TDAH, Pathologies somatiques, douleur

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Journées Franco-québecoises , Paris Mai 2018

Le TDAH, trouble encore mal reconnu en France, mieux identifié au Québec

Longtemps considéré comme trouble de l'**enfance**

Individualisé et étudié depuis peu chez l'**adulte**

Représente un **enjeu de santé mentale** (5% enfants / 2% adultes)

Professionnels de santé peu ou pas formés en France
→ **retard, erreur diagnostique** et de **prise en charge**

Malgré outils diagnostiques et thérapeutiques

CADDRA
CANADIAN ADHD RESOURCE ALLIANCE

RBP HAS 2014

Introduction

- Encore des débats sur le TDAH ?
  - Histoire de théories
  - Syndrome comportemental conséquence et non un trouble
  - Un traitement objet de toutes les croyances, notamment des pédopsychiatres

- Qu’en est il aujourd’hui ?
  - Reconnaissance avec des gold standards
  - Une prise en charge multimodale identifiée
  - Le traitement par MPH : + de 3000 publications à court, et à long terme

Classe d’hyperactifs

Plonk et Replonk

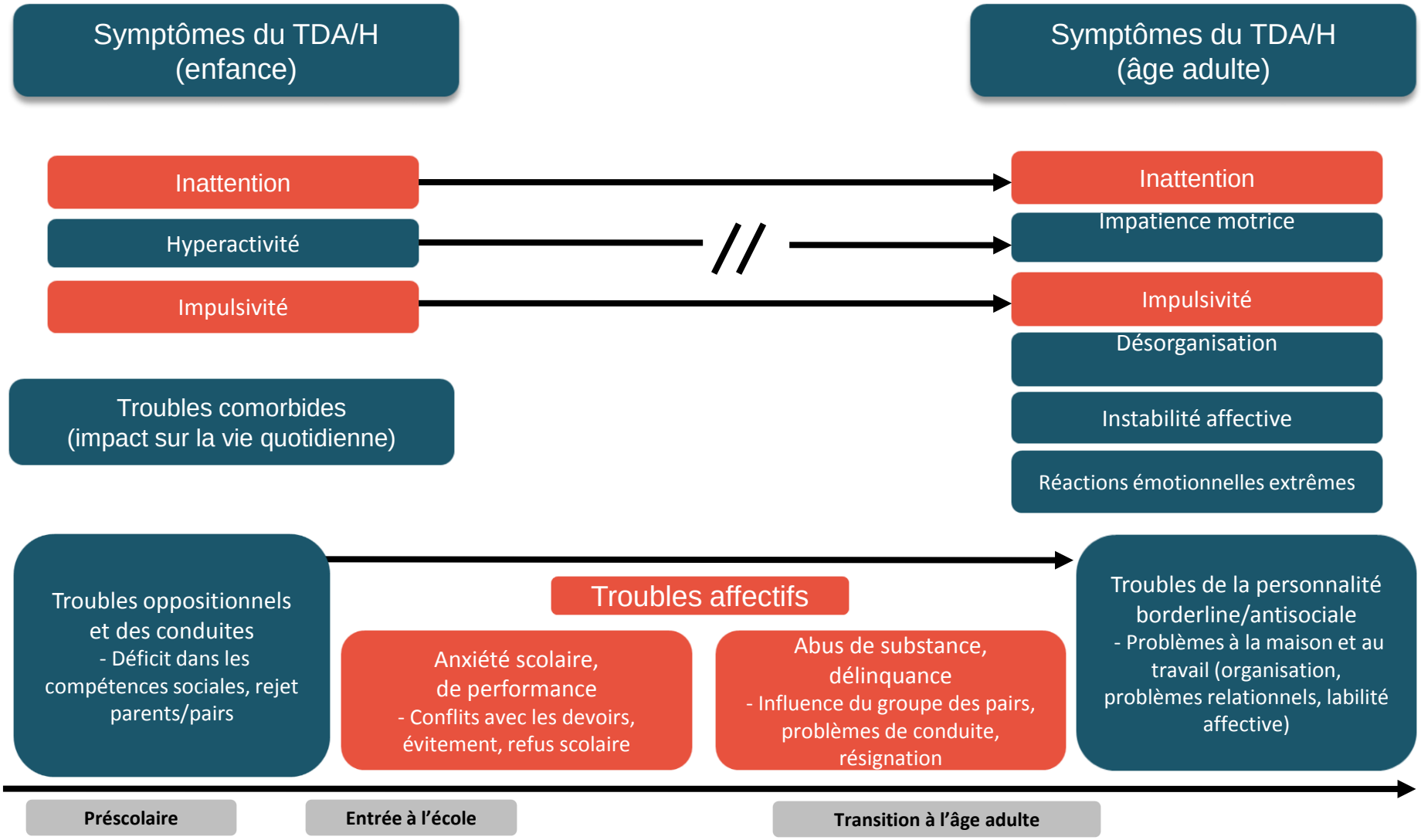
La classe d’hyperactifs de Mlle Bemolle

HI, TEACH!

Noyau Clinique du TDAH

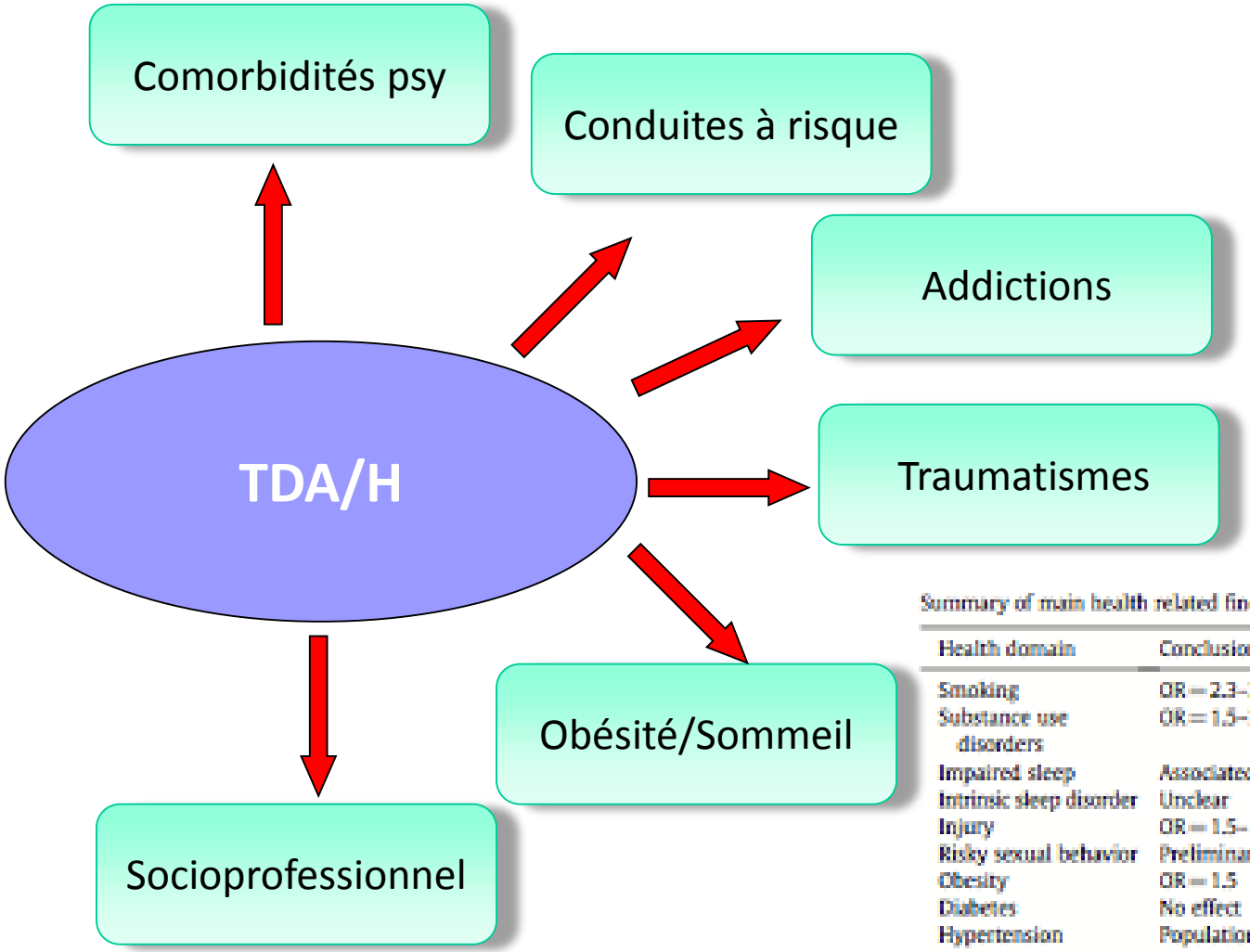
- Hyperactivité
  - Incapacité de rester en place
  - Désorganisée
  - Évitement des situations de repos
- Inattention
  - Trouble de l’attention soutenue: incapacité à rester sur une tâche
  - Trouble de l’attention sélective: distractibilité
- Impulsivité
  - Incapacité à inhiber/ à différer une réponse comportementale
  - Incapacité à planifier

