Comparisons of the BRIEF parental report and neuropsychological clinical tests of executive function in Fetal Alcohol Spectrum Disorders: Data from the UK national specialist clinic

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Presenter Disclosure

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Relationship with commercial interests:
- None
Learning Objectives

Rationale for service evaluation of Executive Functioning (EF) tools used in clinic

Outcomes from the clinic including correlation between carer reports of EF difficulties and clinic based neuropsychological measures and comparison with global data

Implications for our multi-disciplinary clinic and single practitioners
Why assess Executive Functioning?

Executive Functioning (EF) is consistently described as one of the Central Nervous System Domains in FASD diagnosis, for example:


- executive function, memory/cognition, social/adaptive skills, academic achievement, language, motor, attention or activity level
Central Nervous System (CNS)

Canadian guidelines for diagnosis (Chudley et al, 2005)

• Hard and soft neurologic signs, brain structure, cognition, communication, academic achievement, memory, **executive functioning and abstract reasoning**, attention deficit/hyperactivity, adaptive behaviour/social skills/social communication

A guideline for diagnosis across the lifespan (Cook et al, 2016a).

• Motor skills, neuroanatomy/neurophysiology, cognition, language, academic achievement, memory, attention, **executive function (including impulse control and hyperactivity)**, affect regulation, and adaptive behaviour/social skills/social communication
What is Executive Functioning?

- A set of cortical processes carried out by the brain that are needed in order to complete a task.
- Effortful processes where going on ‘automatic pilot’ would not be sufficient.
- The basis of EF consists of Working Memory, Inhibitory Control, and Cognitive Flexibility.
- From these, higher order EFs are built such as reasoning, problem solving, and planning.

Diamond, 2013
A summary of Executive Functioning

A set of deliberate *higher order cognitive functions* involved in a range of planning and organisational behaviour *needed to attain a set goal*

Kodituwakku, Kahlberg, & May 2001
Why we conducted this service evaluation

- What is the profile of EF in children with FASD in the UK?
- Is there a correlation between carer reports of EF difficulties and clinic based neuropsychological measures?
- Is the UK Profile of Executive Function similar to that seen globally?
Measures used in the clinic

**Facial Dysmorphology:**
- 4 Digit FASD analysis
- 3-D Facial recognition

**Background History:**
- Semi structured FASD history Questionnaire

**ASD:**
- SCQ
- DISCO

**ADHD:**
- ADHD Screening Questionnaire
- Connors III

**Adaptive Behaviour:**
- DBCL
  - Parent
  - Teacher
  - Vineland II

**Executive Functioning:**
- Delis Kaplan Executive Function System Tests (D-KEFS)
- Behaviour Rating Index of Executive Functioning (BRIEF)

**Other:**
- Short Sensory Profile
- SPM
- WAIS IV / WISC V
- CELF 4
- PSI
- CCC-2

*For a better life*
## BRIEF (Gioia et al, 2000b)

<table>
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<tr>
<th>Individual Scales</th>
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<tr>
<td>• Inhibition</td>
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<td>• Shift</td>
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<td>• Emotional Control</td>
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<tr>
<td>• Initiate</td>
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<tr>
<td>• Working Memory</td>
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<tr>
<td>• Plan/Organize</td>
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<tr>
<td>• Organization of Materials</td>
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<td>• Monitor</td>
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<table>
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<th>Two Indexes</th>
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<tr>
<td>• Behavioural Regulation Index (BRI)</td>
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<td>• Metacognition Index (MI)</td>
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<th>Overall Index</th>
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<td>• Global Executive Component (GEC)</td>
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For a better life
• Caregiver Report Measure
• Scaled Score above 65 = Potentially Clinically Elevated
• Scaled Score above 70 = 2 standard deviations
• A meta analysis found nearly all the scales in the clinically elevated range for children with FASD (Rai et al., 2017)
D-KEFS (Delis, Kaplan & Kramer 2001)

18 D-KEFS tests selected:

- Trail-making (5)
- Verbal Fluency (3)
- Colour Word Interference (4)
- Twenty Questions (3)
D-KEFS

- Neuropsychological Measure

- Normative mean = 10
- 1.5 SD below mean = 6
- 2 SD below mean = 4
Outcomes from the UK National Specialist FASD Clinic
n = 73
Our results from a UK population show a profile of executive dysfunction in all Scales apart from Organization of Materials; All Indices; and the Global Score.

T-Scores ≥ 65 indicates a potentially clinically elevated score.
Using one sample t-tests, 15 of our 18 tests were significantly different than the normative mean of 10 – suggesting children had difficulty across DKEFS tests.

Relative strengths from both cohorts in Motor speed in Trail Making tests, and Category Fluency in Verbal Fluency Tests.
No correlation between the BRIEF and the D-KEFS in all but 2 relationships (Letter Fluency & Inhibit Scale, $r = .342$; Letter Fluency & the Behavioural Regulation Index, $r = .327$)
Why is there a lack of correlation?
Difference in tool specificity

- BRIEF is a broad screening tool for day-to-day executive functions where scales overlap with other CNS domains.

- D-KEFS tests measure specific aspects of EF.
Hot vs cold executive functioning

Hot executive function is goal directed behaviour in situations where motivation or emotional regulation is needed – Kully-Martens et al (2013)
In conclusion..
This audit provides the first profile of executive functioning (EF) outcomes in a UK FASD sample.

Both executive function measures used in our clinic show a profile of executive dysfunction similar to that of other cohorts indicating similarities between FASD populations in different countries.
Both measures can be used to inform neuro-behavioural aspect of diagnosis - however single practitioners with limited access to resources can use the BRIEF as a quick tool to view EF profile.

This audit will help guide the FASD clinic process – reviewing the FASD neuropsychological ‘toolkit’ including consideration of more ecologically valid measures of executive function.
Further Considerations
EF assessment is complex

McCloskey & Perkins identify four principles to consider in relation to EF assessment (pg. 132-133):

- Tasks that measure EF also measure other cognitive constructs
- Tasks that measure cognitive constructs also measure EF
- All assessment tasks are measures of multiple aspects of EF
- The amount and nature of EF in any assessment task varies greatly depending on the format, content, and complexity of the task.
Patients with prefrontal cortex damage may appear proficient within clinical interview and perform normally on traditional assessments and yet exhibit marked limitations within adaptive functioning.

• George & Gilbert (2018)
Frontal Lobe Paradox and FASD similarities

In Frontal Lobe Paradox (FLP) individuals may be able to describe what they should be doing but in practice fail to use this knowledge to guide their actions.

In FLP individuals perform better on externally prompted tasks such as clinic assessment but have difficulties in:

- Non-routine situations
- Long term rule maintenance
- Multi-step tasks or tasks involving greater mental effort
- Social cognition difficulties
References


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