Surrey and Borders Partnership NHS
NHS Foundation Trust

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

Zameer Mohamed, Alexandra C. S. Carlisle, Alexandra C. Livesey, & Raja A. S. Mukherjee, (2018), Child Neuropsychology

Learning Disabilities Services

For a better life

Presenter Disclosure

Surrey and Borders Partnership NHS
NHS Foundation Trust

- Dr Alexandra Carlisle, Clinical Psychologist and Fetal Alcohol Spectrum Disorder (FASD) Specialist Clinician, FASD National Behaviour Specialist Clinic, Surrey, UK

- 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:

- The 4-Digit Diagnostic Code – Third Edition (Astley, 2004)
  - **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)

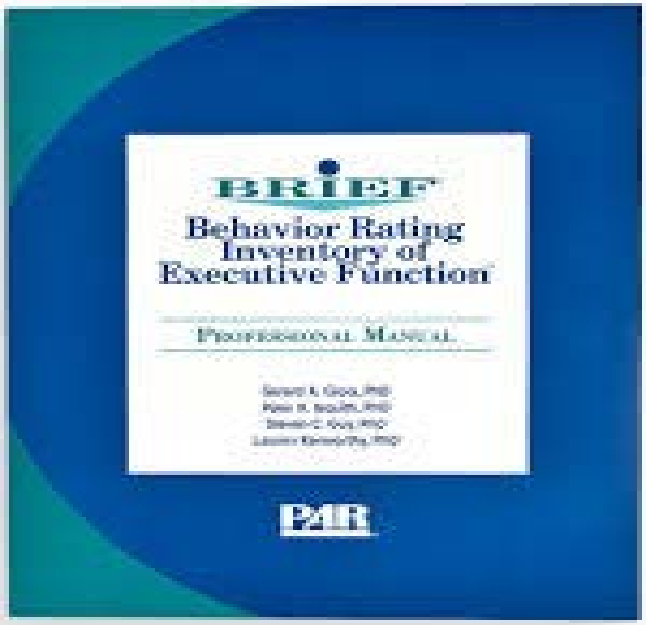
Other:
- Short Sensory Profile
- SPM
- WAIS IV / WISC V
- CELF 4
- PSI
- CCC-2

BRIEF (Gioia et al, 2000b)

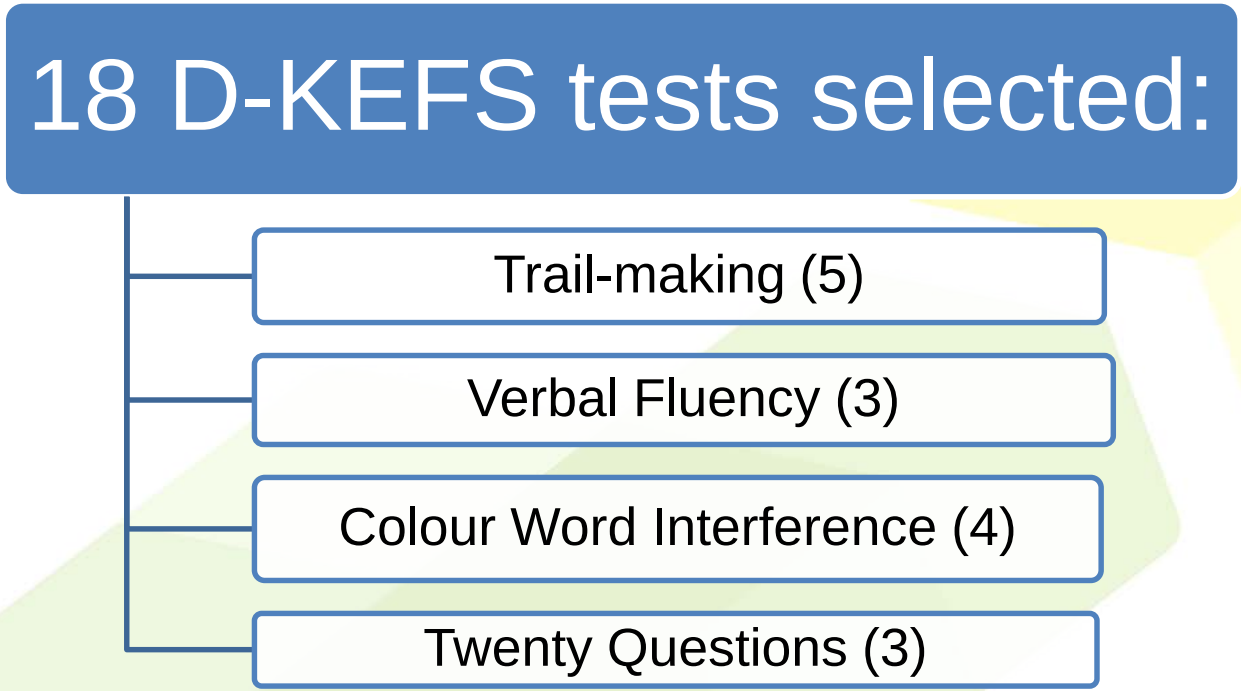
Individual Scales	Two Indexes	Overall Index
• Inhibition • Shift • Emotional Control • Initiate • Working Memory • Plan/Organize • Organization of Materials • Monitor	• Behavioural Regulation Index (BRI) • Metacognition Index (MI)	• Global Executive Component (GEC)

