Adverse childhood experiences: a focus on maltreatment (neglect and abuse), disentangling associated developmental trajectories and long-term outcomes in the 1958 British birth cohort

Snehal M Pinto Pereira
Gabriella Conti
Leah Li
Chris Power
Are specific childhood maltreatments associated with adult living standards at 50y?

Snehal M Pinto Pereira
Leah Li, Chris Power
Simplified conceptual framework

Maltreatment

neglect

abuse

life-course

childhood

adulthood

emotional health

cognitive function / education

physical health

health behaviour

Adult physical and mental health

emotional health

cognitive function / education

physical health

health behaviour

social destinations
Why is understanding pathways important?

- Understand the *range* of long-term outcomes related to child maltreatment

- What *pathways* are involved?

- Are these pathways *common or specific*?
Simplified conceptual framework

Maltreatment
- neglect
- abuse
  - physical
  - psychological
  - sexual

life-course

childhood

emotional health

cognitive function / education

physical health

health behaviour

Adulthood

emotional health

cognitive function / education

physical health

health behaviour

social destinations*

Adult physical and mental health

*Adult living standards e.g.
- Education
- NEET: not in employment, education or training
- social mobility
Aims

To establish:

• extent to which child maltreatment are associated with adult living standards

• mediating pathways: adolescent cognition; mental health
National child development study, 1958-2008
All born one week in England, Scotland and Wales

N~18,000

<table>
<thead>
<tr>
<th>Birth</th>
<th>7y</th>
<th>11y</th>
<th>16y</th>
<th>23y</th>
<th>33y</th>
<th>42y</th>
<th>45y</th>
<th>50y</th>
</tr>
</thead>
</table>

Neglect
(parent & teacher report)

Recalled abuse
(0-16y)

Cognitive tests & behaviours

Childhood SEP, parental education, household amenities, crowding & tenure, birthweight, birth order etc

Economic outcomes
## Child maltreatment

<table>
<thead>
<tr>
<th>Neglect</th>
<th>prospective: at 7y and 11y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- child looks undernourished, scruffy or dirty (T)</td>
</tr>
<tr>
<td></td>
<td>- hardly ever takes outings with mother (P)</td>
</tr>
<tr>
<td></td>
<td>- hardly ever takes outings with father (P)</td>
</tr>
<tr>
<td></td>
<td>- mother has little interest in education (T)</td>
</tr>
<tr>
<td></td>
<td>- father has little interest in education (T)</td>
</tr>
</tbody>
</table>

### T: teacher-report  
P: parent-report

## Abuse by parent self-report at 45y

<table>
<thead>
<tr>
<th>Sexual</th>
<th>- I was sexually abused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>- I was physically abused: punched, kicked, hit, beaten with an object, needed medical treatment</td>
</tr>
<tr>
<td>Psychological</td>
<td>- I was verbally abused; suffered humiliation, ridicule, bullying, mental cruelty</td>
</tr>
</tbody>
</table>
- co-occurrence of child maltreatment

- disentangling from other early life adversities linked to later health outcomes
  - socio-economic position
  - low birthweight
## Child maltreatment

### Neglect

**Prospective:** at 7y and 11y

- child looks undernourished, scruffy or dirty (T)
- hardly ever takes outings with mother (P)
- hardly ever takes outings with father (P)
- mother has little interest in education (T)
- father has little interest in education (T)

**Prevalence:** ~10%

### Sexual abuse by parent

**Self-report at 45y**

- I was sexually abused

**Prevalence:** 1.4%

### Physical abuse

- I was physically abused: punched, kicked, hit, beaten with an object, needed medical treatment

**Prevalence:** 5.6%

### Psychological abuse

- I was verbally abused; suffered humiliation, ridicule, bullying, mental cruelty

**Prevalence:** 9.6%

### Non-sexual abuse

- T: teacher-report
- P: parent-report
Association between: child maltreatments & potential mediators

16y mental health

Mean difference: z-score

16y cognition

Mean difference: z-score

Prevalence: 30.4%

Poor qualifications*

- OR (95% CI)
  - neglect: unadjusted = 3.67, adjusted = 2.33, direct effect = 1.29
  - sexual abuse: unadjusted = 2.33, adjusted = 1.53, direct effect = 1.24
  - non-sexual abuse: unadjusted = 0.9, adjusted = 1.14, direct effect = 1.32
  - vs no (non-sexual) abuse

*Less than O-level
Not in employment, education or training

Prevalence: 7.4%

Odds Ratio (95% CI)

<table>
<thead>
<tr>
<th></th>
<th>unadjusted</th>
<th>adjusted</th>
<th>direct effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>neglect</td>
<td>1.7</td>
<td>1.43</td>
<td>1.41</td>
</tr>
<tr>
<td>sexual abuse</td>
<td>1.9</td>
<td>1.35</td>
<td></td>
</tr>
<tr>
<td>non-sexual abuse</td>
<td>1.3</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>1.6</td>
<td>1.33</td>
<td></td>
</tr>
</tbody>
</table>

vs no (non-sexual) abuse

Not in employment, education or training vs no (non-sexual) abuse (physical, witnessing, psychological)
Social Mobility (birth – 50y)

Prevalence
Stable non-manual: 25.0%
Stable manual: 25.2%
Upward mobility: 43.8%
Downward mobility: 6.5%

vs no (non-sexual) abuse

non-sexual abuse
(physical, witnessing, psychological)

associations adjusted for sex and for other types of child maltreatment
Are *specific* childhood maltreatments associated with adult living standards at 50y?

**Maltreatment**
- neglect
- abuse
  - physical
  - psychological
  - sexual

**Life-course**

<table>
<thead>
<tr>
<th>Childhood</th>
<th>Adulthood</th>
</tr>
</thead>
<tbody>
<tr>
<td>emotional health</td>
<td>emotional health</td>
</tr>
<tr>
<td>cognitive function / education</td>
<td>cognitive function / education</td>
</tr>
<tr>
<td>physical health</td>
<td>physical health</td>
</tr>
<tr>
<td>health behaviour</td>
<td>health behaviour</td>
</tr>
<tr>
<td>social destinations*</td>
<td></td>
</tr>
</tbody>
</table>

*Adult living standards e.g.
- Education
- NEET: not in employment, education or training
- social mobility
Childhood abuse - definitions and indicators

**definition**

Physical abuse  Intentional use of physical force or implements against a child that results in (or has the potential) physical injury.

