Everything is Connected

Connected data for connected services that reflect the complexities of childhood

Lucy Eddy
Centre for Applied Education Research
Bradford: A city of research

1/3 of population under the age of 20

Ethnically diverse

1/4 of population live in poverty

5th largest urban district in England

Poor physical and mental health

Bradford: A city of research
Born in Bradford

>13,500 children born at BRI 2007 - 2010
BiB data

Baseline (mother)
- Lifestyle
- Environment
- Medical (physical & mental health)
- Socio-economic
- Genetic
- Biological

Routinely collected data
- Health visitor/school nurse
- Hospital Admissions
- GP records
- Bradford Education

Full Sweep @ 4-5yrs
- Socio-economic
- Environmental
- Medical
- Cognitive

Secondary School

Lifestyles, obesity & activity
Asthma, Allergies, infection
Pollution & green space
Learning & behaviour
Evolution of BiB
Connected Bradford

- **Connected Bradford** is a **secure pseudonymised cloud platform** that links multiple routine datasets from public services, local government, and voluntary organisations across Bradford.

- Enables scientists to explore patterns in data and understand how services intersect and interact.

- Aims to support targeted insights and interventions and the efficient and evidence-based allocation of resources.
Data necessary but not sufficient

PERMISSIONS AND MANDATE

ETHICS

COPRODUCTION

COMMUNICATION

Sign the pledge

Data sharing code of practice

Co-production in ActEarly: NOTHING ABOUT US WITHOUT US

RECIPES FOR CHANGE
Applied data science

The Centre for Applied Education Research

Seeks to empower educational settings (schools, nurseries, early year providers) to use evidence-based approaches to identify and remove all barriers to learning.
What have we learned from the research so far?
Vulnerabilities concentrate

Number of adverse outcomes
at age 17
by early childhood income (N=15,245)

- Lowest 20%
- Lowest 20-40%
- Middle 40-60%
- Highest 60-80%
- Highest 80-100%

Risk ratio

Number of adverse outcomes

- Any
- One
- Two
- Three
- Four or five
Identifying and understanding inequalities

Abstract
There has been recent interest in the relationship between socioeconomic status and the diagnosis of autism in children. Studies in the United States have found lower rates of autism diagnosis associated with lower socioeconomic status, while studies in other countries report no association, or the opposite. This article aims to contribute to the understanding of this relationship in the United Kingdom. Using data from the Born in Bradford cohort, comprising 13,857 children born...
The Early Years Foundation Stage Profile can identify children at risk of autism.
Connected Bradford

Listening and Attention:

- No ASD
- ASD
The Early Years Foundation Stage Profile can identify children at risk of SEN

Can holistic school readiness evaluations predict academic achievement and special educational needs status? Evidence from the Early Years Foundation Stage Profile

A.L. Atkinson, J. B. Hill, K.J. Pettinger, J. Wright, A.R. Hart, J. Dickerson, M. Mori-Williams

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2 School of Languages, Cultures and Journeys, University of Leeds, Leeds, UK
3 Children's Centre, University of Bradford, Bradford, West Yorkshire, UK
4 Department of Primary Care, Nuffield Children's Hospital, Oxford Radcliffe Trust, Oxford Children's Centre, Oxford, Oxfordshire, UK
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ARTICLE INFO

Keywords: Educational attainment, Special educational needs, School readiness, Primary education

ABSTRACT

This study examined the predictive validity of holistic school readiness evaluations using the 'good level of development' outcome from the Early Years Foundation Stage Profile (EYFSP). The EYFSP assesses a range of abilities at school entry, including academic, language, motor, and social skills. In particular, we examined whether the assessment predicted reading, writing, maths, and science ability in primary school and future special educational needs (SEBD) status (N = 5777-5792). Children who reached a good level of development had higher odds of performing at expected (vs. below expected) levels on later academic assessments. This was particularly true for children with SEN. Reaching a good level of development also increased the odds of performing at above expected (vs. expected) levels on the academic assessments and lowered the odds of requiring SEN support. This demonstrates that holistic school readiness evaluations are powerful tools that can identify 'at risk' children.
EYFSP risk of SEN

GLD - Not Reached (unadj. model)
GLD - Not Reached (adj. model)
FSM - Yes
Ethnicity - White British
Male
EAL - Yes

Odds Ratio & 95% CI (log scale)
Systematic approach to school-based assessments for autism spectrum disorders to reduce inequalities: a feasibility study in 10 primary schools

Barry Wright,1,2 Kalliopi Konstantopoulou,3 Kuldeep Sohal,4 Brian Kelly,4 Geoff Morgan,5 Cathy Hulin,4 Sara Mansoor,6 Mark Mon-Williams5,7,8,9

ABSTRACT
Objectives: This was a pilot study to explore whether the Early Years Foundation Stage Profile (EYFSP) carried out by UK teachers within the 'reception' year, combined with the Social Communication Questionnaire (SCQ), can lead to early identification of children with autism spectrum disorders (ASD) and early access to intervention and can reduce inequality in access to assessment and intervention.