Trajectoires développementales et comorbidités



4e colloque TDA/H 2016 - Schmidt et al. BMC Psychiatry 2009;56,S,265-70.

Retentissement du TDAH

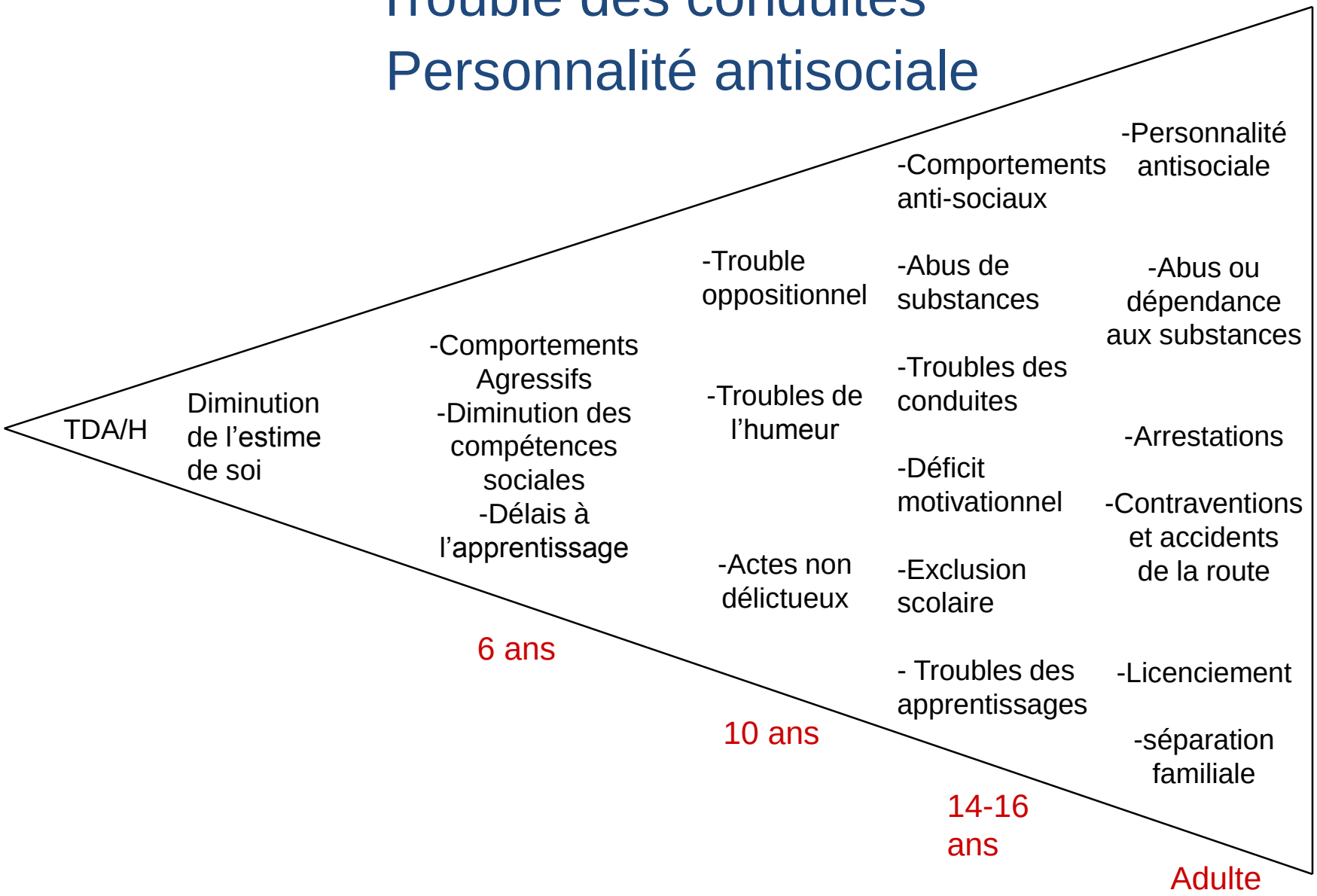


Summary of main health related findings.