Psychological abuse  Intentional behaviour that conveys to a child that h/she is worthless, flawed, unloved, unwanted, endangered, or valued only in meeting another’s needs. Harmful (unintentional) parent-child interactions

Sexual abuse  any completed/attempted sexual act, sexual contact, or non-contact sexual interaction with a child by a caregiver.

**indicators**

Physical abuse by a parent (punched, kicked or hit or beaten with an object, or needed medical treatment)

Psychological abuse by a parent (verbally abused or humiliated, ridiculed, bullied/mental cruelty)

Sexual abuse by a parent
Mediation analysis using inverse odds ratio weighting

Key points

• IORW condenses information on OR between exposure and mediators into a weight
• The weight, (i.e. inverse exposure-mediator OR) used to estimate direct effects via weighted regression
• Applying the weight renders the exposure and mediator independent, deactivating indirect pathways involving the mediator(s).

Assumptions

• no unmeasured confounding of (conditioning on preexposure confounders):
  – exposure on mediator
  – mediator on outcome,
  – exposure on the outcome

Additional assumption:
  – No confounding variables of mediator-outcome relationship affected by exposure
The economic cost of child maltreatment in the UK

Gabriella Conti
Steve Morris
Mariya Melnychuk
Elena Pizzo

NSPCC
Background and aim

- Child maltreatment (CM) can result in short and long-term adverse health, social and economic consequences.
  - Including physical injury, mental health problems, behavioural problems and lower levels of adult economic well-being.
- Several studies from the USA, Asia and New Zealand and very few studies in the UK that estimate the cost of CM, but no lifetime costs.
- Aim of the study was to calculate new estimates of the lifetime costs per victim of non-fatal and fatal child maltreatment from a societal perspective in the UK using an incidence-based approach.
- This study can be used in economic evaluations of CM intervention/prevention activities to quantify the costs saved from reducing the number of maltreated children.
1. **Studies based on UK data**: 69
   - Several datasets used (many NCDS)
   - Various definitions of child maltreatment
   - Range of outcomes considered
   - Wide range of covariates controlled for

2. **Studies published in economics journals**: 9
   - Most use National Longitudinal Study of Adolescent Health (AddHealth)
   - Common identification strategy: siblings or twins fixed-effects design
   - Similar set of definitions of CM and covariates controlled for

3. **Cost Studies**: 26, very few UK
   - Various cost perspectives
   - Incidence- versus prevalence-based approaches
   - All forms of abuse versus specific forms of abuse
   - Range of cost components included
Data #1: National Child Development Study

- Retrospective measures of child maltreatment, asked in the biomedical sweep at age 44/45.
- Our definitions determined after consultation with the Advisory Group convened by the NSPCC for this study.
- We constructed a “global” measure, where CM was said to have occurred if the individual reports having experienced any of the following forms of child maltreatment = 20.6%.

1. **Neglect.** An individual was defined as having been neglected in childhood if he/she reports that any of the three following conditions is true, as compared to none of them being true:
   - “Mother (or mother figure) a little or not at all affectionate towards me up to age 16” = 36.6%
   - “Father (or father figure) a little or not at all affectionate towards me up to age 16” = 17.3%
   - “I was neglected up to age 16” = 2.5%
2. **Emotional abuse.** An individual was defined as having been emotionally abused in childhood if he/she reports that any of the three following conditions is true, as compared to none of them being true.

- “I was verbally abused by a parent (or parent figure) up to age 16” = 8.0%
- “I suffered humiliation, ridicule, bullying or mental cruelty from a parent (or parent figure) up to age 16” = 7.1%
- “I witnessed physical or sexual abuse of others in my family up to age 16” = 6.0%

3. **Physical abuse.** An individual was defined as having been physically abused in childhood if he/she reports yes to “I was physically abused by a parent – punched, kicked or hit or beaten with an object, or needed medical treatment up to age 16” = 6.0%

4. **Sexual abuse.** An individual is defined as having been sexually abused in childhood if he/she reports yes to “I was sexually abused by a parent (or parent-figure)” = 1.5%
Data #2: English Longitudinal Study of Ageing

- ELSA includes retrospective measures of child maltreatment (physical abuse and neglect only), which were asked in the life history module in wave 3.
- Our definitions again determined after consultation with the Advisory Group convened by the NSPCC.
- We constructed a “global” measure, where child maltreatment is said to have occurred if the individual reports having experienced any of the following forms of child maltreatment = 23.8%.

1. **Neglect.** An individual was defined as having been neglected in childhood if he/she answers “agree or strongly agree” to the question “Mother (mother figure) or Father (father figure) seemed emotionally cold to me”: =13.8% and = 16.0%.

2. **Physical Abuse.** An individual was defined as having been physically abused in childhood if he/she answers yes to “When you were aged under 16, were you physically abused by your parents” = 3.5%.
Econometric Analysis

• We estimated the association of our measure of CM with an extensive set of outcomes.
  – **Physical Health Problems**: Obesity, Hypertension, Diabetes, Cancer.
  – **Mental Health Problems (diagnosis)**: Any type, Anxiety, Depression.
  – **Healthy Behaviours**: Heavy Drinking (consuming 2 or more alcoholic drinks a day), Smoking, Heavy Smoking (25 cigarettes per day or more).
  – **Labour Market Outcomes**: Employment, Weekly Earnings (if Employed), Disability benefits.

• We ran various specifications testing the sensitivity of the results to different set of *predetermined* covariates:
  – Background socioeconomic characteristics;
  – Circumstances and behaviours during pregnancy.

