Child and adolescent mental health investigations using CRIS

Dr Johnny Downs

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CRIS: improving care through….

Making better use of existing information

Data-linkage and natural language processing approaches in NHS and school records to understand vulnerability within the clinical and general populations.

Improving the quality of clinical information

Embedding automated monitoring systems within electronic health care records to track family reports of progress over time.

Supporting decisions

Monitoring of symptoms and side-effects using online portals and wearable devices to track the course of medication treatment in ADHD.

Figure 1: Linked data resources to provide an anonymised multi-agency dataset covering child and adolescent mental health services, hospital attendances, education services and social service activity in South London.
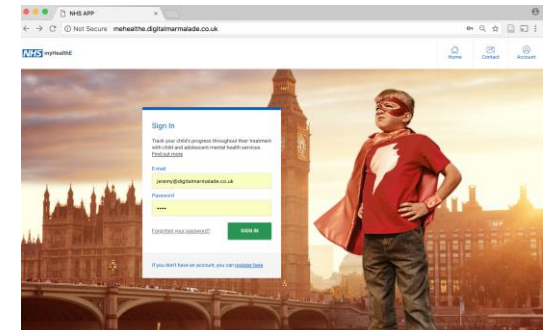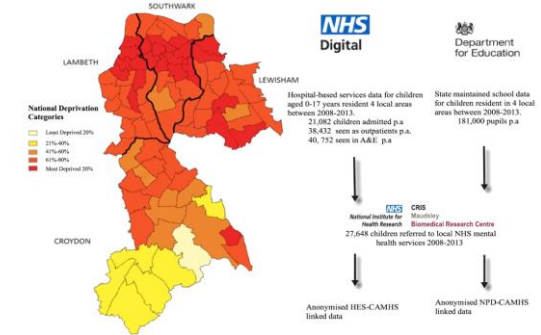
Making better use of existing information..

National Institute for Health Research

1) Tracking use of off-label medication

Eur Child Adolesc Psychiatry (2016) 25:649–658
DOI 10.1007/s00787-015-0780-7

CrossMark

ORIGINAL CONTRIBUTION

Clinical predictors of antipsychotic use in children and adolescents with autism spectrum disorders: a historical open cohort study using electronic health records

Johnny Downs[1] · Matthew Hotopf[1] · Tamsin Ford[1,3] · Emily Simonoff[1] · Richard G. Jackson[1,2] · Hitesh Shetty[2] · Robert Stewart[1,2] · Richard D. Hayes[1]

2) Surveillance of suicidality in ASD

AMIA Annual Symposium Proceedings Archive

AMIA

INFORMATICS PROFESSIONALS. LEADING THE WAY.

AMIA Annu Symp Proc. 2017; 2017: 641–649.
Published online 2018 Apr 16.

PMCID: PMC5977628
PMID: 29854129

Detection of Suicidality in Adolescents with Autism Spectrum Disorders: Developing a Natural Language Processing Approach for Use in Electronic Health Records

Johnny Downs, MRCPsych,[*,1,2] Sumithra Velupillai, PhD,[*,1,3] Gkotsis George, PhD,[*,1] Rachel Holden, MSc,[1,4] Maxim Kikoler, MSc,[1,4] Harry Dean, MSc,[1] Andrea Fernandes, MSc,[1] and Rina Dutta, PhD, FRCPsych[1,2]

3) Understanding what factors predict treatment failure in young people with psychosis

Schizophrenia Bulletin
doi:10.1093/schbul/sbx197

SCHIZOPHRENIA BULLETIN
The Journal of Psychoses and Related Disorders

Negative Symptoms in Early-Onset Psychosis and Their Association With Antipsychotic Treatment Failure

Johnny Downs[1–3], Harry Dean[1], Suzannah Lechler[1], Nicola Sears[1], Rashmi Patel[2,4], Hitesh Shetty[2], Matthew Hotopf[1,2], Tamsin Ford[5], Marinos Kyriakopoulos[2,3,6], Covadonga M. Diaz-Caneja[7], Celso Arango[7], James H. MacCabe[2,4], Richard D. Hayes[1], and Laura Pina-Camacho[*,3,7]

THE JOURNAL OF CLINICAL PSYCHIATRY

Avoid the guessing game. Be confident in your diagnosis.

