The determinants of non-cognitive and cognitive schooling outcomes

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Every Child Matters initiative aims to

• Strength the accountability of schools for the educational achievement of every child

• Broaden the outcomes that schools focus on, to include well being and other non cognitive skills
  - well being, engagement, safety, etc.
This research

• is *not* a formal evaluation of ECM

• rather, it aims to inform policy-makers about the likely impact from ECM by adding to the limited evidence base on *the role of schools in producing non-academic outcomes*

• Addresses the extent to which schools, as key policy levers for DCSF, can currently influence non-cognitive outcomes
ECM Outcomes

• Be healthy *(self-rated health)*
• Stay safe *(experience of bullying)*
• Enjoy and achieve *(key stage test results; school engagement; truancy)*
• Make a positive contribution *(extra-curriculum activities)*
• Achieve economic well-being
Research questions

• What is the role of school in explaining differences in ECM outcomes across children?
• What are the potential complementarities and trade-offs between different ECM outcomes?
  – At school and pupil level
• We focus on variety of ECM outcomes with strongest emphasis on:
  – Academic achievement; School engagement; Bullying experience
Data

• Longitudinal Study of Young People in England (LSYPE)
• Longitudinal survey of about 15,000 people who were 14 in 2004 and followed for 4 waves
• Provides detailed information on individuals
  • personal characteristics, family background, parent’s socio-economic status and employment attitudes, experiences and behaviours

matched with

• Pupil Level Annual School Census/ National Pupil Database (NPD/PLASC)
• Administrative data on pupils' record of achievement and pupil-level background characteristics

• Edubase and LEASIS: school level characteristics
Key outcomes of interest

• **Academic achievement**: results at KS4
  – standardised capped average GCSE point score

• **School engagement**: scale based on 12 attitudinal questions relating to how pupils feel about school
  – e.g. *I am happy when I am at school; School is a waste of time for me; I am bored in lessons, etc.*

• **Experience of bullying**: index summing the occurrence of different types of bullying
ECM Outcomes – raw correlation

• A child’s attitude to school and their academic achievement is highly positive correlated
• Those with higher levels of academic achievement and with greater levels of enjoyment of school are less likely to have experienced bullying
• But do not take account of other characteristics e.g. FSM or school
Model (I)

- **Value Added** approach
  - Pupil outcomes modelled as function of pupil characteristics, family inputs and school
  - Inclusion of lagged measure of outcomes
  - Focus on the change in pupil outcomes over secondary school
  - All outcomes measured in wave 3 (year 11) and prior measures are taken from wave 1 (year 9)
Model (II)

• 3 separate equations for the 3 key outcomes
• Study the inter-relationship between different cognitive and non-cognitive outcomes
  – model the impact of each outcome (lagged) on all
• Focus on the role of schools and school characteristics using a variety of methods
Estimating equation (1)

\[ o_{ijt} = \alpha_i + \beta o_{ijt-1} + \gamma_k \sum_k X_{ijkt} + \varphi_k \sum_k F_{ijkt} + u_{ij} \]

−\( i, j, t= \) pupil, school and period
−\( O_t = \) measure of outcomes (age 16)
−\( O_{t-1} = \) prior measures of outcomes (age 14)
−\( X_k \) and \( F_k \) = set of \( k \) pupil characteristics and \( k \) family inputs
−\( u_{it} \) = error term

\[ \text{Error term decomposed in two components: } u_{it} = \vartheta_i + \varepsilon_{ij} \]

\( \vartheta_i \) = school effect: specific to each school and constant across pupils in the same school
Estimating equation (2)

We use two approaches to account for school effects

Random Effects

• Comparable to the existing literature
• Allows us to calculate the variance of school effects and the intra class correlation (measure the size of the school effect)

\[ \rho = \frac{\sigma^2_\theta}{\sigma^2_\theta + \sigma^2_\varepsilon} \]

Fixed Effects

• Relax the assumption of strict exogeneity (i.e. that school effects are unrelated to other covariates)
• Allows us to extract estimates of school effects and explore whether these effects differ systematically across different types of school

→ 2\textsuperscript{nd} stage regression: school FE on school characteristics
Results: pupil characteristics (1)

- Pupils with higher levels of school enjoyment have slightly higher levels of academic achievement
- Children who had higher academic achievement at 14 seem to have higher levels of enjoyment at age 16
Results: pupil characteristics (2)

• Pupils who experience bullying have subsequently lower levels of academic achievement and lower levels of enjoyment of school.