• In our full specification, we also controlled for other Adverse Childhood Experiences (ACEs) collected in the same sweep.
Summary of Results

- **NCDS**
  - Unable to detect significant impact on physical measures (except, impact of physical abuse on obesity).
  - Persistent, sizeable and significant effects on mental health, with the more negative consequences associated with sexual abuse.
  - Significant effect on **smoking** (all three forms of abuse) but not on drinking.
  - Significant effect on **employment** (all three forms of abuse) but not on earnings.

- **ELSA**
  - Very similar findings to NCDS except with regards **problem drinking** (significant impact).
How did this inform the cost analysis?

- We used the findings from the analysis of the **global measure** of CM
  - Small numbers of cases for some types of maltreatment meant the analysis was underpowered.
  - May be overlap between different types of CM making it difficult to attribute costs to individual types of maltreatment.
  - Preference of the Advisory Group and funder not to distinguish by type of maltreatment.
- **Preferred the NCDS** results over the ELSA results as the former included more types of CM (the only exception heavy drinking).
- We used the coefficients from the **most saturated econometric model**.
- Included **impacts** from the econometric analysis on: Anxiety, Depression, Smoking, Alcohol abuse, Employment.
Overview of cost analysis methods

- Lifetime costs per victim of fatal and non-fatal maltreatment from a societal perspective.
- Analysis based on published evidence and econometric analysis of NCDS and ELSA data using an incidence-based approach.
- Due to data limitations the cost is for overall maltreatment and not by type (neglect, physical, emotional or sexual) or severity.
- We used published estimates from previous cost of illness studies and data specific to the UK.
- We assumed that average age at which CM starts is 6 years (DfE, 2016).
- Costs estimated in 2015 UK£ and expressed in present value terms:
  - Discounting: 3.5% annual rate for future costs up to 30 years (declining rate thereafter).
- Our estimates are conservative - extensive sensitivity analyses were performed.
# Summary of results

Discounted lifetime costs per victim of non-fatal child maltreatment: central estimate

<table>
<thead>
<tr>
<th>Cost type</th>
<th>Value (£)</th>
<th>95% Uncertainty Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unplanned hospital admissions for injuries</td>
<td>120</td>
<td>(83, 141)</td>
</tr>
<tr>
<td>Short-term mental health problems</td>
<td>18,553</td>
<td>(9,758, 29,833)</td>
</tr>
<tr>
<td>Short-term health-related costs</td>
<td>18,673</td>
<td>(9,841, 29,974)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>954</td>
<td>(311, 2,094)</td>
</tr>
<tr>
<td>Depression</td>
<td>5,145</td>
<td>(1,782, 10,740)</td>
</tr>
<tr>
<td>Smoking</td>
<td>528</td>
<td>(100, 1,461)</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>537</td>
<td>(148, 1,262)</td>
</tr>
<tr>
<td>Long-term health-related costs</td>
<td>7,164</td>
<td>(2,341, 15,558)</td>
</tr>
<tr>
<td>Criminal justice system costs incurred by perpetrators</td>
<td>4,316</td>
<td>(2,509, 6,165)</td>
</tr>
<tr>
<td>Social care costs</td>
<td>38,132</td>
<td>(22,679, 53,346)</td>
</tr>
<tr>
<td>Special education costs</td>
<td>7,068</td>
<td>(2,162, 14,455)</td>
</tr>
<tr>
<td>Reduced employment</td>
<td>14,037</td>
<td>(5,364, 26,010)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>89,390</strong></td>
<td><strong>(44,896, 145,508)</strong></td>
</tr>
</tbody>
</table>

All costs are discounted and in 2015 UK£.
Lifetime costs of fatal CM

- Include **health care costs** associated with fatal injuries; and, lifetime costs of **lost productivity**
- Health care costs:
  - we used published data on cost of fatal and penetrating trauma injuries in the UK.
- Lost productivity costs:
  - we used the **human capital approach** and multiplied figures for mean annual earnings by age (ONS 2014) with employment rates by age (from age 16 to 67; (Official Statistics 2016)).
  - The earnings figures were discounted to present value terms and inflated assuming a constant annual increase in earnings of 2% (McCrone 2008).
  - The employment-adjusted earnings figures were summed across the lifetime to provide an estimate of total lifetime earnings accounting for the likelihood of employment.

The average discounted lifetime cost of fatal child maltreatment was estimated to be £940,758 per victim.
Summary

- There is little evidence of the lifetime cost of child maltreatment in the UK.
- We used rich, representative UK data to estimate the effect of child maltreatment on a range of outcomes.
- We found that having experienced any form of child maltreatment was associated with worse mental health outcomes, smoking behaviour, alcohol use, lower probability of employment, and greater welfare dependence.
- We detected no robust effects of child maltreatment on physical health, heavy smoking and wages.
- Using these and other data we calculated that the discounted lifetime costs per victim of non-fatal child maltreatment in the UK were estimated as £89,390 per victim (95% uncertainty interval £44,896 to £145,508).
- The discounted lifetime cost per death from child maltreatment in the UK was estimated to be £940,758.
- There was uncertainty in these estimates due to data limitations.
Our findings are conservative

- Some impacts of CM found to be important in previous studies were not available in our data (e.g., days off work, premature mortality, drug use) so we did not analyse them.

- There was considerable uncertainty in available data and where this arose we made conservative assumptions.
Further work

• Econometric analyses to investigate maltreatment by parties other than the primary caregivers.

• Evaluate separately the costs of different types of child maltreatment (e.g., physical, emotional and sexual above, neglect) - although unlikely to be straightforward!

• Repeat our analysis in future when better data are available.

• Further research would be beneficial to evaluate the cost-effectiveness of interventions to reduce child maltreatment.
Why is this study useful?

• This study can be used in economic evaluations of CM intervention/prevention activities to quantify the costs saved from reducing the number of maltreated children.

• Our research identifies the different components of the lifetime costs of child maltreatment and the size of the contribution of each sector in society (e.g. social care).

• Baseline for future research: hopefully the limitations of our work will galvanize others into action!
Acknowledgments

• This research was funded by the NSPCC

• This report would not have been possible without the input of the Advisory Group:

• A huge thank you to Helen Fisher, John Devaney, Chris Cuthbert, Haroon Chowdry, Andrew James, Jon Brown, Alan Wardle, Pam Miller and Sonja Jütte for their time and input.
Thank you!

