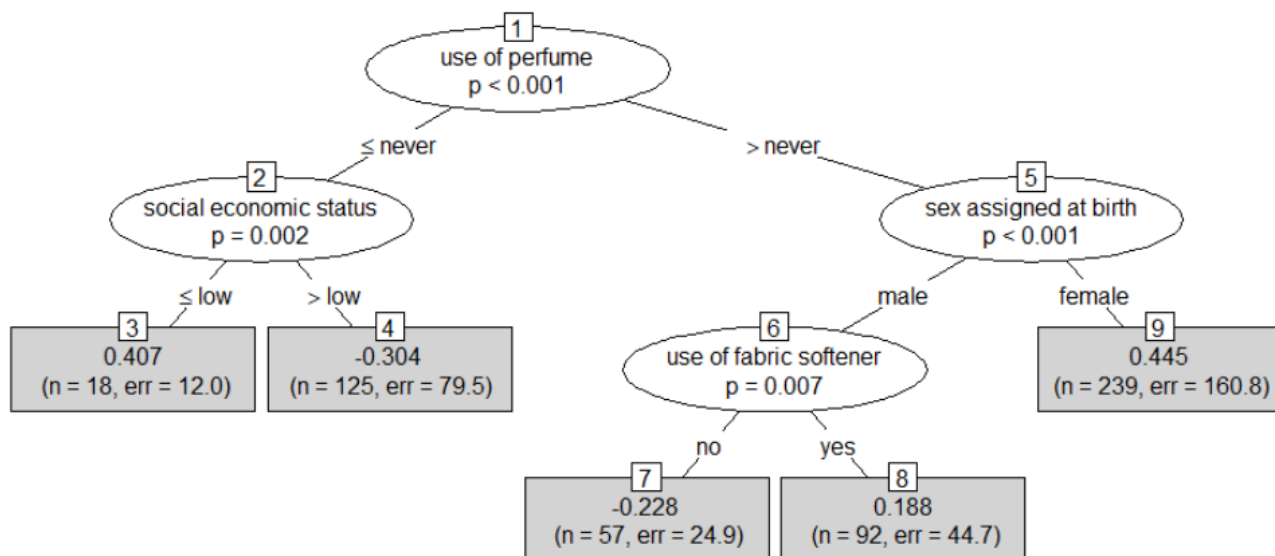


Table S2 Results of the logistic regression analysis for the urinary TBBA and lysmerol concentration of GerES V participants.

| Predictors | TBBA | | | | | Lysmerol | | | | |
|---------------------------------------|---------|------|---------------|-----------|----------|----------|------|---------------|-----------|----------|
| | β | SE | CI | Statistic | <i>p</i> | β | SE | CI | Statistic | <i>p</i> |
| (Intercept) | 0.99 | 0.23 | 0.54 – 1.44 | 4.33 | <0.001 | -0.67 | 0.21 | -1.07 – -0.26 | -3.19 | 0.001 |
| sex assigned at birth | | | | | | | | | | |
| male ^a | | | | | | | | | | |
| female | 0.16 | 0.05 | 0.07 – 0.25 | 3.54 | <0.001 | 0.10 | 0.04 | 0.02 – 0.18 | 2.43 | 0.015 |
| age group | | | | | | | | | | |
| 3-5 years ^a | | | | | | | | | | |
| 6-10 years | -0.40 | 0.06 | -0.52 – -0.29 | -6.91 | <0.001 | -0.15 | 0.05 | -0.26 – -0.05 | -2.84 | 0.005 |
| 11-13 years | -0.67 | 0.07 | -0.80 – -0.54 | -10.21 | <0.001 | -0.33 | 0.06 | -0.45 – -0.21 | -5.47 | <0.001 |
| 14-17 years | -0.88 | 0.08 | -1.03 – -0.73 | -11.61 | <0.001 | -0.45 | 0.07 | -0.58 – -0.31 | -6.46 | <0.001 |
| use of fabric softener | | | | | | | | | | |
| no ^a | | | | | | | | | | |
| yes | 0.23 | 0.04 | 0.15 – 0.31 | 5.48 | <0.001 | 0.26 | 0.04 | 0.19 – 0.33 | 6.88 | <0.001 |
| use of perfume | | | | | | | | | | |
| never ^a | | | | | | | | | | |
| up to once per week | 0.08 | 0.05 | -0.02 – 0.19 | 1.55 | 0.121 | 0.07 | 0.05 | -0.03 – 0.16 | 1.41 | 0.159 |
| more than once per week | 0.30 | 0.06 | 0.18 – 0.43 | 4.69 | <0.001 | 0.23 | 0.06 | 0.12 – 0.35 | 3.94 | <0.001 |
| use of air freshener | | | | | | | | | | |
| no ^a | | | | | | | | | | |
| yes | 0.04 | 0.04 | -0.04 – 0.13 | 0.98 | 0.327 | 0.06 | 0.04 | -0.02 – 0.14 | 1.37 | 0.171 |
| use of body wash or shower gel | | | | | | | | | | |
| never ^a | | | | | | | | | | |
| up to once per week | 0.05 | 0.15 | -0.25 – 0.36 | 0.35 | 0.728 | -0.09 | 0.14 | -0.36 – 0.19 | -0.61 | 0.545 |
| more than once per week | 0.28 | 0.15 | -0.01 – 0.58 | 1.88 | 0.061 | 0.13 | 0.14 | -0.14 – 0.39 | 0.92 | 0.360 |
| use of body lotion | | | | | | | | | | |
| never ^a | | | | | | | | | | |