Design: Pragmatic prospective cohort.

Setting: Ten primary schools from the SHINE project in Bradford.

Participants: 587 pupils from 10 schools who transitioned from reception to year 1 in July 2017 and had the EYFSP completed were included in the final study.

Interventions: The assessment involved a multidisciplinary team of three staff who completed Autism Diagnostic: Interview-Revised, Autism Diagnostic Observation Schedule Version 2, classroom observations with an ASD checklist, a teacher-based ASD questionnaire and a final consensus meeting.

Primary outcome measures: National Institute for Health and Care Excellence guideline-compiled clinical diagnosis of ASD.

Strengths and limitations of this study:
- Consent was sought from all parents regardless of the language by flexible use of interpreters.
- Education and health data were shared, yielding significant benefits.
- We conducted the Social Communication Questionnaire (SCQ) (threshold of 12) with children who scored >10 in the Early Years Foundation Stage Profile (EYFSP) and with a random subsample from the high EYFSP group (15% of children with score ≥10).
- All children with a score ≥12 on the SCQ received a detailed comprehensive autism spectrum disorder assessment, and the rest had a teachers' screening questionnaire.
- Any child who had already had a diagnosis on the autism spectrum from the local diagnostic services was also noted.

ASD is a neurodevelopmental condition that can lead to lifelong challenges for affected individuals.
Under-used diagnosis of DCD

Estimated to be 5-6% of children – in Bradford only 154 diagnoses in 40 years

Referral
- Family doctor
- School Nurse
- Paediatrician

Assessment
- OT and Physio

Diagnosis
What are we doing with the research?
The problem

“we are not doing as well as we should”

- 3-4% have neurodevelopmental disorder
- large variation across UK
- short-term costs estimated as £1.58 billion per annum
- annual long-term costs estimated at £2.35 billion
Future pathways

Plan
Review
Do

District Wide Neurodiversity Strategy and Training
Whole School Neurodiversity Training
Neurodiversity Profile and Support Plan
Specialist Neurodiversity Consultation
Multidisciplinary Assessment
<table>
<thead>
<tr>
<th>EYFSP sub-goals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening, Attention and</td>
<td>Number</td>
</tr>
<tr>
<td>Understanding</td>
<td>Numerical Patterns</td>
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<tr>
<td>Speaking</td>
<td>Past and Present</td>
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<td>People Culture and</td>
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<td>Communities</td>
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<td>Building Relationships</td>
<td>The Natural World</td>
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<td>Gross Motor Skills</td>
<td>Creating with Materials</td>
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<td>Being Imaginative and</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Expressive</td>
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<tr>
<td>Word Reading</td>
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<td>Writing</td>
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<tr>
<td>Cognitive skills</td>
<td></td>
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<td>---------------------</td>
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<td>Writing</td>
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</tbody>
</table>
Structure

EARLY LEARNING GOALS
Nomenclature change

FUNDAMENTAL LEARNING SKILLS
<table>
<thead>
<tr>
<th>ENPT FLS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>• Literacy</td>
<td>• Speech and non-verbal communication</td>
</tr>
<tr>
<td>• Mathematics</td>
<td>• Expressive language</td>
</tr>
<tr>
<td>• Writing</td>
<td>• Receptive Language</td>
</tr>
<tr>
<td>• Fine Motor skills</td>
<td>• Executive function</td>
</tr>
<tr>
<td>• Gross Motor Skills</td>
<td>• Memory</td>
</tr>
<tr>
<td>• Impulse and compulsion</td>
<td>• Flexibility</td>
</tr>
<tr>
<td>• Self regulation</td>
<td>• Sensory sensitivity</td>
</tr>
<tr>
<td>• Co-regulation</td>
<td>• Self care and management</td>
</tr>
<tr>
<td>• Emotional regulation</td>
<td>• Social interaction</td>
</tr>
<tr>
<td>• Attention regulation</td>
<td>• Social attention</td>
</tr>
<tr>
<td>• Prosocial</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Child name</td>
<td></td>
</tr>
<tr>
<td>Child D.O.B</td>
<td></td>
</tr>
<tr>
<td>Child class</td>
<td></td>
</tr>
<tr>
<td>Child gender</td>
<td></td>
</tr>
<tr>
<td>Child ethnicity</td>
<td></td>
</tr>
<tr>
<td>Does the child have English as an Additional Language (EAL)??</td>
<td></td>
</tr>
<tr>
<td>Is the child entitled to Free School Meals (FSM)??</td>
<td></td>
</tr>
<tr>
<td>Any parental concerns raised?</td>
<td></td>
</tr>
<tr>
<td>EYFSP from reception</td>
<td></td>
</tr>
<tr>
<td>Phonics scores</td>
<td></td>
</tr>
<tr>
<td>KS1 scores</td>
<td></td>
</tr>
<tr>
<td><strong>School-based assessments</strong></td>
<td></td>
</tr>
<tr>
<td>Medical records</td>
<td></td>
</tr>
<tr>
<td>Does child wear their glasses if needed?</td>
<td></td>
</tr>
<tr>
<td>Hearing test completed?</td>
<td></td>
</tr>
<tr>
<td>Any siblings with known difficulties?</td>
<td></td>
</tr>
</tbody>
</table>
Electronic advantage