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The full report is available on the NSPCC website at: https://www.nspcc.org.uk/services-and-resources/research-and-resources/2017/economic-cost-child-maltreatment-united-kingdom-preliminary-study/
Child maltreatments, physical development and adult cardiometabolic markers

Leah Li
Snehal M Pinto Pereira, Chris Power
Simplified conceptual framework

Maltreatment

- neglect
- abuse
- physical
- sexual
- psychological

Simplified conceptual framework

- childhood
- adulthood

- emotional health
- cognitive function / education
- physical health
- health behaviour

- emotional health
- cognitive function / education
- physical health
- health behaviour
- social destinations

Physical & mental health
Why is understanding pathways important?

- Understand the *range* of long-term outcomes related to child maltreatment

- What *pathways* are involved?

- Are these pathways *common or specific*?
Simplified conceptual framework

Maltreatment
- neglect
- abuse
  - physical
  - sexual
  - psychological

childhood
- emotional health
- cognitive function / education
- physical development (height, BMI, puberty)
- health behaviour

adulthood
- emotional health
- cognitive function / education
- adiposity
- health behaviour
- social destinations

Cardiometabolic markers

life-course

childhood

adulthood
• child maltreatment:
  – child abuse & neglect

• outcomes:
  – Height (7y, 11y, 16y, adult)
  – Puberty (11y, 16y)
  – BMI (7y, 11y, 16y, 23y, 33y, 45y, 50y)
  – Cardiometabolic markers (45y) – BP, lipids, HbA1c, obesity
Aims

To investigate the extent to which specific forms of maltreatment were associated with child-to-adult body sizes (i.e. height & BMI), pubertal development, and cardiometabolic markers in mid-adulthood
National child development study, 1958-2008
All born one week in England, Scotland and Wales

N~18,000

Birth 1958
7y 1965
11y 1969
16y 1974
23y 1981
33y 1991
42y 2000
45y 2003
50y 2008

Neglect (parent & teacher report)

Recalled abuse (0-16y)

Puberty

Child-to-adult height

Child-to-adult BMI

Childhood covariates depending on the outcome of interest, e.g. confounders, and factors affect outcome measures

Cardiometabolic markers

Smoking, psychological distress, educational attainment, SEP
## Child maltreatment

### Questions asked (at 45y)

<table>
<thead>
<tr>
<th>Abuse by a parent</th>
<th>Physical (6%)</th>
<th>- I was physically abused by a parent (punched, kicked, hit, beaten with an object, needed medical treatment)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sexual (1.5%)</td>
<td>- I was sexually abused by a parent</td>
</tr>
<tr>
<td></td>
<td>Psychological (10%)</td>
<td>- I was verbally abused by a parent; suffered humiliation, ridicule, bullying, mental cruelty from a parent</td>
</tr>
</tbody>
</table>

### Neglect (questions asked at 7y and 11y)

- child looks undernourished, scruffy or dirty (T)
- hardly ever takes outings with mother (P)
- hardly ever takes outings with father (P)
- mother has little interest in education (T)
- father has little interest in education (T)
- mother hardly ever read to/with the child (P)
- father hardly ever read to/with the child (P)

Neglect (10%)

(prospective)

constructed from:

T: teacher-report

P: parent-report
Childhood maltreatment and child-to-adult height trajectories
Childhood neglect and height growth

Deficit in average height at ages 7, 11 and 16y and in adulthood associated with child neglect in the 1958 birth cohort*

![Graph showing difference in height (cm) between men and women over ages 7, 11, 16, and adulthood.]

Difference for the most neglected at 7y (score ≥3 vs score = 0) adjusted for parental height, birthweight, and social factors.

### Childhood neglect and height growth

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>11</td>
<td>16</td>
<td>Adult</td>
</tr>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td></td>
<td>-0.06(0.01)</td>
<td>-0.05(0.01)</td>
<td>-0.05(0.01)</td>
<td>-0.03(0.01)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Adult</td>
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<td>Neglect score (0-7) (reported at 7y)</td>
<td></td>
<td>-0.05(0.01)</td>
<td>-0.05(0.01)</td>
<td>-0.04(0.01)</td>
<td>-0.03(0.01)</td>
</tr>
</tbody>
</table>

† estimated from multivariate response models, adjusted for parental height, birthweight, maternal smoking, social class, infant feeding, household crowding, tenure, amenities, disability

## Childhood maltreatment and height growth

### Difference in height SDS

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neglect score (0-7) (reported at 7y)</strong></td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>-0.06(0.01)</td>
<td>-0.05(0.01)</td>
</tr>
<tr>
<td>Psychological abuse</td>
<td>-0.08(0.05)</td>
<td>-0.05(0.05)</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>-0.11(0.06)</td>
<td>-0.12(0.06)</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td>-0.07(0.21)</td>
<td>-0.09(0.23)</td>
</tr>
<tr>
<td><strong>Neglect score (0-7) (reported at 7y)</strong></td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>-0.05(0.01)</td>
<td>-0.05(0.01)</td>
</tr>
<tr>
<td>Psychological abuse</td>
<td>0.00(0.04)</td>
<td>0.03(0.05)</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>-0.02(0.06)</td>
<td>0.01(0.07)</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td>-0.08(0.09)</td>
<td>0.09(0.10)</td>
</tr>
</tbody>
</table>

† estimated from multivariate response models, adjusted for parental height, birthweight, maternal smoking, social class, infant feeding, household crowding, tenure, amenities, disability

Childhood maltreatment and pubertal development
## Pubertal stage rated at 11y & 16y

<table>
<thead>
<tr>
<th>Males</th>
<th>11y</th>
<th>16y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genitalia</td>
<td>Tanner stage (1=preadolescent to 5=adult)</td>
<td></td>
</tr>
<tr>
<td>Pubic hair</td>
<td>Tanner stage</td>
<td>Absent/sparse/intermediate/adult</td>
</tr>
<tr>
<td>Facial hair</td>
<td></td>
<td>Absent/sparse/adult</td>
</tr>
<tr>
<td>Voice change</td>
<td></td>
<td>Age of voice change</td>
</tr>
</tbody>
</table>