• The reverse is not true. Pupils with lower levels of academic achievement at age 14 are not more likely to experience bullying at age 16.
Results: pupil characteristics (3)

• Pupils’ health was also found to be positively correlated with academic achievement and enjoyment.

• Pupils with health problems at age 14 or who had Special Educational Needs were significantly more likely to report being bullied at age 16.
Results: pupil characteristics (4)

• Extra curricular activities, including tuition, were positively related to academic achievement.

• Pupils who worked more hours in paid employment had lower levels of enjoyment of school.
Results: pupil characteristics (5)

• Strong negative link between unauthorised absence in the previous period and subsequent academic achievement.
• Even stronger negative link with school enjoyment.
• Unauthorised absence is a marker for subsequent poor achievement and lower pupil well being.
Summary of pupil results

<table>
<thead>
<tr>
<th></th>
<th>Achievement</th>
<th>Engagement</th>
<th>Experience of bullying</th>
</tr>
</thead>
<tbody>
<tr>
<td>KS2 prior achievement</td>
<td>0.521</td>
<td>0.351</td>
<td>/</td>
</tr>
<tr>
<td>Prior school engagement</td>
<td>0.015</td>
<td>0.566</td>
<td>/</td>
</tr>
<tr>
<td>Prior experience of bullying</td>
<td>-0.029</td>
<td>-0.313</td>
<td>0.188</td>
</tr>
<tr>
<td>Unauthorised absences</td>
<td>-0.025</td>
<td>-0.161</td>
<td>/</td>
</tr>
<tr>
<td>Extra curric. courses</td>
<td>0.087</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Tuition</td>
<td>0.063</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Self rated health</td>
<td>0.089</td>
<td>1.137</td>
<td>-0.075</td>
</tr>
</tbody>
</table>
Results: the role of schools (1)

- Measure the relative importance of differences between schools (the policy lever) compared to the differences between pupils
- Around 27% of the variation in pupil achievement is attributable to differences across schools
- Variation across schools in the other non-cognitive outcomes is much less
  - for enjoyment of school, only around 3% of the variation across pupils was attributable to differences across schools, even less for bullying.
Results: the role of schools (2)

• Do certain types of schools have higher achievement and engagement?
• Foundation, VA and CTC schools have higher value added achievement
• Higher pupil teacher ratio associated with less value added in pupil engagement
Results: the role of schools (3)

• Do certain types of schools have less bullying?
• Firstly not much difference in bullying rates between schools allowing for pupil characteristics
• Schools don’t matter much
Results: the role of schools (4)

- Schools with more FSM children have lower increase in bullying over secondary phase
- Schools with higher achieving intakes (KS2) have lower increase in bullying over secondary phase
- A higher pupil teacher ratio and larger school associated with lower increase in bullying over secondary phase
# Summary of school results

<table>
<thead>
<tr>
<th></th>
<th>School effects on achievement</th>
<th>School effects on engagement</th>
<th>School effects on bullying</th>
</tr>
</thead>
<tbody>
<tr>
<td>% FSM</td>
<td>/</td>
<td>/</td>
<td>-0.252</td>
</tr>
<tr>
<td>Average score in KS2</td>
<td>/</td>
<td>/</td>
<td>-0.073</td>
</tr>
<tr>
<td>Pupil Teacher Ratio</td>
<td>/</td>
<td>/</td>
<td>-0.0178</td>
</tr>
<tr>
<td>Single Sex school</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Proportion non-white British</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>School size</td>
<td>/</td>
<td>/</td>
<td>-0.000079</td>
</tr>
<tr>
<td>Voluntary Controlled</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Foundation, VA, CTC</td>
<td>0.131</td>
<td>/</td>
<td>0.441</td>
</tr>
</tbody>
</table>
Results