Recognition and Treatment of Pediatric Bipolar Disorder

SUPPLEMENT

CLINICAL PSYCHIATRY SUPPLEMENT

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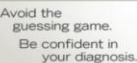Clinical Points
Methods
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Supplementary Material
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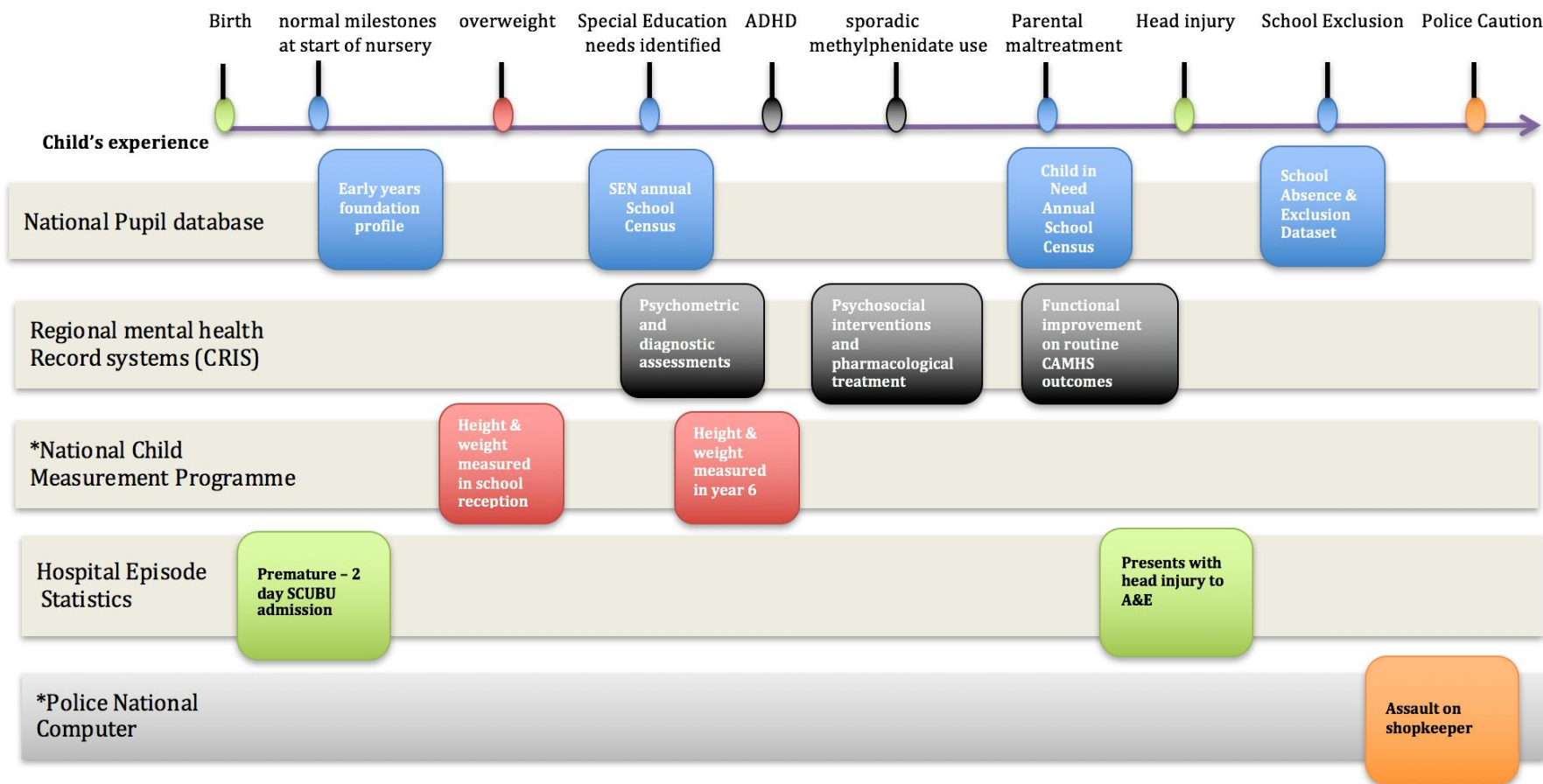Related ▶

Early Career Psychiatrists

The Association Between Comorbid Autism Spectrum Disorders and Antipsychotic Treatment Failure in Early-Onset Psychosis:
A Historical Cohort Study Using Electronic Health Records

Johnny M. Downs, MSc, MRCPsych[a,b,*]; Suzannah Lechler, MSc[a,b]; Harry Dean, MSc[a,b]; Nicola Sears, MSc[a,b]; Rashmi Patel, PhD, MRCPsych[a,b]; Hitesh Shetty, MSc[b]; Emily Simonoff, MD, FRCPsych[a,b]; Matthew Hotopf, PhD, MRCPsych[a,b]; Tamsin J. Ford, PhD, FRCPsych[c]; Covadonga M. Diaz-Caneja, MD[d]; Celso Arango, MD, PhD[d]; James H. MacCabe, PhD, FRCPsych[a,b]; Richard D. Hayes, PhD[a,b]; and Laura Pina-Camacho, MD, PhD[a,b,d]

Maudsley Biomedical Research Centre

Making better use of existing information..