**Females:**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>Tanner stage</td>
<td></td>
</tr>
<tr>
<td>Pubic hair</td>
<td>Tanner stage</td>
<td></td>
</tr>
<tr>
<td>Menarche</td>
<td></td>
<td>Age of menarche</td>
</tr>
</tbody>
</table>
# Pubertal measures

<table>
<thead>
<tr>
<th></th>
<th><strong>Early</strong></th>
<th><strong>Intermediate</strong></th>
<th><strong>Late</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genitalia (11y)</td>
<td>3-5 (16.8%)</td>
<td>2 (45.1%)</td>
<td>1 (38.1%)</td>
</tr>
<tr>
<td>Pubic hair (11 &amp; 16y)</td>
<td>≥2 (11y) &amp; adult (16y), or 4/5 (11y) &amp; intermediate (16y) (16.1%)</td>
<td>1 (11y) &amp; adult (16y), 2/3 (11y) &amp; intermediate/sparse (16y), or 4 (11y) &amp; sparse (16y) (40.4%)</td>
<td>1 (11y) &amp; intermediate/sparse (16y), or absent (16y) (43.5%)</td>
</tr>
<tr>
<td>Facial hair (16y)</td>
<td>Adult (8.8%)</td>
<td>Sparse/intermediate (53.9%)</td>
<td>Absent (37.4%)</td>
</tr>
<tr>
<td>Voice change</td>
<td>≤12y (10.2%)</td>
<td>13-14y (44.0%)</td>
<td>≥15y (45.8%)</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menarche</td>
<td>≤11y (16.1%)</td>
<td>12-13y (56.8%)</td>
<td>≥14y (27.1%)</td>
</tr>
<tr>
<td>Breast (11y)</td>
<td>3-5 (27.9%)</td>
<td>2 (35.9%)</td>
<td>1 (36.2%)</td>
</tr>
<tr>
<td>Pubic hair (11y)</td>
<td>3-5 (22.1%)</td>
<td>2 (36.5%)</td>
<td>1 (41.4%)</td>
</tr>
</tbody>
</table>
Maltreatment and puberty (females)

Relative risk ratio of early or late (vs intermediate) development

<table>
<thead>
<tr>
<th>Age of menarche</th>
<th>Early developers</th>
<th>Late developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>1.01</td>
<td>1.13 (P&lt;0.05)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breast development</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>0.98</td>
<td>1.06 (P&lt;0.05)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pubic hair</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>0.99</td>
<td>1.04 (P&lt;0.10)</td>
</tr>
</tbody>
</table>

† models fitted using multiple imputation, adjusted for age of assessment, ethnicity, maternal smoking, social class, infant feeding, household crowding, tenure and amenities, and maternal age of menarche (for menarche only)

### Maltreatment and puberty (females)

#### Relative risk ratio of early or late (vs intermediate) development

<table>
<thead>
<tr>
<th>Age of menarche</th>
<th>Early developers</th>
<th>Late developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>1.01</td>
<td><strong>1.13 (P&lt;0.05)</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>1.06</td>
<td>1.08</td>
</tr>
<tr>
<td>Sexual</td>
<td><strong>1.86</strong></td>
<td><strong>1.66</strong></td>
</tr>
<tr>
<td>Psychological</td>
<td>1.06</td>
<td><strong>1.38</strong></td>
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</table>

#### Breast development

<table>
<thead>
<tr>
<th>Neglect score (0-7) (reported at 7y)</th>
<th>Early developers</th>
<th>Late developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>0.98</td>
<td><strong>1.06 (P&lt;0.05)</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>1.12</td>
<td>1.04</td>
</tr>
<tr>
<td>Sexual</td>
<td>1.00</td>
<td>1.14</td>
</tr>
<tr>
<td>Psychological</td>
<td>1.08</td>
<td>1.14</td>
</tr>
</tbody>
</table>

#### Pubic hair

<table>
<thead>
<tr>
<th>Neglect score (0-7) (reported at 7y)</th>
<th>Early developers</th>
<th>Late developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>0.99</td>
<td><strong>1.04 (P&lt;0.10)</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>1.21</td>
<td>1.09</td>
</tr>
<tr>
<td>Sexual</td>
<td>0.98</td>
<td>1.13</td>
</tr>
<tr>
<td>Psychological</td>
<td>1.04</td>
<td>1.07</td>
</tr>
</tbody>
</table>

† models fitted using multiple imputation, adjusted for age of assessment, ethnicity, maternal smoking, social class, infant feeding, household crowding, tenure and amenities, and maternal age of menarche (for menarche only)

<table>
<thead>
<tr>
<th>Genitalia development</th>
<th>Early developers</th>
<th>Late developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>1.05</td>
<td>1.04 (p&lt;0.10)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pubic hair</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>1.03</td>
<td>1.07 (p&lt;0.05)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facial hair</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>0.93</td>
<td>1.04 (p&lt;0.10)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Voice change</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect score (0-7) (reported at 7y)</td>
<td>1.05</td>
<td>1.14 p&lt;0.05</td>
</tr>
</tbody>
</table>

† models fitted using multiple imputation, adjusted for age of assessment, ethnicity, maternal smoking, social class, infant feeding, household crowding, tenure and amenities

## Maltreatment and puberty (males)

### Relative risk ratio of early or late (vs intermediate) development

<table>
<thead>
<tr>
<th>Genitalia development</th>
<th>Early developers</th>
<th>Late developers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td>1.20</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Sexual</strong></td>
<td>2.15</td>
<td>2.01</td>
</tr>
<tr>
<td><strong>Psychological</strong></td>
<td>1.12</td>
<td>1.01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Pubic hair</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td>1.14</td>
<td>1.24</td>
</tr>
<tr>
<td><strong>Sexual</strong></td>
<td>1.67</td>
<td>1.94</td>
</tr>
<tr>
<td><strong>Psychological</strong></td>
<td>1.13</td>
<td>1.22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Facial hair</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td>0.83</td>
<td>0.92</td>
</tr>
<tr>
<td><strong>Sexual</strong></td>
<td>1.03</td>
<td>1.42</td>
</tr>
<tr>
<td><strong>Psychological</strong></td>
<td>1.11</td>
<td>1.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Voice change</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td>0.99</td>
<td>1.24</td>
</tr>
<tr>
<td><strong>Sexual</strong></td>
<td>0.94</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>Psychological</strong></td>
<td>1.17</td>
<td>1.12</td>
</tr>
</tbody>
</table>

† models fitted using multiple imputation, adjusted for age of assessment, ethnicity, maternal smoking, social class, infant feeding, household crowding, tenure and amenities

Neglect was associated with delayed pubertal development on several markers: In females late menarche and late breast development; in males late voice change and late pubic hair growth.