Health domain	Conclusion	Comment and caveats
Smoking	OR = 2.3–2.8	Not accounted for by conduct disorder
Substance use disorders	OR = 1.5–2.5	Conduct disorder explains many effects
Impaired sleep	Associated	Bedtime related behavior problems
Intrinsic sleep disorder	Unclear	Mixed, small sample studies
Injury	OR = 1.5–1.8	Mediators, role of comorbidity not clear
Risky sexual behavior	Preliminary	Prospective case control data only
Obesity	OR = 1.5	Cross sectional data only
Diabetes	No effect	Essentially unstudied
Hypertension	Population effect	Adults, mediated by obesity/body mass
Suicide attempt	Associated	Girls, mediated by mood disorder
Lethal or completed attempt	OR > 4	Boys, mediated by conduct, substance

Nigg, Clin Psychol Rev, 2013

Trouble oppositionnel
Trouble des conduites
Personnalité antisociale



- Adapté à partir de Newcorn 2004 -

TDA/H et DSM-5 : quelles nouveautés ?

- **Inclus dans le chapitre des troubles neuro-développementaux et non plus dans le chapitre des troubles du comportement**
- **Critères diagnostiques**
  - Pas de changements ➔ ≥ 6/9 symptômes d'inattention ou d'hyperactivité/impulsivité
  - Introduction d'exemples de symptômes selon l'âge + réduction des symptômes (≥ 5/9) dès l'adolescence

- **Introduction de *specifiers***
  - Plus de sous-types mais présentations durant les 6 derniers mois
  - Rémission (plus de symptômes mais retentissement fonctionnel)
  - Sévérité du trouble (nombre de symptômes et impact fonctionnel)