Examples of routinely collected electronic child and young person data in England

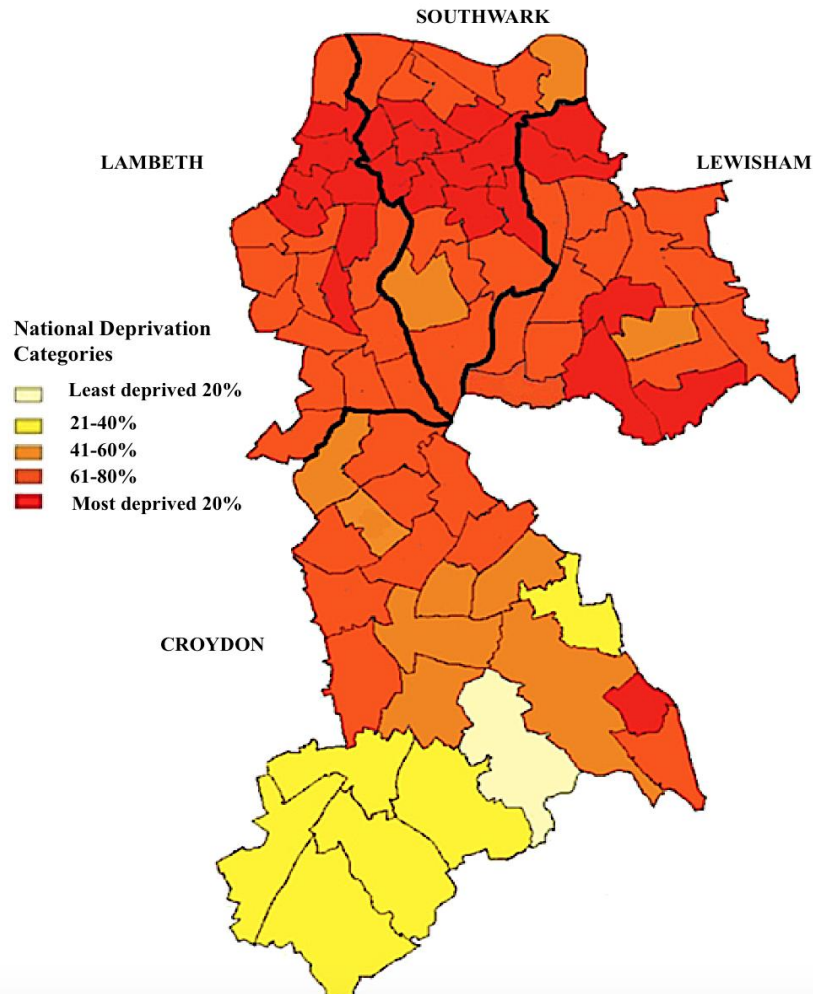Timeline — Child's experience:
Birth · normal milestones at start of nursery · overweight · Special Education needs identified · ADHD · sporadic methylphenidate use · Parental maltreatment · Head injury · School Exclusion · Police Caution

National Pupil database
- Early years foundation profile
- SEN annual School Census
- Child in Need Annual School Census
- School Absence & Exclusion Dataset

Regional mental health Record systems (CRIS)
- Psychometric and diagnostic assessments
- Psychosocial interventions and pharmacological treatment
- Functional improvement on routine CAMHS outcomes

*National Child Measurement Programme
- Height & weight measured in school reception
- Height & weight measured in year 6

Hospital Episode Statistics
- Premature – 2 day SCUBU admission
- Presents with head injury to A&E

*Police National Computer
- Assault on shopkeeper

Ford T, Stewart R, Downs J Practical Psychiatric Epidemiology (in press) OUP

Maudsley Biomedical Research Centre

Making better use of existing information..

Linking health and education data to plan and evaluate services for children

SOUTHWARK

LAMBETH

LEWISHAM

National Deprivation Categories

- Least deprived 20%
- 21-40%
- 41-60%
- 61-80%
- Most deprived 20%

CROYDON

NHS Digital

Hospital-based services data for children aged 0-17 years, resident within 4 local areas between 2008-2013.
  21,082 children admitted p.a
  38,432 seen as outpatients p.a.
  40, 752 seen in A&E p.a.

Department for Education

State maintained school data for children, resident within 4 local areas between 2008-2013.
  181,000 pupils p.a.

NHS National Institute for Health Research — **CRIS Maudsley Biomedical Research Centre**