Sexual abuse was associated with early as well as late menarche.

Childhood maltreatment and life course BMI trajectories
Difference in mean BMI from 7-50y by physical abuse in the 1958 birth cohort

## Child maltreatment and life course BMI

### Difference in mean BMI (kg/m²) 7-50y in the 1958 birth cohort

<table>
<thead>
<tr>
<th></th>
<th>7y</th>
<th>11y</th>
<th>16y</th>
<th>23y</th>
<th>33y</th>
<th>45y</th>
<th>50y</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>0.08</td>
<td>-0.33</td>
<td>0.00</td>
<td>0.09</td>
<td>0.40</td>
<td><strong>0.58</strong></td>
<td><strong>0.97</strong></td>
</tr>
<tr>
<td>Sexual</td>
<td>0.18</td>
<td>1.15</td>
<td>0.69</td>
<td>0.93</td>
<td>0.13</td>
<td>-0.13</td>
<td>0.10</td>
</tr>
</tbody>
</table>

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<tr>
<th></th>
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<th>23y</th>
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<th>50y</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>-0.16</td>
<td>-0.29</td>
<td>-0.02</td>
<td>0.11</td>
<td>0.16</td>
<td><strong>0.99</strong></td>
<td><strong>1.18</strong></td>
</tr>
<tr>
<td>Sexual</td>
<td>-0.14</td>
<td>-0.36</td>
<td>-0.27</td>
<td>0.27</td>
<td>-0.42</td>
<td>0.33</td>
<td><strong>1.09</strong></td>
</tr>
</tbody>
</table>

† Neglect score ≥2 at 7 and/or 11y

## Child maltreatment and life course BMI

### Difference in mean BMI 7-50y in the 1958 birth cohort

<table>
<thead>
<tr>
<th></th>
<th>7y</th>
<th>11y</th>
<th>16y</th>
<th>23y</th>
<th>33y</th>
<th>45y</th>
<th>50y</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neglect †</strong></td>
<td>-0.08</td>
<td>-0.11</td>
<td>0.01</td>
<td><strong>0.54</strong></td>
<td><strong>0.36</strong></td>
<td><strong>0.55</strong></td>
<td><strong>0.69</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>0.08</td>
<td><strong>-0.33</strong></td>
<td>0.00</td>
<td>0.09</td>
<td>0.40</td>
<td><strong>0.58</strong></td>
<td><strong>0.97</strong></td>
</tr>
<tr>
<td>Sexual</td>
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<td>0.69</td>
<td>0.93</td>
<td>0.13</td>
<td>-0.13</td>
<td>0.10</td>
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</table>

<table>
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<tr>
<th></th>
<th>7y</th>
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<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neglect †</strong></td>
<td>0.04</td>
<td>0.03</td>
<td><strong>0.29</strong></td>
<td><strong>0.65</strong></td>
<td><strong>0.78</strong></td>
<td><strong>1.15</strong></td>
<td><strong>1.40</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>-0.16</td>
<td>-0.29</td>
<td>-0.02</td>
<td>0.11</td>
<td>0.16</td>
<td><strong>0.99</strong></td>
<td><strong>1.18</strong></td>
</tr>
<tr>
<td>Sexual</td>
<td>-0.14</td>
<td>-0.36</td>
<td>-0.27</td>
<td>0.27</td>
<td>-0.42</td>
<td>0.33</td>
<td><strong>1.09</strong></td>
</tr>
</tbody>
</table>

† Neglect score ≥2 at 7 and/or 11y

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<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neglect †</td>
<td>-0.08</td>
<td>-0.11</td>
<td>0.01</td>
<td><strong>0.54</strong></td>
<td><strong>0.36</strong></td>
<td><strong>0.55</strong></td>
<td><strong>0.69</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>0.08</td>
<td><strong>-0.33</strong></td>
<td>0.00</td>
<td>0.09</td>
<td>0.40</td>
<td><strong>0.58</strong></td>
<td><strong>0.97</strong></td>
</tr>
<tr>
<td>Sexual</td>
<td>0.18</td>
<td>1.15</td>
<td>0.69</td>
<td>0.93</td>
<td>0.13</td>
<td>-0.13</td>
<td>0.10</td>
</tr>
<tr>
<td>Psychological</td>
<td>0.17</td>
<td>-0.12</td>
<td>0.03</td>
<td>0.09</td>
<td>0.18</td>
<td>0.23</td>
<td>0.41</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neglect †</td>
<td>0.04</td>
<td>0.03</td>
<td><strong>0.29</strong></td>
<td><strong>0.65</strong></td>
<td><strong>0.78</strong></td>
<td><strong>1.15</strong></td>
<td><strong>1.40</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>-0.16</td>
<td>-0.29</td>
<td>-0.02</td>
<td>0.11</td>
<td>0.16</td>
<td><strong>0.99</strong></td>
<td><strong>1.18</strong></td>
</tr>
<tr>
<td>Sexual</td>
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<td>-0.36</td>
<td>-0.27</td>
<td>0.27</td>
<td>-0.42</td>
<td>0.33</td>
<td><strong>1.09</strong></td>
</tr>
<tr>
<td>Psychological</td>
<td>-0.15</td>
<td>-0.17</td>
<td>-0.07</td>
<td>-0.01</td>
<td>-0.20</td>
<td>0.41</td>
<td><strong>0.61</strong></td>
</tr>
</tbody>
</table>

