

Evaluation of Fluency in Differential Diagnosis

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Introduction

Behavior rating scales, such as the Conners' Teacher Rating Scale-Revised (Conners et al., 1998), the Child Behavior Checklist (Achenbach, T.M., 1991), and the Burks' Behavior Rating Scales (Burks, H., 1996) are frequently used to assist in the differential diagnosis of childhood disorders.

These scales all have a high degree of "ecological validity" in that they measure behaviors that relate directly to daily functioning. A review of the items that make up these scales, however, reveals that none of the items on these instruments attempt to assess information processing speed, or more specifically, fluency (speed combined with accuracy).

The SNAP-IV Teacher + Parent Rating Scale

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Name _____
Completed by _____

For each item, check the column which best describes this child.

	Not At All	Just a Little	Quite a Bit	Very Much
1. Often fails to give close attention to details or makes careless mistakes in schoolwork or tasks				
2. Often has difficulty sustaining attention in tasks or activities				
3. Often does not seem to listen when spoken to directly				
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties				
5. Often has difficulty organizing tasks and activities				
6. Often avoids, dislikes, or reluctantly engages in tasks requiring sustained mental effort				
7. Often loses things necessary for activities (e.g., toys, school assignments, pencils, or books)				
8. Often is distracted by extraneous stimuli				
9. Often is forgetful in daily activities				
10. Often has difficulty maintaining alertness, orienting to requests, or executing directions				
11. Often fidgets with hands or feet or squirms in seat				
12. Often leaves seat in classroom or in other situations in which remaining seated is expected				
13. Often talks or fidgets excessively in situations in which it is inappropriate				
14. Often has difficulty playing or engaging in leisure activities quietly				
15. Often is "on the go" or "driven by a motor"				
16. Often talks excessively				
17. Often blurts out answers before questions have been completed				
18. Often has difficulty reading from left to right				
19. Often misreads or mishears what others say (e.g., turns into conversations/games)				
20. Often has difficulty sitting still, being quiet, or inhibiting impulses in the classroom or at home				
21. Often makes excuses				
22. Often argues with adults				
23. Often actively defies or refuses adult requests or rules				
24. Often does things that annoy other people				
25. Often blames others for his or her mistakes or misbehavior				
26. Often touchy or easily annoyed by others				
27. Often is angry and resentful				
28. Often is spiteful or vindictive				
29. Often is quarrelsome				
30. Often is negative, defiant, disobedient, or hostile toward authority figures				
31. Often makes noises (e.g., humming or oral sounds)				
32. Often is excitable, impulsive				
33. Often is restless				
34. Often is uncooperative				
35. Often acts "mean"				
36. Often is restless or overactive				
37. Often disturbs other children				
38. Often easily changes mood quickly and drastically				
39. Often easily frustrated, demands are not met, or is not interested				
40. Often loses other children and friends with their activities				
41. Often is aggressive to other children (e.g., picks fights or bullies)				
42. Often is destructive with property of others (e.g., vandalism)				
43. Often is defiant (e.g., swears, lies, argues, copies the work of other, or "copy" others)				
44. Often and seriously violates rules (e.g., is truant, runs away, or completely ignores class rules)				
45. Has persistent pattern of violating the basic rights of others or major societal norms				
46. Has episodes of failure to resist aggressive impulses (to assault others or to destroy property)				
47. Has motor or verbal tic (stuttering, recurrent, non-rhythmic motor or verbal activity)				
48. Has repetitive motor behavior (e.g., hand waving, body rocking, or picking at skin)				
49. Has obsessional (persistent and intrusive) thoughts, images, or impulses				
50. Has compulsions (repetitive behaviors of mental acts to reduce anxiety or stress)				
51. Often is restless or fidgets in seat or on edge				
52. Often is easily fatigued				
53. Often has difficulty concentrating (mind goes blank)				
54. Often is irritable				
55. Often has trouble listening				
56. Often has excessive anxiety and worry				

Figure 1: (Sample section) The SNAP-IV Teacher + Parent Rating Scale

Methods

A group of 85 undiagnosed children referred for academic difficulties were administered a psychoeducational battery that included

- measures of intelligence
- behavior rating scales completed by a teacher
- measures of reading and math fluency
- attention measures from the CPT-2 (the Conners' Continuous Performance Test-2) was also administered to measure the ability to sustain attention.

A linear regression analysis model was performed to explore the relationship between processing speed, reading fluency, math fluency, hit reaction time from the CPT-2, and various scales from the Conners' Teacher Rating Scale-R (CTRS-R).

Means (M), Standard Deviations (S), and Sample Sizes (N) for the 16 Variables

Variable	M	S	N
Processing Speed Index	101.8	14.0	86
Math Fluency	102.6	14.4	86
Reading Fluency	100.5	11.9	84
Working Memory	101.3	10.8	86
Full-Scale IQ	103.7	9.0	86
Difference	10.7	8.4	86
CPT Hit Rate	52.6	13.4	86
CPT Detection	50.7	8.6	86
Oppositional	51.5	10.3	70
Cog Props/Inattention	62.1	12.2	70
Hyperactivity	54.3	11.5	70
Anxiety/Shy	56.2	11.9	70
Perfectionism	48.4	8.5	70
Social Problems	54.0	11.7	70
ADHD Index	60.5	11.7	70

Table 1: Variables were separated into 1) **Fluency Measures** (Processing Speed Index, Math Fluency, Reading Fluency); 2) **Cognitive Measures** (Working Memory Index, Full-Scale IQ, CPT Hit Rate, CPT Detection); 3) **Behavioral Rating Measures** (Oppositional, Cognitive Problems/Inattention, Hyperactivity, Anxiety/Shy, Perfectionism, Social Problems, ADHD Index).