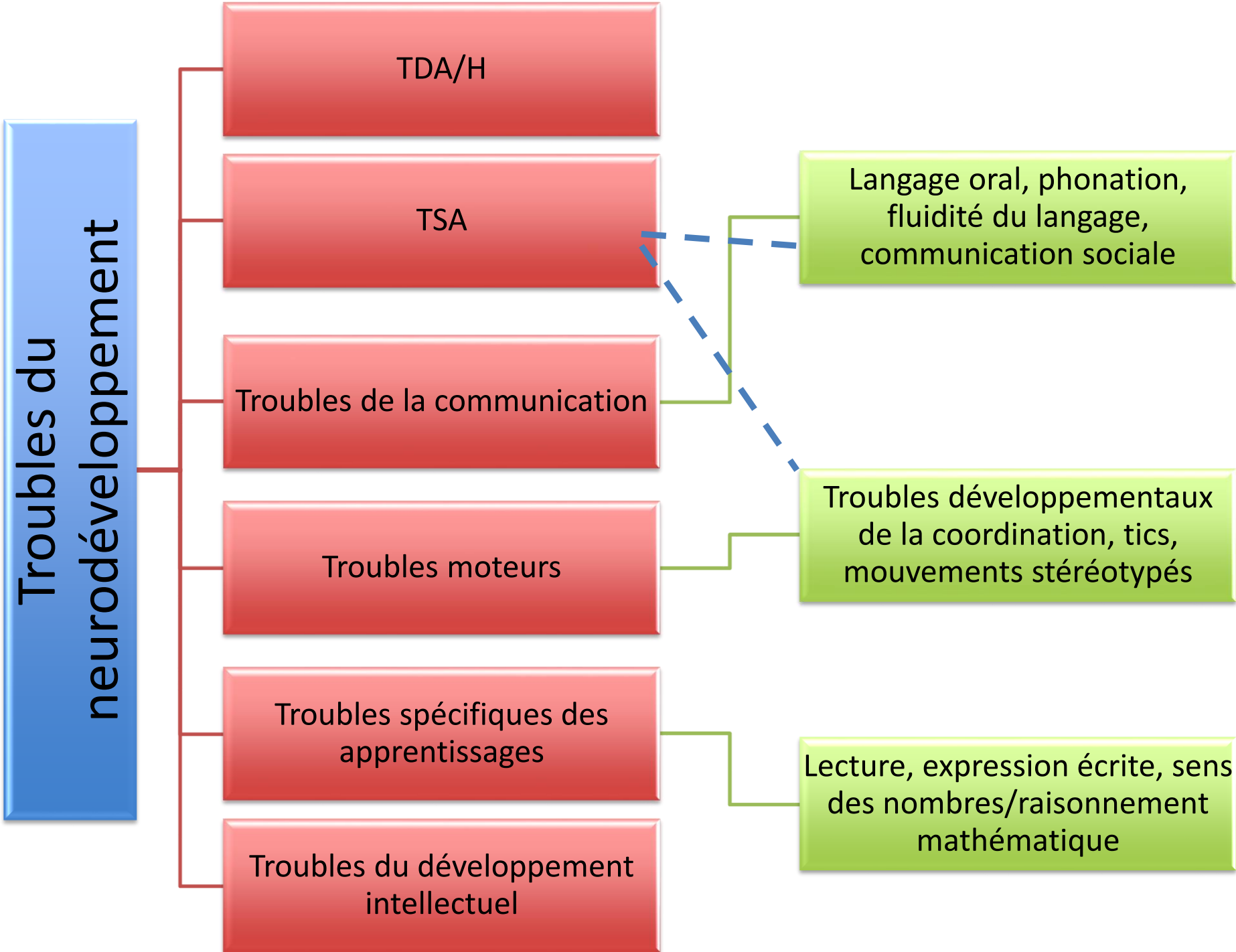
- **Symptômes présents avant l'âge de 12 ans (7 ans dans le DSM-4)**
  - Identification d'une rupture d'équilibre entre capacités et exigences
  - Pas de diagnostic d'exclusion avec les troubles du spectre autistique