27,648 children referred to local NHS mental health services 2008-2013

Anonymised Hospital - CAMHS linked data
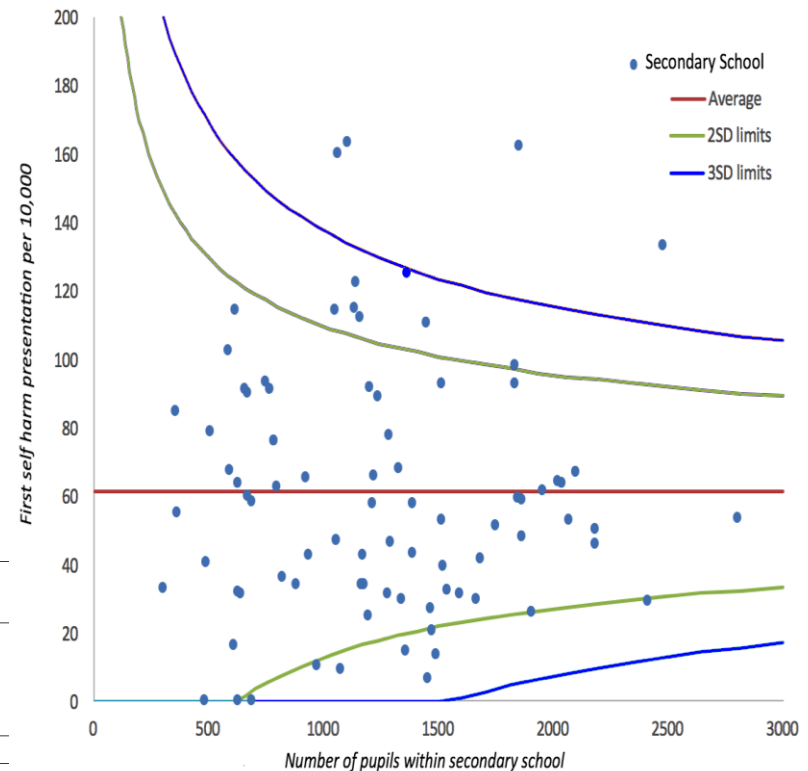
Anonymised School - CAMHS linked data

Downs J, Gilbert R, Hayes RD, *et al Archives of Disease in Childhood* 2017;**102:**599-602.
Downs J, Ford T, Shetty H, et al. BMJ Open 2018 (in press)

