Using the ALSPAC cohort study to investigate the effect of clustering of childhood problems on educational attainment

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Outline of presentation

- Fulfilling Lives: A Better Start initiative
  - Local area model

- ALSPAC analysis
  - Aims
  - Definitions
  - Results

- Points for discussion
‘Fulfilling Lives: A Better Start’

• Big Lottery: £215m over 10 years -> 5 local areas

• Aim: to improve life chances of babies and young children in England

• Improve outcomes in
  – social and emotional development
  – communication and language development
  – nutrition

• Disadvantaged families

• Early intervention

• Variety of programmes and initiatives
Preventonomics: ‘A Better Start’ – how will it pay?

Develop models and frameworks to understand the potential down-stream public sector cost savings from intervening with parents and children aged 0-3

→ Calculate the costs of ‘problems’
→ Estimate savings from intervention

ALSPAC analysis: to inform cost models
Perinatal
- Pre-term birth / Low birth weight
- Breastfeeding
- Maternal depression and anxiety

Childhood
- Nutrition
  - Obesity
  - (Activity)
  - (Good nutritional status)
- Social & emotional learning
  - Behaviour problems
  - (Child maltreatment)
  - (Domestic violence)
  - Depression
  - Anxiety
- Speech & language
  - Speech, language and communication needs
  - Key Stage attainment in reading and Maths

Economic end points
- Long-term health
  - Obesity, diabetes, cardio-vascular disease
- Long-term mental health
  - Depression, anxiety
- Criminality
- Employment / income
- Education
ALSPAC analysis

Aims to contribute to the models by investigating:

• relationship between perinatal factors and childhood problems
• relationship between childhood problems and later outcomes
• clustering of childhood problems age 5, 8, 11
• effect of clustering of problems on later outcomes
• persistence over time of childhood problems
• effect of persistence of problems on later outcomes
Definitions of childhood problems (1)

Communication difficulties
• Macarthur Infant Communication Questionnaire total communication score: bottom quartile

Low school readiness
• combined reading, writing, maths, language score at school entry: lowest quintile (Chittleborough et al 2014)

Behaviour problems
• parent–rated Rutter or SDQ conduct disorder sub score: highest quintile (Goodman, 1997)
Definitions of childhood problems (2)

Mental ill health
• Development and Well-Being Assessment (DAWBA): any depressive disorder; any anxiety disorder; combined
• Short Moods and Feelings Questionnaire (SMFQ) score: score of 12 or higher (e.g. Angold et al)

Obesity
• BMI derived from height and weight
• obesity = above the sex and age-specific 95th BMI centiles (Viner)
Outcomes

Educational attainment
• Not obtaining 5 or more GCSEs or equivalent grades A* - C including English and Maths
• Age 16

• Other outcomes for future analyses
Confounders

• Maternal education

• Paternal social class

• Child’s ethnicity

• Housing tenure
Methods

Clustering

– Pairs of childhood problems at or as near to the same age as possible
– univariate logistic regression

Association between problem and outcome

– multivariate logistic regression
– problems age 5/age 8 and GCSE results age 16
– number of problems age 5/age 8 and GCSE results
– controlling for confounders
## Sample size

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
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<tbody>
<tr>
<td>1</td>
<td>13,988</td>
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<td>7</td>
<td>15,458</td>
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<td>18</td>
<td>7,729</td>
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</table>

- 3,049 completed all questionnaires to date
- 5,777 completed 75% of questionnaires to date
## Problems age 5 and not obtaining 5 or more GCSEs A*-C inc. English & Maths

<table>
<thead>
<tr>
<th>Category</th>
<th>Odds ratio</th>
<th>CI</th>
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</thead>
<tbody>
<tr>
<td>Communication difficulties</td>
<td>1.22 (ns)</td>
<td>0.80, 1.87</td>
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<tr>
<td>Low school readiness</td>
<td>3.91*</td>
<td>2.31, 6.62</td>
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<tr>
<td>Behaviour problems</td>
<td>2.34*</td>
<td>1.48, 3.71</td>
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<tr>
<td>Obese</td>
<td>1.28 (ns)</td>
<td>0.58, 2.82</td>
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<tr>
<td>Constant</td>
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Problems age 8 and not obtaining 5 or more GCSEs A*-C inc. English & Maths

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<thead>
<tr>
<th></th>
<th>Odds ratio</th>
<th>CI</th>
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<tbody>
<tr>
<td>Low school readiness</td>
<td>4.16*</td>
<td>3.12, 5.55</td>
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<tr>
<td>Behaviour problems</td>
<td>1.71*</td>
<td>1.33, 2.20</td>
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<tr>
<td>Obese</td>
<td>1.13 (ns)</td>
<td>0.71, 1.82</td>
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<tr>
<td>Depressed or anxious</td>
<td>2.22*</td>
<td>1.22, 4.02</td>
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<tr>
<td>Constant</td>
<td>0.68</td>
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Clustering of problems age 8

- Low school readiness
- Obesity
- Depressed or anxious
- Behaviour problems
## Number of problems age 5 and 8

<table>
<thead>
<tr>
<th>Number of problems</th>
<th>Percent</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Age 5</td>
<td></td>
<td></td>
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<tr>
<td>0</td>
<td>7.1</td>
<td>455</td>
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<td>1</td>
<td>74.0</td>
<td>4720</td>
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<td>2</td>
<td>17.2</td>
<td>1094</td>
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<td>3</td>
<td>1.7</td>
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<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Number of problems</th>
<th>Percent</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Age 8</td>
<td></td>
<td></td>
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<tr>
<td>0</td>
<td>23.9</td>
<td>1391</td>
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<tr>
<td>1</td>
<td>67.5</td>
<td>3932</td>
</tr>
<tr>
<td>2</td>
<td>8.0</td>
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<td>3</td>
<td>0.6</td>
<td>34</td>
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<tr>
<td>Total</td>
<td>100</td>
<td>5822</td>
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Clustering of problems age 5 and not obtaining 5 or more GCSEs A*-C inc. English & Maths

<table>
<thead>
<tr>
<th>Number of problems</th>
<th>Odds ratio</th>
<th>CI</th>
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<tbody>
<tr>
<td>No problem</td>
<td>1.0</td>
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<tr>
<td>One problem</td>
<td>3.16*</td>
<td>2.40, 4.42</td>
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<tr>
<td>Two problems</td>
<td>4.83*</td>
<td>3.56, 6.55</td>
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<tr>
<td>Three problems</td>
<td>8.84*</td>
<td>4.83, 16.17</td>
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<tr>
<td>Constant</td>
<td>0.42</td>
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N 3974
Clustering of problems age 8 and not obtaining 5 or more GCSEs A*-C inc. English & Maths

<table>
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<th>Odds ratio</th>
<th>CI</th>
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</thead>
<tbody>
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<td></td>
<td>One problem</td>
<td>3.23*</td>
<td>2.74, 3.81</td>
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<tr>
<td></td>
<td>Two problems</td>
<td>6.51*</td>
<td>4.83, 8.77</td>
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<tr>
<td></td>
<td>Three problems</td>
<td>11.98*</td>
<td>3.96, 36.25</td>
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</table>

Constant

N 3790
Questions, problems, concerns

- Definitions of problems
- Better way of looking at clustering?
- Multicollinearity
- Lack of data for some problems -> reduced sample size
- Attrition
Thank you

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bit.ly/preventonomics

@preventonomics