• At school level - schools with higher value added in achievement also have higher value added in school engagement

• Other outcomes not correlated
School effects: achievement and enjoyment of school
School effects: achievement and bullying
School effects: bullying and enjoyment of school
Uncovering causality using IV

- **Instrument for achievement**: quarter of birth (see work by Dearden on month of birth and its impact on achievement)

- **Instrument for truancy**: change in the average absence rate at the LEA level (to reflect different LEA policies towards truancy)

- Not found a suitable instrument for the other ECM variables
## IV Results

<table>
<thead>
<tr>
<th>Instruments used</th>
<th>Achievement</th>
<th>Attitude toward school</th>
<th>Bullying</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Absences instrumented with differences in abs at LEA level</em></td>
<td><em>Both achievement and absences instrumented</em></td>
<td><em>Both achievement and absences instrumented</em></td>
</tr>
<tr>
<td>Prior achievement (KS2)</td>
<td>0.421***</td>
<td>0.863</td>
<td>0.011</td>
</tr>
<tr>
<td>Unauthorized absences</td>
<td>-0.216***</td>
<td>0.370</td>
<td>0.017</td>
</tr>
<tr>
<td>F First stage</td>
<td>6.30***</td>
<td>69.51***</td>
<td>68.70***</td>
</tr>
</tbody>
</table>
IV estimates: summary of results

- Truancy → Achievement
- Achievement → Attitude
- Attitude → Bullying
- Bullying → Achievement
- Bullying → Attitude

It seems the direction of causation goes from non-cognitive to non-cognitive and not vice versa.
Conclusions (1)

• Schools clearly play an important role in determining pupil achievement but less variation across schools in the other non-cognitive outcomes

• Schools are an obvious and important policy lever to raise pupil achievement

• Schools are not playing as large a role in determining pupils’ enjoyment or whether or not pupils get bullied
Conclusions (2)

• Does not mean that schools cannot exert a greater impact on non cognitive outcomes but rather that this does not happen currently.
Conclusions (3)

• At school level little evidence of trade off in outcomes e.g. achievement and bullying

• However, preliminary pupil level analysis suggests that schools that improve their value added have pupils who experience a fall in their levels of engagement

• So process of change at school level to improve VA may cause loss of well being particularly for pupils near to key thresholds.
Conclusions

• Some non-cognitive indicators can be potentially used pro-actively to target pupils at risk of future cognitive and non-cognitive difficulties
  – high levels of unauthorised absence warn of lower levels of academic achievement and school enjoyment
  – those with poor health (especially with Special Educational Needs) go on to have worse academic and non-cognitive outcomes
## VARIABLES IN THE ANALYSIS

### Key outcomes’ measures
- KS4 total point score
- Attitude to school scale at age 16
- Bullying scale at age 16

### Prior outcomes’ measures
- KS2 total point score
- Attitude to school scale at age 14
- Bullying scale at age 14

### Administrative covariates (from PLASC)
- Gender
- Statement of special education needs
- Ethnic group
- English as a first language
- Free school meals eligibility
- LEA identifier

### Socio-demographic covariates (From LSYPE)
- Main parent’s social class
- Whether main parent is unemployed
- Mother’s highest education qualification
- Father’s highest education qualification
- Financial difficulties (whether parents receive means tested benefits)
- Number of hours worked per week during term time

### School-level covariates
- Institution type
- Whether single sex school
- Pupil-teacher ratio
- Average score in KS2
- Proportion of pupils receiving FSM
- Proportion of non-white British pupils
- School size (total number of pupils enrolled)

### Other ECM variables
- Self rated health
- Whether takes extra-curriculum courses (in supplementary subjects)
- Whether takes extra-curriculum courses (in subjects they also do at school)
- Number of (unauthorised) absences