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|---|---------------|------|--------------|-------|--------------|---------------|------|---------------|-------|------------------|
| less than once per week | 0.07 | 0.06 | -0.05 – 0.18 | 1.17 | 0.242 | 0.01 | 0.05 | -0.10 – 0.11 | 0.11 | 0.915 |
| once per week | 0.08 | 0.06 | -0.04 – 0.20 | 1.24 | 0.215 | 0.06 | 0.06 | -0.05 – 0.17 | 1.11 | 0.269 |
| more than once per week | 0.12 | 0.05 | 0.01 – 0.22 | 2.20 | 0.028 | 0.05 | 0.05 | -0.04 – 0.15 | 1.07 | 0.287 |
| region of residence | | | | | | | | | | |
| former West Germany ^a | | | | | | | | | | |
| former East Germany | 0.02 | 0.04 | -0.06 – 0.10 | 0.52 | 0.603 | 0.15 | 0.04 | 0.08 – 0.23 | 3.97 | <0.001 |
| use of eye make-up | | | | | | | | | | |
| never ^a | | | | | | | | | | |
| up to once per week | -0.09 | 0.08 | -0.25 – 0.06 | -1.20 | 0.231 | -0.01 | 0.07 | -0.15 – 0.14 | -0.09 | 0.926 |
| more than once per week | 0.18 | 0.08 | 0.03 – 0.33 | 2.30 | 0.022 | 0.16 | 0.07 | 0.03 – 0.30 | 2.32 | 0.021 |
| use of floor cleaners | | | | | | | | | | |
| no ^a | | | | | | | | | | |
| yes | 0.13 | 0.04 | 0.05 – 0.20 | 3.33 | 0.001 | 0.04 | 0.04 | -0.03 – 0.11 | 1.11 | 0.268 |
| highest professional qualification | | | | | | | | | | |
| foreign ^a | | | | | | | | | | |
| no qualification (yet) | 0.35 | 0.16 | 0.03 – 0.67 | 2.16 | 0.031 | 0.33 | 0.15 | 0.04 – 0.62 | 2.21 | 0.027 |
| vocational training | 0.40 | 0.15 | 0.11 – 0.70 | 2.66 | 0.008 | 0.31 | 0.14 | 0.05 – 0.58 | 2.30 | 0.022 |
| graduate degree | 0.37 | 0.16 | 0.06 – 0.68 | 2.35 | 0.019 | 0.28 | 0.14 | -0.00 – 0.56 | 1.94 | 0.053 |
| community size | | | | | | | | | | |
| rural ^a | | | | | | | | | | |
| small town | -0.05 | 0.05 | -0.16 – 0.05 | -1.00 | 0.317 | -0.02 | 0.05 | -0.11 – 0.08 | -0.37 | 0.714 |
| medium town | -0.05 | 0.05 | -0.15 – 0.06 | -0.86 | 0.389 | -0.03 | 0.05 | -0.13 – 0.06 | -0.67 | 0.500 |
| metropolitan | -0.11 | 0.06 | -0.22 – 0.01 | -1.78 | 0.075 | -0.07 | 0.05 | -0.17 – 0.04 | -1.22 | 0.223 |
| social economic status | | | | | | | | | | |
| low ^a | | | | | | | | | | |
| medium | -0.07 | 0.07 | -0.20 – 0.06 | -1.09 | 0.276 | -0.24 | 0.06 | -0.36 – -0.13 | -4.06 | <0.001 |
| high | -0.08 | 0.08 | -0.24 – 0.08 | -0.95 | 0.342 | -0.35 | 0.07 | -0.50 – -0.21 | -4.81 | <0.001 |
| use of fragrances | | | | | | | | | | |
| no ^a | | | | | | | | | | |
| yes | 0.01 | 0.04 | -0.07 – 0.09 | 0.18 | 0.860 | 0.02 | 0.04 | -0.05 – 0.09 | 0.62 | 0.536 |
| Observations | 2047 | | | | | 2047 | | | | |
| R ² / R ² adjusted | 0.247 / 0.237 | | | | | 0.272 / 0.262 | | | | |