Then, Stepwise Multiple Regression Analyses were used to predict the selected variables.

Statistically Significant Correlates of Processing Speed Index

There is a significant positive correlation between Processing Speed Index and Full-Scale IQ	(r = .38)**
There is a significant positive correlation between Processing Speed Index and Working Memory	(r = .20)*
There is a significant positive correlation between Processing Speed Index and Math Fluency	(r = .31)**
There is a significant positive correlation between Processing Speed Index and CPT Hit Rate	(r = .29)**
There is a significant positive correlation between Processing Speed Index and Reading Fluency	(r = .26)**
There is a significant positive correlation between Processing Speed Index and Conners Anxiety/Shy	(r = .21)*

** p < .01 * p < .05

Statistically Significant Correlates of Reading Fluency

There is a significant positive correlation between Reading Fluency and Math Fluency	(r = .42)**
There is a significant positive correlation between Reading Fluency and Cognitive Problems/Inattention	(r = .34)**
There is a significant positive correlation between Reading Fluency and Full-Scale IQ	(r = .30)**
There is a significant positive correlation between Reading Fluency and Working Memory	(r = .29)**
There is a significant positive correlation between Reading Fluency and Processing Speed Index	(r = .26)**
There is a significant negative correlation between Reading Fluency and CPT Hit Rate	(r = -.24)**

** p < .01

Statistically Significant Correlates of Math Fluency

These data support the following:

There is a significant positive correlation between Math Fluency and Processing Speed Index	(r = .31)**
There is a significant positive correlation between Math Fluency and Reading Fluency	(r = .42)**
There is a significant positive correlation between Math Fluency and Working Memory Index	(r = .37)**
There is a significant positive correlation between Math Fluency and Letter Word Identification	(r = .38)**
There is a significant positive correlation between Math Fluency and Cognitive Problems/Inattention	(r = .41)**
There is a significant negative correlation between Math Fluency and ADHD Index	(r = -.23)**

** p < .01 * p < .05

Tables 2, 3, 4: Statistically Significant Correlates of Processing Speed Index, Statistically Significant Correlates of Reading Fluency, and Statistically Significant Correlates of Math Fluency.

Results

Multiple regression analyses showed that cognitive measures accounted for approximately 24% of the variance in Processing Speed Index (p < .001) and 38% of the variance in Reading Fluency (p < .001) and 26% of the variance in Math Fluency (p < .001); on the other hand, Behavioral Rating Measures accounted for 6% of the variance in PSI (p = ns), 3% of the variance in Reading Fluency (p = ns), and 16% of the variance in Math Fluency (p < .05).

Conclusions

These findings point to a statistically significant correlation between the cognitive measures and the measures of processing speed and fluency. The absence of explicit fluency items on ratings scales is not compensated for by a strong correlation between fluency and other items in these rating scales. Since academic fluency is an important part of functioning in the classroom, rating scales should include items that measure this skill.

For this reason it is suggested that additional items dealing with academic fluency be added to the usual clinical instruments, such as rating scales, to increase their clinical utility and ecological validity. A consensus group of experts would be ideally suited for this task. Added items might include such statements as:

For each item, check the column which best describes this child:

	All	Just a Little	Quite a Bit	Very Much
1. Needs extra time to complete an academic task, even when engaged in task	-----	-----	-----	-----
2. Runs out of time when taking tests	-----	-----	-----	-----
3. Finishes early when working on assignments	-----	-----	-----	-----
4. Slow output of work	-----	-----	-----	-----

Figure 2. Statements for inclusion.

Literature cited

Achenbach, T.M. (1991). *Integrative Guide to the 1991 CBCL/4-18, YSR, and TRF Profiles*. Burlington, VT: University of Vermont, Department of Psychology.

Burks, Harold F., Ph.D. (1996). *Burks' Behavior Rating Scales: Manual*. Los Angeles, CA: Western Psychological Services.

Buttross, S. (2000). "Attention deficit-hyperactivity disorder and its deceivers." *Current Problems in Pediatrics*. 2000 Feb 30(2):37-50.

Conners, K. et al. (1998) "Revision and restandardization of the Conners' Teacher Rating Scale (CTRS-R): factor structure, reliability, and criterion validity." *Journal of Abnormal Child Psychology*. 1998 Aug 26(4): 279-91.

For further information

Information on this and related projects can be obtained at info@C4L.net.

Objective

The objective of this study was to compare the ability of cognitive measures versus behavioral ratings to predict two measures of fluency:

Processing speed (from the WISC-IV)

Academic fluency (average reading and math fluency)

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