BRIEF

- 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)



D-KEFS

- Neuropsychological Measure

- Normative mean = 10
- 1.5 SD below mean = 6
- 2 SD below mean = 4

Surrey and Borders Partnership NHS
NHS Foundation Trust

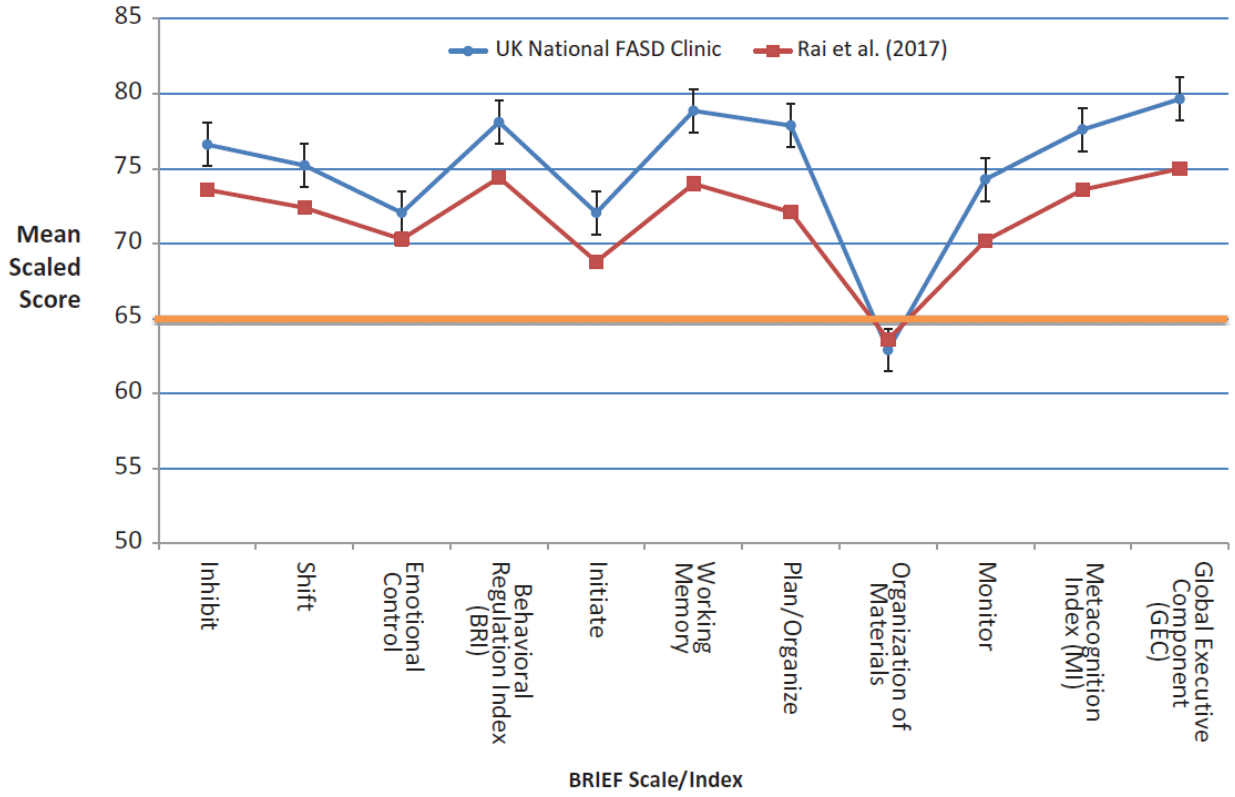
Outcomes from the UK National Specialist FASD Clinic