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a: Reference group; β : Unstandardized regression coefficient; SE: Standard Error; CI Confidence Intervall; SES: Socioeconomic status; p- values in bold indicate statistically significant differences on the 95% confidence limit.

Table S2 Results of the logistic regression analysis for the creatinine-normalized urinary TBBA and lysmerol concentration of GerES V participants.

| Predictors | TBBA | | | | | lysmerol | | | | |
|---------------------------------------|---------|------|---------------|-----------|--------|----------|------|---------------|-----------|--------------|
| | β | SE | CI | Statistic | p | β | SE | CI | Statistic | p |
| (Intercept) | 1.83 | 0.22 | 1.39 – 2.27 | 8.19 | <0.001 | 0.11 | 0.20 | -0.29 – 0.51 | 0.54 | 0.588 |
| sex assigned at birth | | | | | | | | | | |
| male ^a | | | | | | | | | | |
| female | 0.18 | 0.04 | 0.10 – 0.27 | 4.11 | <0.001 | 0.13 | 0.04 | 0.05 – 0.21 | 3.28 | 0.001 |
| age group | | | | | | | | | | |
| 3-5 years ^a | | | | | | | | | | |
| 6-10 years | -0.51 | 0.06 | -0.62 – -0.40 | -9.02 | <0.001 | -0.28 | 0.05 | -0.38 – -0.18 | -5.50 | <0.001 |
| 11-13 years | -0.76 | 0.06 | -0.88 – -0.64 | -12.17 | <0.001 | -0.46 | 0.06 | -0.57 – -0.35 | -8.13 | <0.001 |
| 14-17 years | -0.97 | 0.07 | -1.11 – -0.83 | -13.71 | <0.001 | -0.59 | 0.06 | -0.72 – -0.47 | -9.29 | <0.001 |
| use of fabric softener | | | | | | | | | | |
| no ^a | | | | | | | | | | |
| yes | 0.24 | 0.04 | 0.16 – 0.32 | 5.79 | <0.001 | 0.27 | 0.04 | 0.20 – 0.34 | 7.33 | <0.001 |
| use of perfume | | | | | | | | | | |
| never ^a | | | | | | | | | | |
| up to once per week | 0.08 | 0.05 | -0.03 – 0.18 | 1.48 | 0.140 | 0.06 | 0.05 | -0.03 – 0.15 | 1.30 | 0.193 |
| more than once per week | 0.28 | 0.06 | 0.16 – 0.40 | 4.40 | <0.001 | 0.21 | 0.06 | 0.09 – 0.32 | 3.58 | <0.001 |
| use of air freshener | | | | | | | | | | |
| no ^a | | | | | | | | | | |
| yes | 0.05 | 0.04 | -0.03 – 0.14 | 1.24 | 0.214 | 0.06 | 0.04 | -0.01 – 0.14 | 1.60 | 0.109 |
| use of body wash or shower gel | | | | | | | | | | |
| never ^a | | | | | | | | | | |