Educational and clinical risk factors for self-harm in adolescence

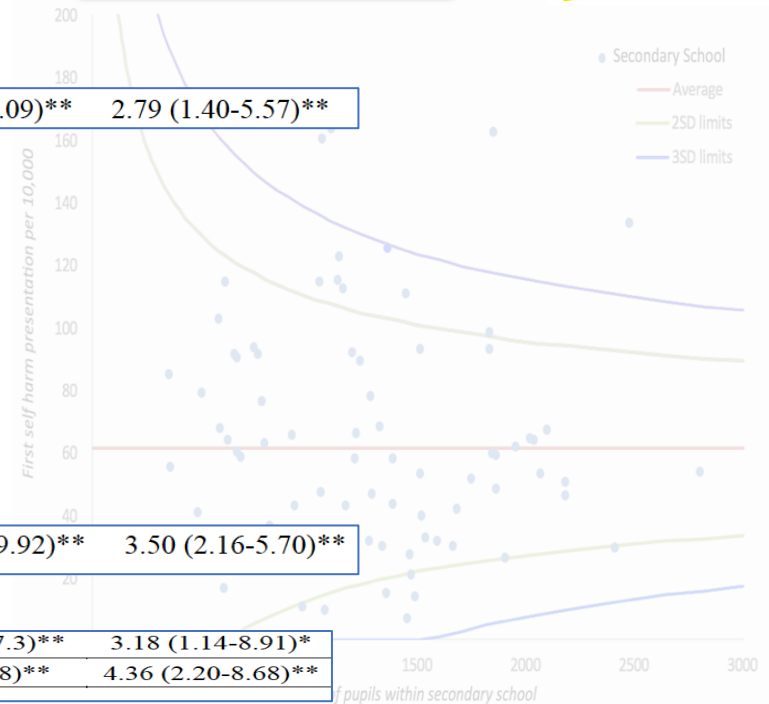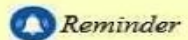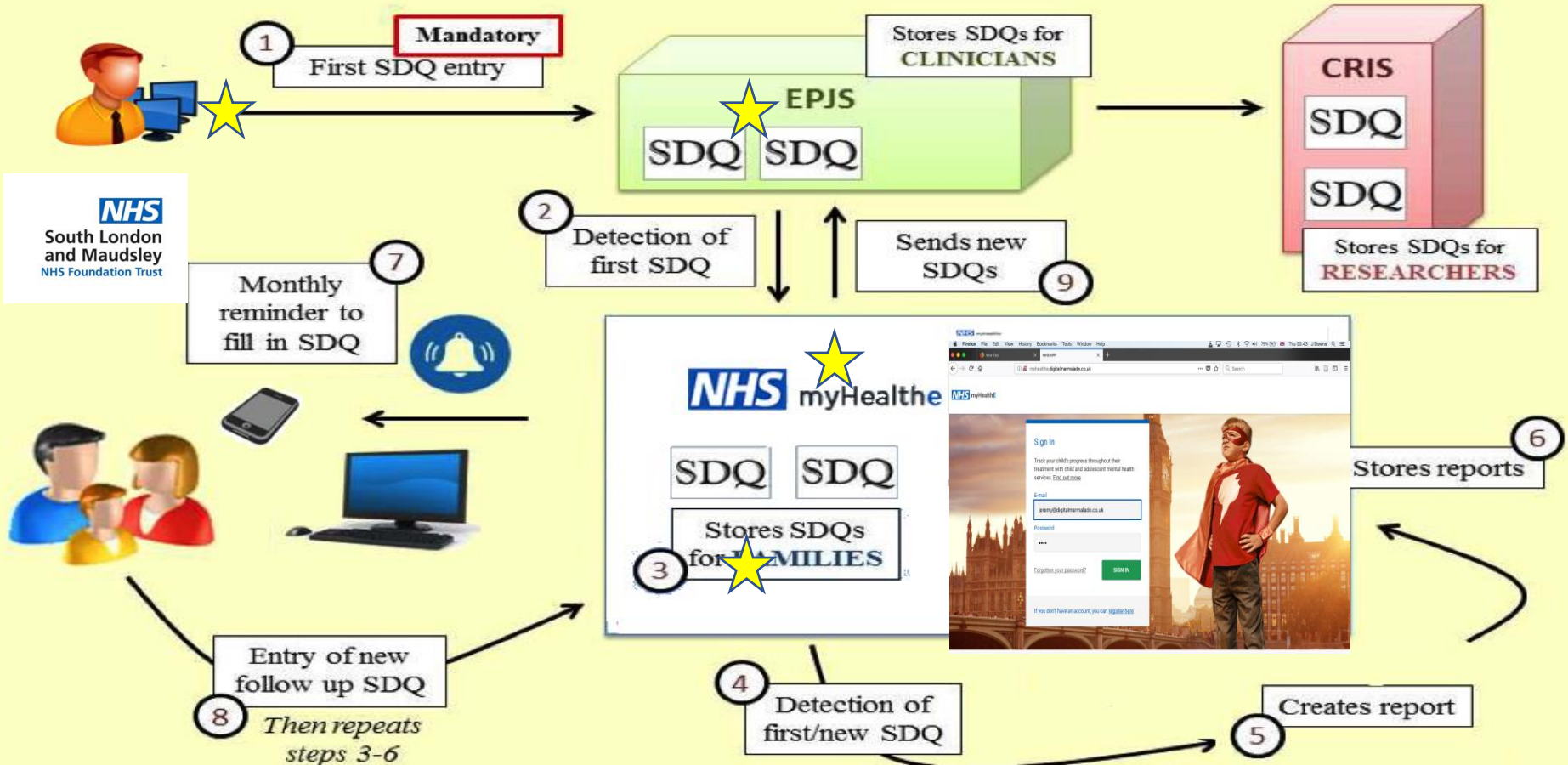| Educational and Clinical characteristics	Male (n=56,581)			
	No self-harm (n=56,460) (n, %)	Self-harm (n=120) (n, %)	Unadjusted Hazard Ratio	Adjusted Hazard Ratio
Special Education Needs [a]				
Autism Spectrum Disorders	2,015 (3.5)	11 (9.2)	2.73 (1.47-5.09)**	2.79 (1.40-5.57)**
Learning Difficulties (specific/moderate)	9,418 (16.7)	28 (23.3)	1.44 (0.95-2.20)	1.07 (0.62-1.76)
Learning Difficulties (severe/profound)	840 (1.5)	≤5 (≤5.0)	0.55 (0.08-3.92)	0.39 (0.05-2.98)
Behavioural, Emotional, Social	7,235 (12.8)	39 (33.5)	3.14 (2.19-4.70)**	1.66 (1.02-2.73)*
Speech, language and communication	5,086 (9.0)	11 (9.2)	1.06 (0.57-1.98)	0.99 (0.51-1.95)
Hearing, vision or physical disability	860 (1.5)	≤5 (≤5.0)	2.17 (0.80-5.89)	2.13 (0.77-5.85)
First language [a]				
English	41,482 (73.5)	100 (83.3)	reference	reference
Other	13,942 (24.7)	11 (9.2)	0.33 (0.18-0.62)**	0.50 (0.25-0.98)*
Not disclosed	1,038 (1.8)	9 (7.5)	4.14 (2.10-8.2)**	n/a
Educational attainment (Key stage two) [b]				
Lowest quintile	13,328 (24.4)	39 (33.0)	reference	reference
second	10,713 (19.6)	25 (21.2)	0.80 (0.40-1.32)	1.07 (0.60-1.90)
third	10,501 (19.2)	24 (20.3)	0.82 (0.49-1.36)	1.56 (0.87-2.78)
fourth	10,437 (19.1)	14 (11.9)	0.50 (0.27-0.92)*	1.01 (0.50-2.09)
highest quintile	9,9689 (17.7)	16 (13.6)	0.73 (0.41-1.31)	1.75 (0.85-3.55)
Less than 80% attendance [c]	2,676 (4.9)	29 (26.4)	6.50 (4.24-9.92)**	3.50 (2.16-5.70)**
Fixed term exclusions [a]	6,054 (10.7)	32 (26.7)	2.88 (1.92-4.31)**	1.30 (0.78-2.15)
Other social factors				
Summer birth (May-Aug)	19,615 (34.7)	47 (41.6)	1.21 (0.84-1.75)	1.23 (0.83-1.83)
Free school meals [a]	13, 764 (24.4)	37 (30.8)	1.40 (0.95-2.05)	1.35 (0.87-2.10)
Looked after Child status [d]	443 (0.8)	7 (6.3)	8.04 (3.75-17.3)**	3.18 (1.14-8.91)*
ICD-10 Hyperkinetic disorder	788 (1.4)	19 (10.2)	8.0 (5.0-12.8)**	4.36 (2.20-8.68)**