  - Symptômes non expliqués par un autre trouble mental (mais comorbidité possible)

4e colloque TDA/H 2016 - American Psychiatric Association

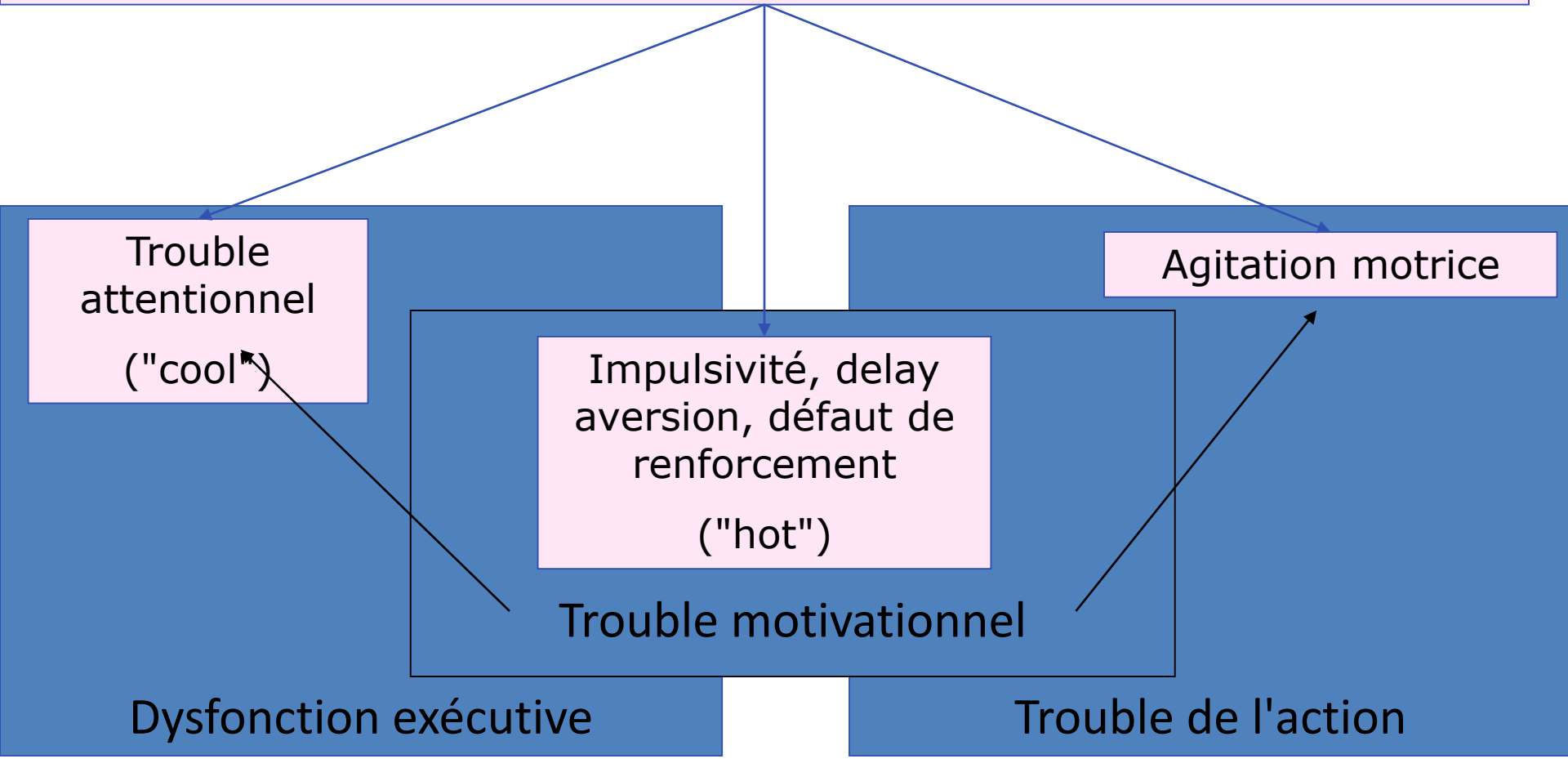
Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington, VA: American Psychiatric Association;2013.