n = 73

Learning Disabilities Services

For a better life

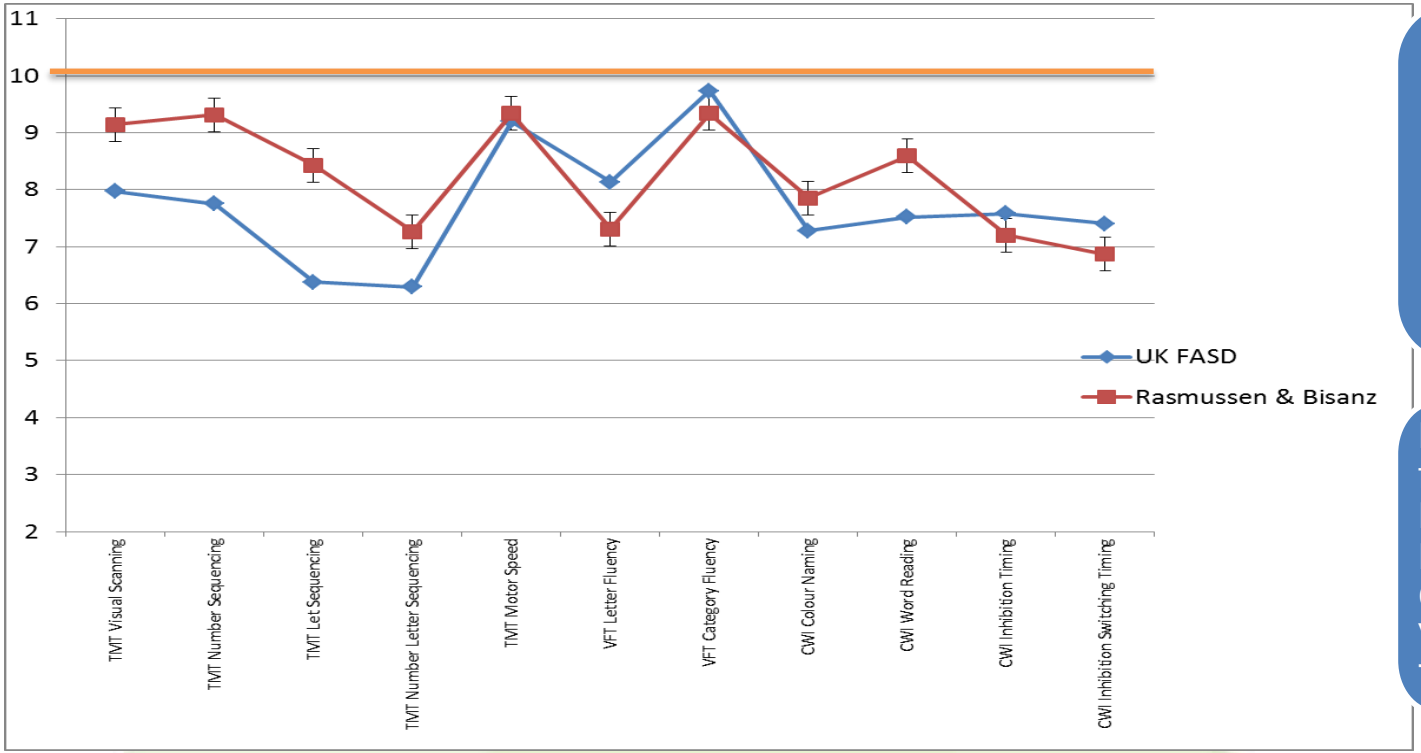
BRIEF



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

D-KEFS



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.

Relationships between BRIEF & D-KEFS

- 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)