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Improving the quality of clinical information..

Digital Health Monitoring Systems

1 Mandatory First SDQ entry

Stores SDQs for **CLINICANS**

EPJS
SDQ SDQ

CRIS
SDQ
SDQ
Stores SDQs for **RESEARCHERS**

NHS South London and Maudsley NHS Foundation Trust

7 Monthly reminder to fill in SDQ

2 Detection of first SDQ

Sends new SDQs 9

NHS myHealthe
SDQ SDQ
Stores SDQs for FAMILIES 3

6 Stores reports

8 Entry of new follow up SDQ *Then repeats steps 3-6*

4 Detection of first/new SDQ

Creates report 5

Reminder **EPJS:** Electronic Patient Journey System; **CRIS:** Clinical Record Interactive Search (anonymised)

Improving the quality of clinical information..

Digital Health Monitoring Systems

Improving the quality of clinical information..

Digital Health Monitoring Systems

GUY'S &
St THOMAS'
CHARITY

SDQ completion rates (2008-2017)

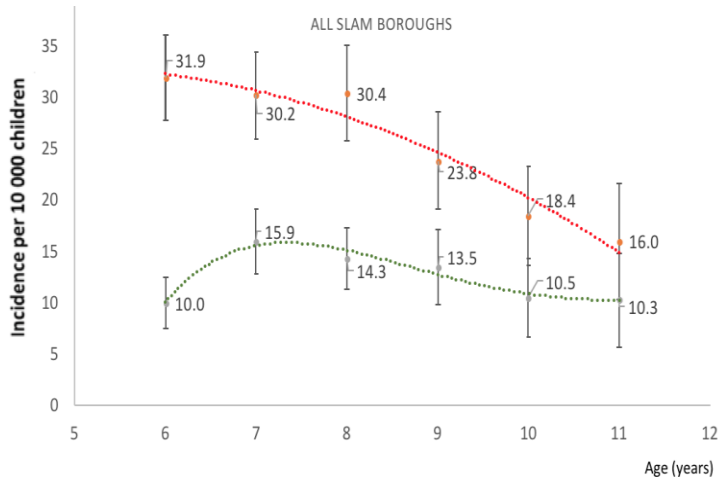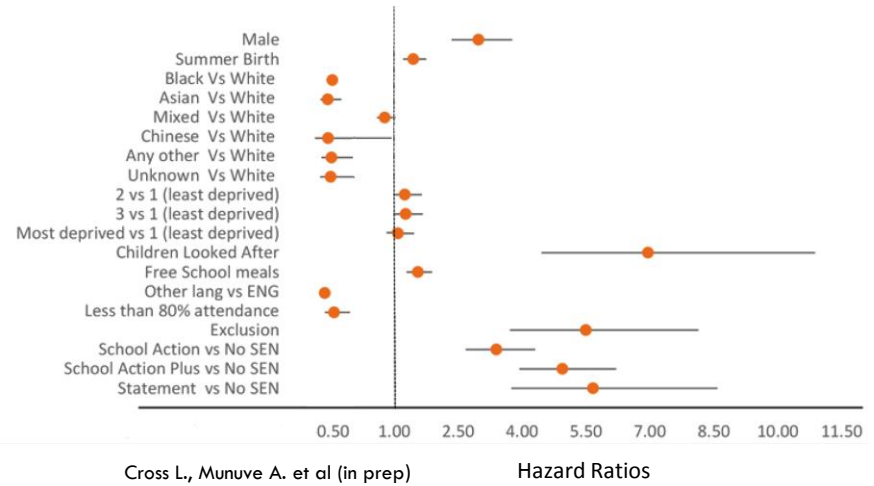| Category	Value
Accepted 1st CAMHS referrals	36,383
SDQs completed baseline	12,865
6month follow-up	1509

Morris A., Macdonald A. et al (in prep)