† Neglect score ≥2 at 7 and/or 11y

## OR for obesity 7-50y in the 1958 birth cohort

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7y</td>
<td>11y</td>
<td>16y</td>
<td>23y</td>
<td>33y</td>
<td>45y</td>
<td>50y</td>
</tr>
<tr>
<td>Neglect †</td>
<td>0.64</td>
<td>1.17</td>
<td><strong>1.86</strong></td>
<td><strong>2.34</strong></td>
<td>1.17</td>
<td><strong>1.22</strong></td>
<td><strong>1.35</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>0.90</td>
<td>0.35</td>
<td>0.33</td>
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<td><strong>1.31</strong></td>
<td><strong>1.50</strong></td>
</tr>
<tr>
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<td>0.00</td>
<td>5.44</td>
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<td>3.54</td>
<td>1.04</td>
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<tr>
<td>Psychological</td>
<td>1.29</td>
<td>0.76</td>
<td>1.02</td>
<td>1.02</td>
<td>1.21</td>
<td>1.15</td>
<td><strong>1.36</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>7y</td>
<td>11y</td>
<td>16y</td>
<td>23y</td>
<td>33y</td>
<td>45y</td>
<td>50y</td>
</tr>
<tr>
<td>Neglect †</td>
<td>0.99</td>
<td>1.41</td>
<td><strong>2.08</strong></td>
<td><strong>2.34</strong></td>
<td><strong>1.48</strong></td>
<td><strong>1.39</strong></td>
<td><strong>1.54</strong></td>
</tr>
<tr>
<td>Physical</td>
<td>0.67</td>
<td>0.31</td>
<td>0.00</td>
<td>0.51</td>
<td><strong>1.07</strong></td>
<td><strong>1.48</strong></td>
<td><strong>1.73</strong></td>
</tr>
<tr>
<td>Sexual</td>
<td>0.00</td>
<td>0.00</td>
<td>0.88</td>
<td>0.83</td>
<td>0.92</td>
<td>1.15</td>
<td><strong>1.75</strong></td>
</tr>
<tr>
<td>Psychological</td>
<td>1.35</td>
<td>1.37</td>
<td>0.75</td>
<td>0.79</td>
<td>0.93</td>
<td>1.15</td>
<td><strong>1.44</strong></td>
</tr>
</tbody>
</table>

† Neglect score ≥ 2 at 7 and/or 11y

Childhood maltreatment and cardiometabolic markers in mid-adulthood
• Outcomes - cardiometabolic markers at 45y (BP, lipids, HbA1c, obesity)

• Intermediate factors - child-to-adult BMI, adult SEP, lifestyles, mental health.
<table>
<thead>
<tr>
<th>Neglect</th>
<th>Mod 1</th>
<th>+BMI7&amp;45</th>
<th>+adult SEP</th>
<th>+lifestyle factors</th>
<th>+depressive symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>0.53</td>
<td>0.30</td>
<td>0.50</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Waist (cm)</td>
<td>1.23</td>
<td>0.59</td>
<td>1.09</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>HDL(F)</td>
<td>-0.05</td>
<td>-0.03</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.04</td>
</tr>
<tr>
<td>Triglycerides(%)</td>
<td>3.9</td>
<td>2.2</td>
<td>2.4</td>
<td>2.4</td>
<td>3.4</td>
</tr>
<tr>
<td>HbA₁c(%)</td>
<td>1.2</td>
<td>1.0</td>
<td>0.7</td>
<td>0.7</td>
<td>1.1</td>
</tr>
</tbody>
</table>

| Physical         |       |          |            |                   |                      |
| BMI              | 0.72  | 0.71     | 0.79       | 0.66              |                      |
| Waist (cm)       | 1.29  | 1.25     | 1.32       | 1.04              |                      |
| HDL(F)           | -0.06 | -0.04    | -0.06      | -0.04             | -0.05                |
| HbA₁c(%)         | 2.5   | 2.1      | 2.4        | 1.9               | 2.3                  |

| Sexual           |       |          |            |                   |                      |
| HbA₁c(%)         | 2.4   | 2.2      | 1.8        | 1.2               | 2.0                  |

| Psychological    |       |          |            |                   |                      |
| HDL              | -0.04 | -0.04    | -0.04      | -0.02             | -0.03                |

Mod 1: includes sex, birthweight-for-gestation, childhood SEP (social class, housing tenure, crowding), family history of diabetes (for HbA1c), factors affecting measurement

## Cardiometabolic markers at 45y

### OR for elevated levels

<table>
<thead>
<tr>
<th>Neglect</th>
<th>Model 1</th>
<th>+BMI7&amp;45</th>
<th>+adult SEP</th>
<th>+lifestyle factors</th>
<th>+depressive symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>1.16</td>
<td>1.06</td>
<td>1.13</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>Central obesity</td>
<td>1.15</td>
<td>1.05</td>
<td>1.13</td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td>1.36</td>
<td>1.36</td>
<td>1.38</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>Central obesity</td>
<td>1.38</td>
<td>1.38</td>
<td>1.39</td>
<td>1.34</td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td>1.25</td>
<td>1.21</td>
<td>1.24</td>
<td>1.16</td>
<td>1.21</td>
</tr>
<tr>
<td><strong>Sexual</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td>1.41</td>
<td>1.41</td>
<td>1.38</td>
<td>1.26</td>
<td>1.34</td>
</tr>
<tr>
<td><strong>Psychological</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triglycerides</td>
<td>1.21</td>
<td>1.22</td>
<td>1.21</td>
<td>1.18</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Mod 1: includes sex, birthweight-for-gestation, childhood SEP (social class, housing tenure, crowding), family history of diabetes (for HbA1c), and factors affecting measurement

Summary

• Neglect was associated with delayed physical growth with some catch-up growth, late pubertal markers, increased adult obesity risk (not childhood), and poor lipid and HbA$_1$c profile in mid-adulthood.

• Child abuse was not associated with height growth or pubertal timing, except sexual abuse with early/late menarche in girls.