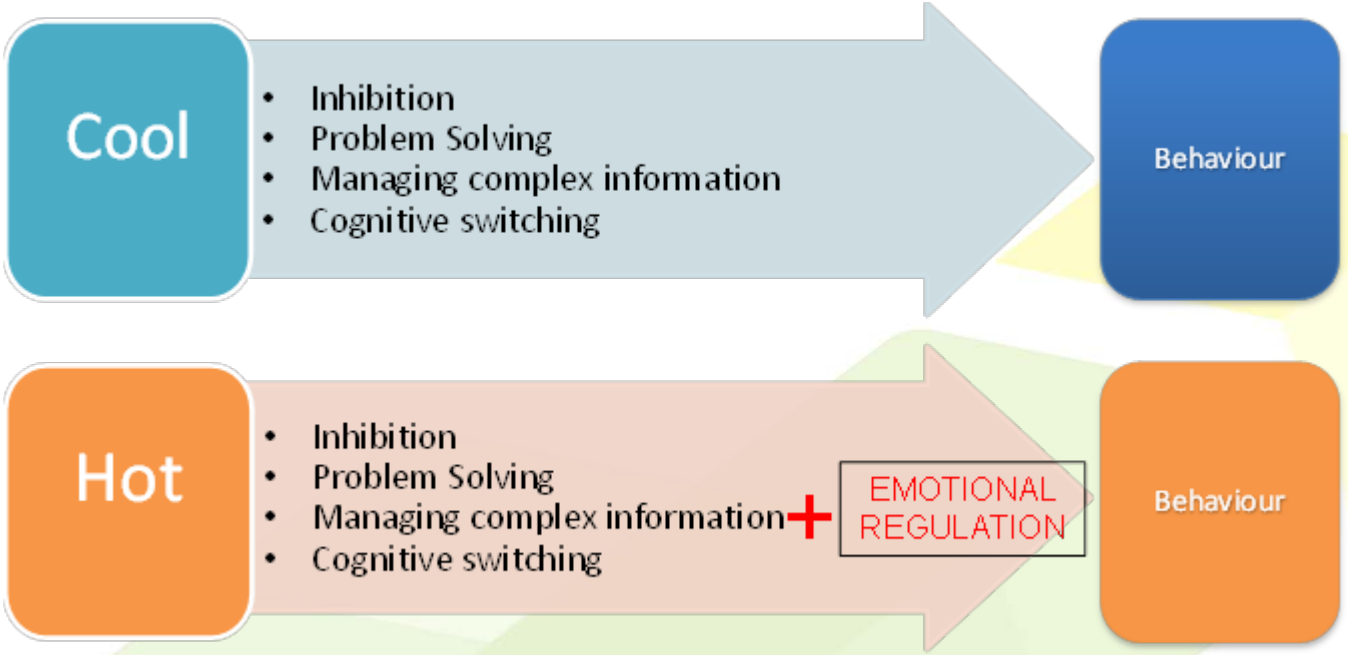
Why is there a lack of correlation?

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.

Frontal Lobe Paradox in patients with brain injury

- 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

- Astley, S. J. (2004). *Diagnostic Guide for Fetal Alcohol Spectrum Disorders: The 4-Digit Diagnostic Code – Third Edition*. Seattle: University of Washington Publication Services.
- Chudley, A. E., Conry, J., Cook, J. L., Loock, C., Rosales, T., and LeBlanc, N. (2005). Fetal alcohol spectrum disorder: Canadian guidelines for diagnosis. *Canadian Medical Association Journal*,172(Suppl.), S1–S21.

References

- Cook, J. L., Green, C. R., Lilley, C. M., Anderson, S. M., Baldwin, M. E., Chudley, A. E., & Rosales, T. (2016a) Fetal alcohol spectrum disorder: A guideline for diagnosis across the lifespan. *Canadian Medical Association Journal,* 188 (3):, 191–197.
- Delis, D. C., Kaplan, E., and Kramer, J. H. (2001). *Delis-Kaplan Executive Function System (DKEFS)*. San Antonio, TX: The Psychological Corporation.

References

- Diamond, A. (2012). Executive Functions. *Annual Review of Psychology* (64). 10.1146/annurev-psych-113011-143750.
- George, M. & Gilbert, S. (2018). 'Mental Capacity Act (2005) assessments: Why everyone needs to know about the frontal lobe paradox' *The Neuropsychologist 5 (May) pg 59-66*
- Gioia, G. A., Isquith, P. K., Guy, S. C., & Kenworthy, L. (2000b). *Behavior Rating Inventory of Executive Function*. Odessa, FL: Psychological Assessment Resources

References

- Kodituwakku, P. W., Kahlberg, W. & May, P. A. (2001). The effects of prenatal alcohol exposure on executive functioning. *Alcohol Research and Health, 25 (3)*, 192-198.
- Kully-Martens, K., Treit, S., Pei, J., & Rasmussen, C (2013). Affective decision-making on the Iowa gambling task in children and adolescents with fetal alcohol spectrum disorders. *Journal of the International Neuropsychological Society, 19*(2), 137-144.

References

- McCloskey G., Perkins, L. A. (2013) *Essentials of Executive Functions Assessment*. Hoboken: John Wiley & Sons.
- Rai, J. K., Abecassis, M., Casey, J. E., Flaro, L., Erdodi, L. A., and Roth, R. M. (2017). Parent rating of executive function in fetal alcohol spectrum disorder: A review of the literature and new data on Aboriginal Canadian children. *Child Neuropsychology,* 23(6), 713–732.

References

- Rasmussen, C., and Bisanz, J. (2009). Executive functioning in children with fetal alcohol spectrum disorders: Profiles and age-related differences. *Child Neuropsychology*, 15(3), 201–215.