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|---|-------|------|--------------|-------|--------------|-------|------|---------------|-------|------------------|
| up to once per week | 0.06 | 0.15 | -0.24 – 0.35 | 0.37 | 0.715 | -0.08 | 0.14 | -0.35 – 0.19 | -0.57 | 0.568 |
| more than once per week | 0.28 | 0.15 | -0.01 – 0.57 | 1.89 | 0.059 | 0.12 | 0.13 | -0.14 – 0.39 | 0.92 | 0.357 |
| use of body lotion | | | | | | | | | | |
| never ^a | | | | | | | | | | |
| less than once per week | 0.07 | 0.06 | -0.04 – 0.19 | 1.32 | 0.188 | 0.01 | 0.05 | -0.09 – 0.11 | 0.26 | 0.796 |
| once per week | 0.08 | 0.06 | -0.04 – 0.20 | 1.35 | 0.178 | 0.07 | 0.06 | -0.04 – 0.18 | 1.26 | 0.208 |
| more than once per week | 0.14 | 0.05 | 0.03 – 0.24 | 2.59 | 0.010 | 0.07 | 0.05 | -0.02 – 0.17 | 1.52 | 0.128 |
| region of residence | | | | | | | | | | |
| former West Germany ^a | | | | | | | | | | |
| former East Germany | 0.01 | 0.04 | -0.07 – 0.09 | 0.30 | 0.764 | 0.14 | 0.04 | 0.07 – 0.21 | 3.73 | <0.001 |
| use of eye make-up | | | | | | | | | | |
| never ^a | | | | | | | | | | |
| up to once per week | -0.09 | 0.08 | -0.24 – 0.06 | -1.18 | 0.238 | -0.01 | 0.07 | -0.15 – 0.13 | -0.12 | 0.901 |
| more than once per week | 0.17 | 0.08 | 0.02 – 0.32 | 2.23 | 0.026 | 0.15 | 0.07 | 0.01 – 0.28 | 2.15 | 0.032 |
| use of floor cleaners | | | | | | | | | | |
| no ^a | | | | | | | | | | |
| yes | 0.12 | 0.04 | 0.05 – 0.19 | 3.15 | 0.002 | 0.03 | 0.03 | -0.03 – 0.10 | 0.95 | 0.342 |
| highest professional qualification | | | | | | | | | | |
| foreign ^a | | | | | | | | | | |
| no qualification (yet) | 0.30 | 0.16 | -0.02 – 0.61 | 1.85 | 0.064 | 0.26 | 0.15 | -0.02 – 0.55 | 1.81 | 0.071 |
| vocational training | 0.36 | 0.15 | 0.07 – 0.65 | 2.44 | 0.015 | 0.27 | 0.13 | 0.01 – 0.53 | 2.01 | 0.044 |
| graduate degree | 0.34 | 0.15 | 0.04 – 0.64 | 2.19 | 0.028 | 0.24 | 0.14 | -0.03 – 0.52 | 1.74 | 0.083 |
| community size | | | | | | | | | | |
| rural ^a | | | | | | | | | | |
| small town | -0.07 | 0.05 | -0.17 – 0.04 | -1.25 | 0.211 | -0.03 | 0.05 | -0.13 – 0.06 | -0.67 | 0.505 |
| medium town | -0.05 | 0.05 | -0.16 – 0.05 | -0.94 | 0.349 | -0.04 | 0.05 | -0.13 – 0.06 | -0.81 | 0.419 |
| metropolitan | -0.10 | 0.06 | -0.22 – 0.01 | -1.80 | 0.072 | -0.07 | 0.05 | -0.17 – 0.04 | -1.28 | 0.202 |
| social economic status | | | | | | | | | | |
| low ^a | | | | | | | | | | |
| medium | -0.06 | 0.06 | -0.18 – 0.07 | -0.89 | 0.374 | -0.23 | 0.06 | -0.35 – -0.12 | -4.00 | <0.001 |
| high | -0.08 | 0.08 | -0.23 – 0.08 | -0.99 | 0.324 | -0.36 | 0.07 | -0.50 – -0.22 | -5.01 | <0.001 |
| use of fragrances | | | | | | | | | | |

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|--|---------------|------|-------|-------|------|-------|---------------|------|-------|-------|------|-------|
| no ^a | | | | | | | | | | | | |
| yes | 0.00 | 0.04 | -0.07 | -0.08 | 0.10 | 0.921 | 0.01 | 0.04 | -0.06 | -0.09 | 0.42 | 0.677 |
| Observations | 2047 | | | | | | 2047 | | | | | |
| R ² / R ² adjusted | 0.158 / 0.147 | | | | | | 0.152 / 0.142 | | | | | |

a: Reference group; β : Unstandardized regression coefficient; SE: Standard Error; CI Confidence Intervall; SES: Socioeconomic status; p- values in bold indicate statistically significant differences on the 95% confidence limit.