SCREENER
**Screener examples**

Compared to children of the same age, is this pupil below the expected skill level in any of these skills?

<table>
<thead>
<tr>
<th>Cognition and Learning</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading</strong></td>
<td></td>
<td></td>
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<tr>
<td>(e.g. reading fluently, possessing age appropriate vocabulary, following a narrative, phonological awareness)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Maths</strong></td>
<td></td>
<td></td>
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<tr>
<td>(e.g. completing math tasks, counting, number awareness, understanding space and time concepts, not mixing numbers)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. writing letters/words neatly, writing at appropriate speed, writing without excessive concentration)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Cognitive processing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. good short term recall, switching between tasks, planning work carefully, solving problems flexibly)</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication and Interaction</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. speaking clearly, expresses thoughts/opinions, aware of facial expressions/gestures, understands what is said/asked of them directly/indirectly)</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social, Emotional and Mental Health</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulating emotions and actions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. controlling temper/excitability, demonstrating patience, employing coping strategies, looking to others for guidance)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Attention and flexibility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. listening attentively, remaining on task, not easily distracted, not overly focused, effectively switching between tasks)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Control of impulses and compulsions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g., thinking before acting or speaking, no repetitive/obsessive/ritual behaviours)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Building relationships</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. playing cooperatively, making friends, sensitive to others, engaging with adults, socially aware)</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensory and Physical</th>
<th>Yes</th>
<th>No</th>
</tr>
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<tr>
<td><strong>Sensory sensitivity</strong></td>
<td></td>
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<tr>
<td>(e.g. coping with bright lights/loud noises, tolerating physical contact, comfortable with smells/sounds associated with eating)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Self care and management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. eating tidily, keeping clean, using the toilet hygienically, getting dressed independently)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Everyday movement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. fine and gross motor skills: using scissors efficiently, playground activities, changing clothes/shoes, using cutlery, moving around the classroom)</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Reading
Maths
Writing
Everyday movement
Regulating emotions and actions
Attention and flexibility
Control of impulses and compulsions
Communication
Building relationships
Cognitive processing
Sensory sensitivity
Self care and management
Screener fields

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Maths
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Control of impulses and compulsions
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Building relationships
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Sensory sensitivity
Self care and management
Electronic advantage

SCREENER

FUNDAMENTAL LEARNING SKILLS
ENPT FLS

- Literacy
- Mathematics
- Writing
- Fine Motor skills
- Gross Motor Skills
- Impulse and compulsion
- Self regulation
- Co-regulation
- Emotional regulation
- Attention regulation
- Prosocial

- Speech and non-verbal communication
- Expressive language
- Receptive Language
- Executive function
- Memory
- Flexibility
- Sensory sensitivity
- Self care and management
- Social interaction
- Social attention
FLSs

Manipulates tools to complete a task successfully (e.g., using a pen/pencil, scissors, cutlery)

Co-ordinates both hands to achieve a goal (e.g., typing, tying shoelaces, buttoning clothes)

Able to achieve a goal with a single hand (e.g., moving or picking up objects)

**SCORE =**

LACKS SKILL
EMERGING SKILL
EXPECTED/EXCEEDING SKILL
Refinement

Letter to parent

SCREENER

FUNDAMENTAL LEARNING SKILLS

TASK COMPETANCIES
Refinement

SCREENER

FUNDAMENTAL LEARNING SKILLS

each question can be refined

each FLS can be refined

task

each task can be refined

TASK COMPETANCIES
Adding additional information

- Assess a whole class FMS in <1 hour
- Uses school resources
- Tested on over 1300 children
- Iterative development
  - Rasch analysis
  - Teacher opinion
- Identifies in alignment with clinical tools
Flipping the system

Universal school-based screening

Occupational Therapy and Physiotherapy guided P.E.

Access to clinical services
Incorporating Lived Experiences

The CLEVER Framework

Connecting Lived Experiences with Visualisation of Electronic Records

Dr Mai Elshehaly
The CLEVER Framework

- Visual Storytelling
- Mapping journeys through the system
The vision
Data sharing
Everything is Connected

Connected data for connected services that reflect the complexities of childhood

Lucy Eddy
Centre for Applied Education Research