Improving detection, symptom and adverse effect monitoring in ADHD

1) Age and diagnosis incidence, and medication use for ADHD

2) Population-level risk factors for ADHD

Cross L., Munuve A. et al (in prep)   Hazard Ratios

3) Prediction models for ADHD using education census data
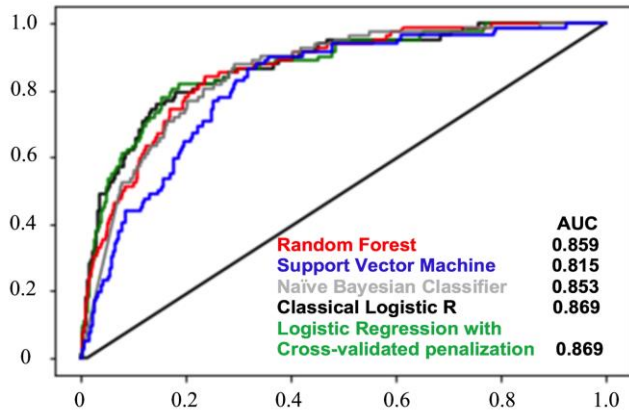
Ter-Minassian L., Cross L. et al (in prep)

	AUC
Random Forest	0.859
Support Vector Machine	0.815
Naïve Bayesian Classifier	0.853
Classical Logistic R	0.869
Logistic Regression with Cross-validated penalization	0.869

- **Current measures in ADHD symptom monitoring are too subjective**

- **Clinical contact greater at assessment, but very little orientated towards regular monitoring post treatment.**