TROUBLES NEURODÉVELOPPEMENTAUX

La joie de vivre Robert Delaunay, 1930


Troubles du neurodéveloppement
TDA/H
TSA
Troubles de la communication
Troubles moteurs
Troubles spécifiques des apprentissages
Troubles du développement intellectuel
Langage oral, phonation, fluidité du langage, communication sociale
Troubles développementaux de la coordination, tics, mouvements stéréotypés
Lecture, expression écrite, sens des nombres/raisonnement mathématique

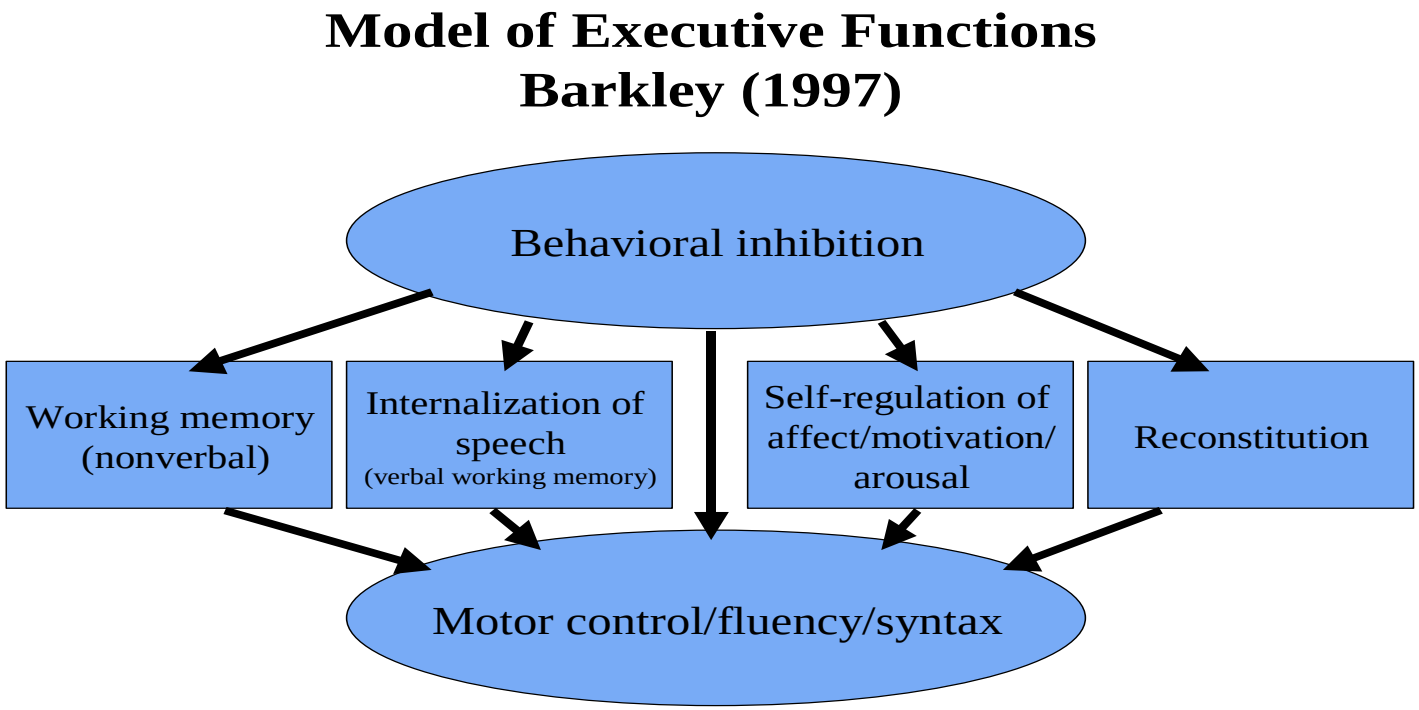
Syndrome TDAH : pathologie de l'action --> 3 niveaux de perturbations