• Physical/sexual abuse were associated with faster BMI gains, increased risk of adult obesity and poorer lipid/HbA$_1$c profiles (mediated by adult lifestyle factors). Associations were modest but independent of early life factors
References

Specific associations?

child maltreatment and adult mental health, cognition and physical functioning

Chris Power
Snehal M Pinto Pereira, Leah Li
Simplified conceptual framework

Maltreatment

- neglect
- abuse
  - physical
  - psychological
  - sexual

Life-course

Childhood

Emotional health
Cognitive function / education
Physical health
Health behaviour

Adult physical / mental function

Emotional health
Cognitive function / education
Physical health
Health behaviour
Social destinations
To establish:

- whether specific childhood maltreatments are associated with adult
  - mental health
  - cognition,
  - physical functioning
All born one week in England, Scotland and Wales

N~18,000

Birth 1958
7y 1965
11y 1969
16y 1974
23y 1981
33y 1991
42y 2000
45y 2003
50y 2008

Neglect (parent & teacher report)

Recalled abuse (0-16y)

Smoking, psychological distress, educational attainment, SEP

Cognitive tests, socio-emotional behaviours

Child SEP, birthweight, birth order, household amenities, crowding & tenure, child physical impairment, parental education, chronic & psychiatric illness

Cognitive tests, mental health & physical function (SF-36)
## Child maltreatments

<table>
<thead>
<tr>
<th><strong>neglect</strong></th>
<th>prospective - at 7y and 11y</th>
</tr>
</thead>
<tbody>
<tr>
<td>- child looks undernourished, scruffy or dirty (T)</td>
<td></td>
</tr>
<tr>
<td>- outings (hardly ever) with mother/ father (P)</td>
<td></td>
</tr>
<tr>
<td>- little interest in education of mother/ father (T)</td>
<td></td>
</tr>
<tr>
<td>- read to/with child (hardly ever) by mother/ father (P)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>abuse by parent</strong></th>
<th>self-report at 45y</th>
</tr>
</thead>
<tbody>
<tr>
<td>sexual</td>
<td>- I was sexually abused</td>
</tr>
<tr>
<td>physical</td>
<td>- I was physically abused: punched, kicked, hit, beaten with an object, needed medical treatment</td>
</tr>
<tr>
<td>psychological</td>
<td>- I was verbally abused; suffered humiliation, ridicule, bullying, mental cruelty</td>
</tr>
<tr>
<td>witnessing</td>
<td>- I witnessed physical or sexual abuse of others in my family</td>
</tr>
</tbody>
</table>
Difference in mean sex-standardised SD-scores (exposed v unexposed)
Adj birth-weight, maternal smoking in pregnancy, birth order, maternal age, class at birth, mother's/father's education, household amenities.

Geoffroy et al, 2016
Child maltreatment & mental health child to adult

**Physical abuse**

**Psychological abuse**

**Sexual abuse**

**Neglect**

Geoffroy et al, 2016
Child maltreatment & cognitive ability child to adult

**Physical abuse**

- Cognitive sd-score vs. Age (y)

**Psychological abuse**

- Cognitive sd-score vs. Age (y)

Geoffroy et al., 2016
Child maltreatment & cognitive ability child to adult

Physical abuse

Psychological abuse

Sexual abuse

Neglect

Age (y)

Cognitive sd-score

Geoffroy et al, 2016
child maltreatments are associated with adult mental health and abuse to 50y; less for abuse
cognition neglect to 50y; less for abuse
Child maltreatment: % daily smoking at age 23 & 50y

Men

Women

Currently ≥1 cigarettes/day; ‘others’ are non-neglect or abuse

Power et al. 2015
Adult physical functioning

- physical functioning
  limitations, e.g. lifting, carrying groceries, climbing stairs, bending, kneeling, stooping and walking moderate distances

Short Form-36 at 50y:  ~12% defined as poor

Aims:  - child maltreatment associations
  - mediating factors: education, mental health, adult smoking, socioeconomic position (SEP)
OR for poor physical functioning

Neglect  | Physical  | Psychological  | Sexual

~12% defined as poor

Archer et al. 2017
OR for poor physical functioning

- Neglect
  - Odds Ratio (95% CI)

- Psychological
  - Odds Ratio (95% CI)

- Sexual
  - Odds Ratio (95% CI)

Archer et al. 2017
Mid-life physical functioning

- **long-term associations:** child neglect, psychological & sexual abuse & poor physical functioning at 50y
  - independent of several other early life factors
  - intermediary factors
    - adult SEP for neglect and sexual abuse
    - adult psychological distress for psychological abuse

- **magnitude of associations**
  - comparable to mental health
General conclusions

• specific associations (mostly)

• poorer development trajectories
  – height growth, adiposity gain, emotional and cognitive development
  – important in immediate term and formative re future health/wealth in adulthood

• social mobility /adult living standards
  – child neglect & sexual abuse

• adult smoking & poor health (45y obesity, blood lipids/glucose; 50y poor physical functioning & self-rated health)
  – child neglect and sexual abuse
  – key determinants of serious disease, disability and death, and are therefore important burdens for individuals and for society, particularly in the context of ageing populations.
Publications


Power, Pinto Pereira, Li. Childhood maltreatment and BMI trajectories to mid-adult life: Follow-up to age 50y in a British birth cohort *Plos One* 2015 10(3): e0119985.


Childhood abuse - definitions and indicators

**definition**

**Physical abuse**  Intentional use of physical force or implements against a child that results in (or has the potential) physical injury.

**Psychological abuse**  Intentional behaviour that conveys to a child that he/she is worthless, flawed, unloved, unwanted, endangered, or valued only in meeting another’s needs. Harmful (unintentional) parent-child interactions

**Sexual abuse**  any completed/attempted sexual act, sexual contact, or non-contact sexual interaction with a child by a caregiver.

**indicators**

**Physical abuse by a parent**  (punched, kicked or hit or beaten with an object, or needed medical treatment)

**Psychological abuse by a parent**  (verbally abused or humiliated, ridiculed, bullied/mental cruelty)

**Sexual abuse by a parent**