- **No systematic method of detecting need for treatment alterations.**

Improving detection, symptom and adverse effect monitoring in ADHD

Fig. 2 Mean 20-minute activity level time profiles for 24 hours (A) and for a 10-hour school day following methylphenidate treatments (B). EXP = experimental; TID = thrice-daily; PLA = placebo.
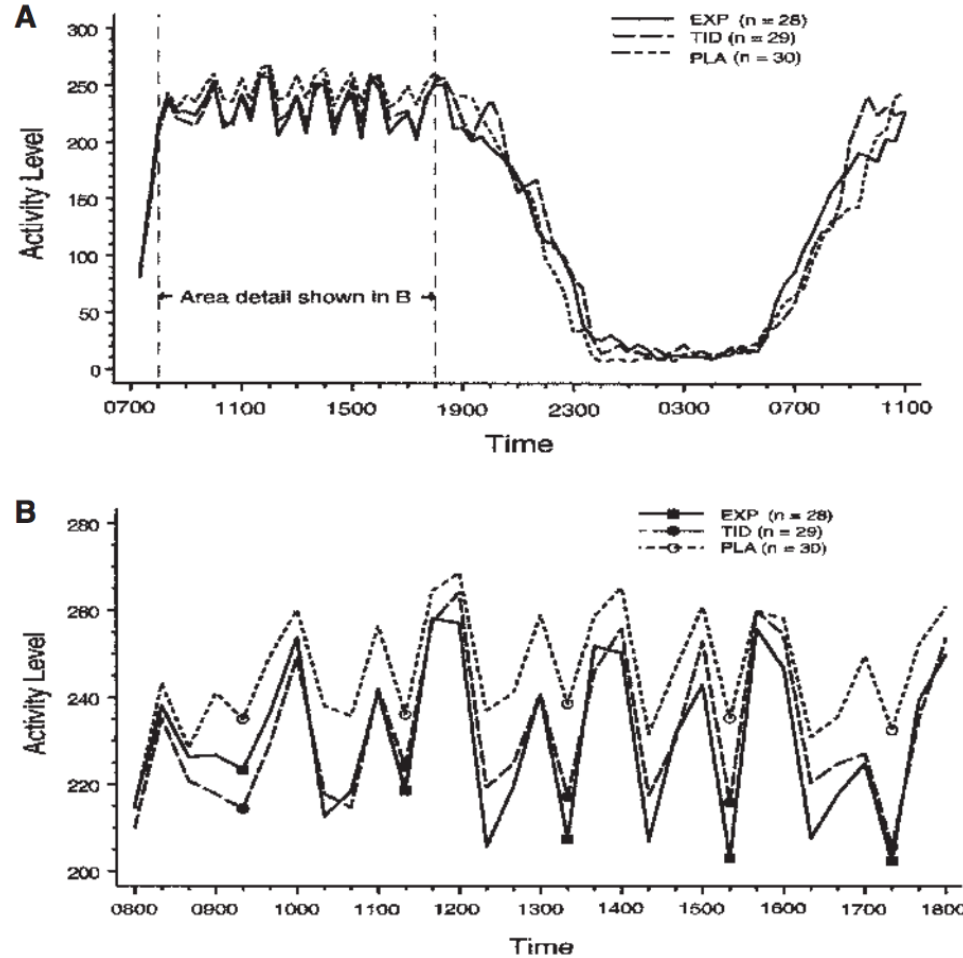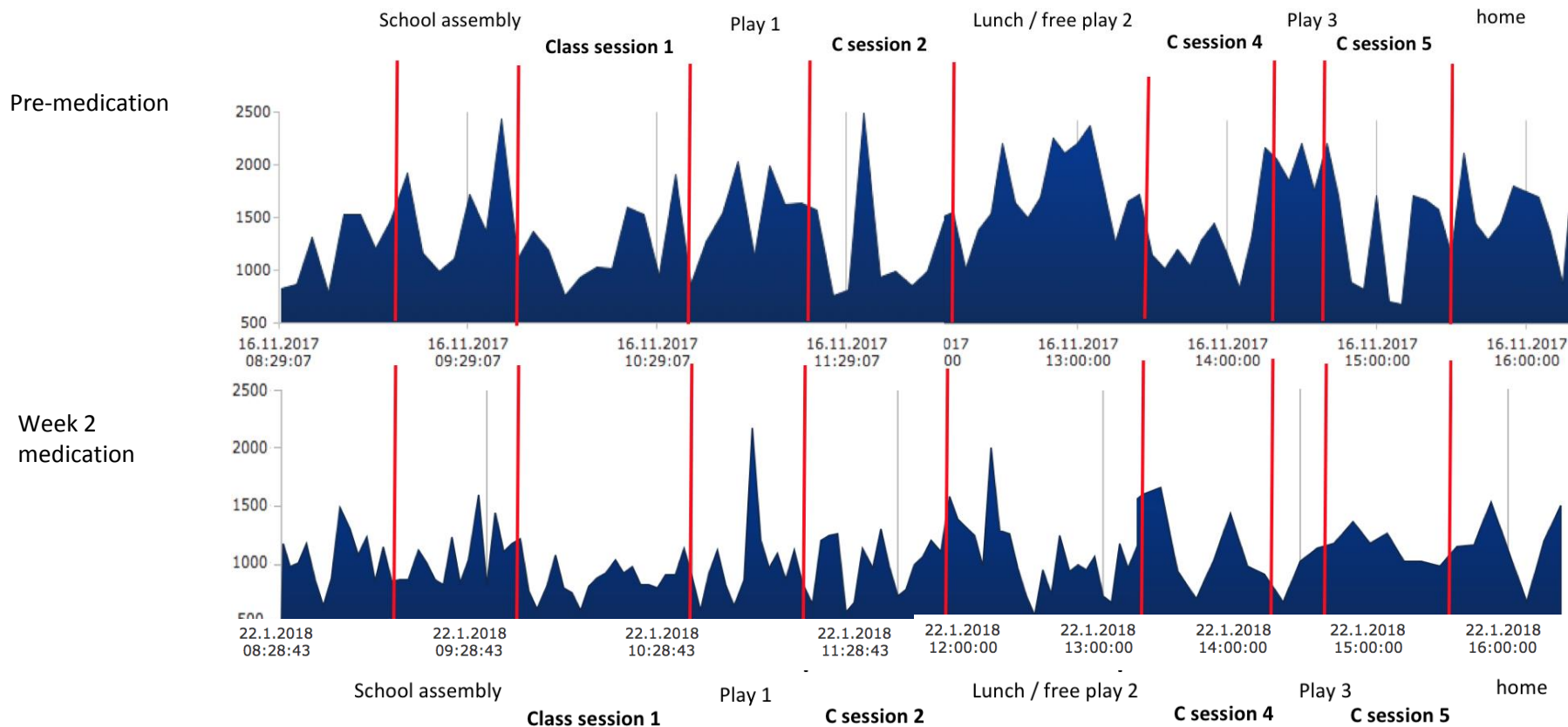
Swanson, et al.
JAACAP(2002) 41: 11

EXPLORING NEW HORIZONS
in Mental Health and Brain Disease Research

Improving detection, symptom and adverse effect monitoring in ADHD

- Lost cost, durable device
- Set up and maintenance easy to explain & do
- Access to raw data
- Simple but acceptable device – "not weird"
- Simple but sufficiently detailed clinical and caregiver interface

Improving detection, symptom and adverse effect monitoring in ADHD

	School assembly	Class session 1		Play 1	C session 2	Lunch / free play 2	C session 4	Play 3 / C session 5	home
Pre-medication Mean Gmax (sd)	1476 (506)	1263 (370)		1269 (449)	1662(475)	1300 (473)	1122 (774)		
Medication Week 2	1224 (300)	950 (270)		1134 (215)	1450(375)	853 (270)	1204 (218)		
Medication effect Base vs Week 2 (SMD)	-0.6	-0.97		-0.16	-0.49	-1.16	0.14		

Many thanks to :

BRC Nucleus Team (CRIS) : Prof Rob Stewart, Prof Matthew Hotopf, Dr Richard Hayes, Dr Catherine Polling, Matthew Broadbent, Megan Pritchard, Hitesh Shetty, Amelia Jewell.

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External: Prof Ruth Gilbert, Prof Tamsin Ford, Lucile Ter-Minassian.

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