

# The impact of Kawasaki disease on neuropsychological development of primary school-aged children: a Montreal pilot study.

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## INTRODUCTION

Acute Kawasaki disease (KD) is known to present with characteristic irritability, disproportionate to the presenting symptoms and degree of fever. Few imaging and many biological studies supported ongoing central nervous system inflammation.

Whereas most studies investigate cardiovascular and immunological implications of KD, **little is known about possible associated impacts on subsequent neuropsychological development.**

## OBJECTIVES

To evaluate long-term impact of KD on children's cognitive and behavioral development.

## RESULTS

### TEA-Ch

- KD cohort mean scaled score on the attention test is similar to normative data.

- Results in the **low average** (-0.68 to -1.33 SD) or **limit range** (-1.34 to -1.99 SD) for 4 children (28.6%). For 3 of these children, low scores qualitatively correlated with their parents' ratings of inattention.

Table 1. CVLT-C performances

Data	Mean scores(SD)
Total trials 1-5	50.79 (13.69)
Short-delay free recall	0.71* (0.89)
Short-delay cued recall	0.57 (1.12)
Long-delay free recall	0.43 (0.99)
Long-delay cued recall	0.43 (0.98)
Recognition hits	0.43* (0.62)

Note. \*Different from norms at  $p \leq 0.05$ . With the exception of the top row (T-score), all values are mean Z-scores.

WISC-V primary index scores and global intellectual quotient correspond to national norms.

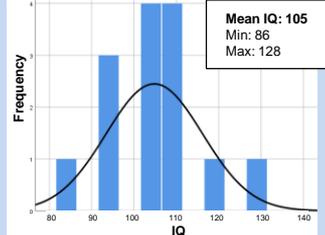


Figure 1. Intellectual quotient (IQ) distribution

One participant was considered to have moderate social deficits on the SRS-2.

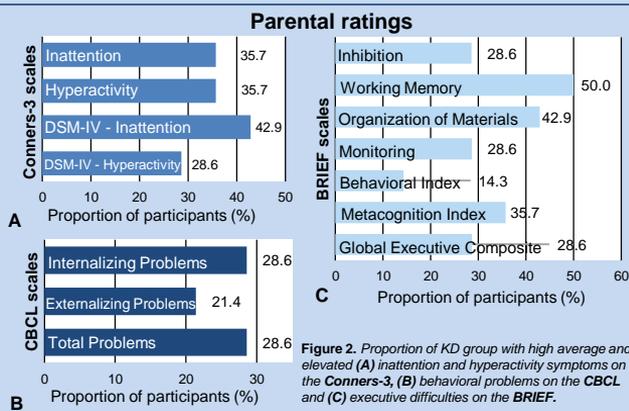


Figure 2. Proportion of KD group with high average and elevated (A) inattention and hyperactivity symptoms on the Conners-3, (B) behavioral problems on the CBCL and (C) executive difficulties on the BRIEF.

## METHODS

- 14 children aged  $8.9 \pm 2.5$  years (10 males) were recruited  $5.2 \pm 2.5$  years after KD onset.
- Extensive neuropsychological testing using standardized scales

### A) Cognitive evaluation

- 1- Intellectual abilities → French Canadian version of the Wechsler Intelligence Scale for Children (WISC-V)
- 2- Verbal learning and long-term memory → California Verbal Learning Test for Children (CVLT-C)
- 3- Auditive sustained attention → Test of Everyday Attention for Children (TEA-Ch; Code Transmission)

High average  
T-scores  $\geq 60$   
for all scales

### B) Behavioral assessment using parental ratings

- 1- Symptoms associated with Attention Deficit Hyperactivity Disorder → Conners-3
- 2- Impairment of executive function behaviors → Behavior Rating Inventory of Executive Function (BRIEF)
- 3- Psychopathology, internalizing and externalizing difficulties → Child Behavior Checklist (CBCL)
- 4- Social deficits associated with Autism Spectrum Disorder → Social Responsiveness Scale (SRS-2)

Elevated  
T-scores  $\geq 65$   
for all scales,  
except for CBCL  
(T-scores  $\geq 63$ )

- High average (borderline) and elevated (clinical) scores on parental scales were considered to obtain proportion of children with potential behavioral difficulties.
- KD cohort's cognitive results were compared to norms using one-sample t-tests.

According to parents' answers on the Conners-3, identical proportions of participants would present inattention or hyperactivity symptoms at higher levels than typically reported. When looking at symptom-level criteria for DSM-IV-TR based diagnosis, an important proportion of KD cohort could have elevated inattention symptoms and a smaller proportion of children would manifest hyperactivity symptoms (Figure 2 – A).

Parental answers on the CBCL revealed possible internalizing problems (such as anxiety, depression symptoms or somatic complaints) in a rather high proportion of participants. A similar proportion of children could have externalizing difficulties, such as rule-breaking or aggressive behaviors (Figure 2 – B).

Executive difficulties reported in the BRIEF were mainly in the Metacognition Index (working memory, organization of material and monitoring). In the Behavioral Index, the inhibition scale had the highest proportion of elevated scores (Figure 2 – C).

DISCLOSURES : No conflict of interest to declare.

## CONCLUSIONS

This pilot study provides preliminary indication of overall preserved cognitive functions in Quebec's children with previous history of KD. However, outliers were found, suggesting the presence of a subgroup that could benefit from further support. Parental assessment and cognitive testing suggest a possible association between KD and attention deficit concerns. Executive, internalizing and externalizing difficulties were similarly substantial, revealing considerable parents' concerns about their children's behavioral development.

Future interest: larger longitudinal study including baseline sub-acute neuropsychology assessment.