TDAH : trois domaines de la dysfonction

M. Habib

Modèle de BARKLEY (97)



Cognition
Neuropsychologie

Fonctions exécutives

Inhibition de la réponse
Mémoire de travail
Planification

Fonctions non exécutives

Sensibilité à récompense
Perception du temps
Motivation
Vigilance

30 à 50 %

Dysrégulation émotionnelle

Difficultés à gérer les émotions
Manifestations explosives
Crises colères
Agressivité (hétéro / auto)

> 50 % ?

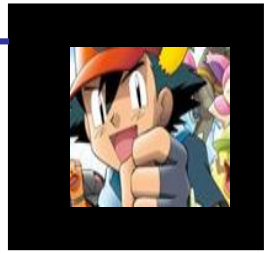
Caractéristiques Tempéramentales ?

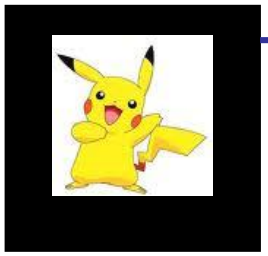
Problèmes d'intégration sensorielle ??

Motivation et sensibilité à la récompense

Control subjects

ADHD subjects





Equivalent results between the two CPT

Different results between the two CPT

A, B

X

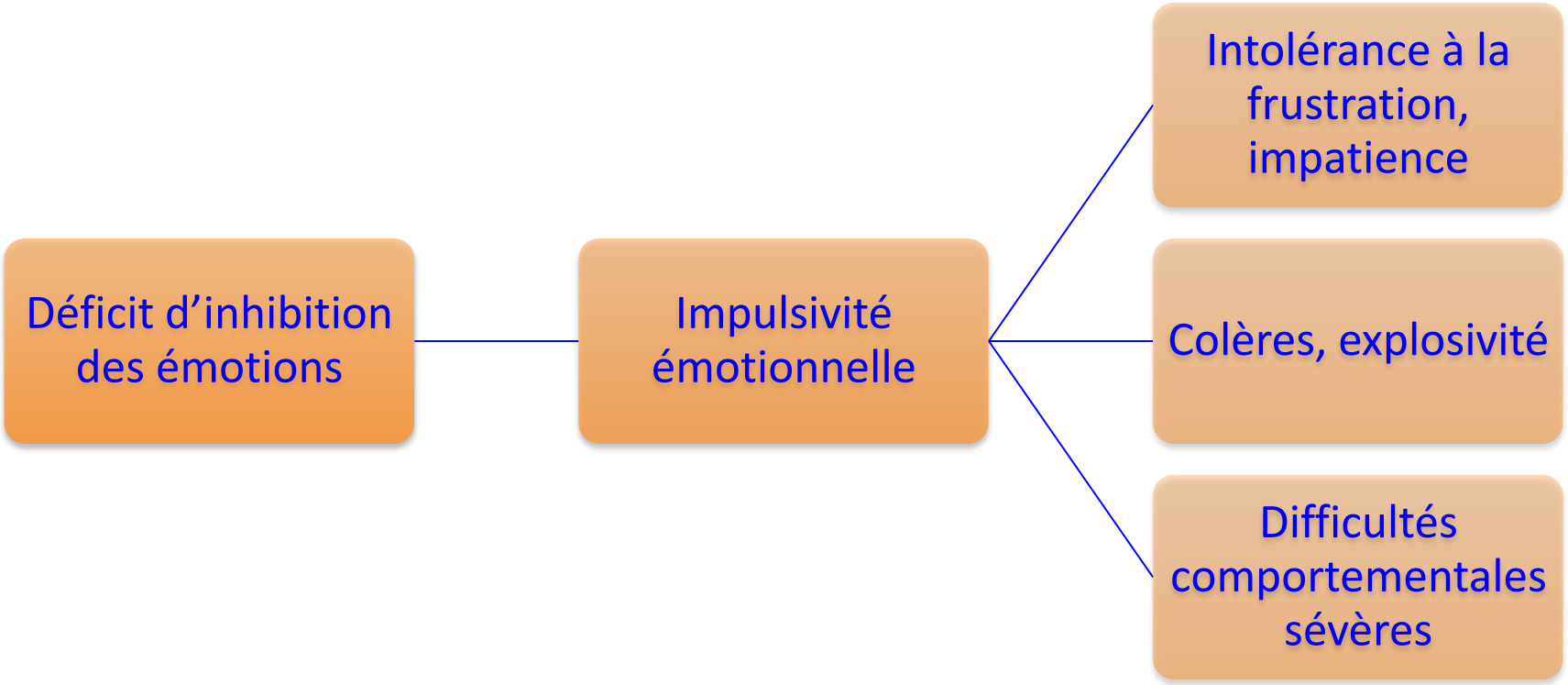
⇒ Importance of context of the task : Motivational aspect of the stimuli

Shaw et al, 2005

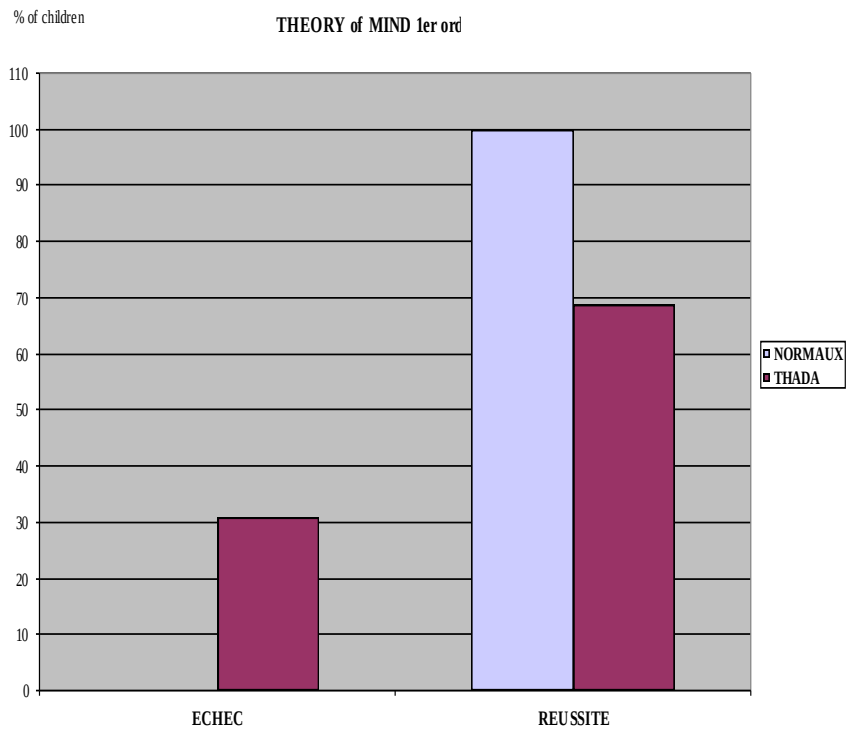
Rôle des émotions

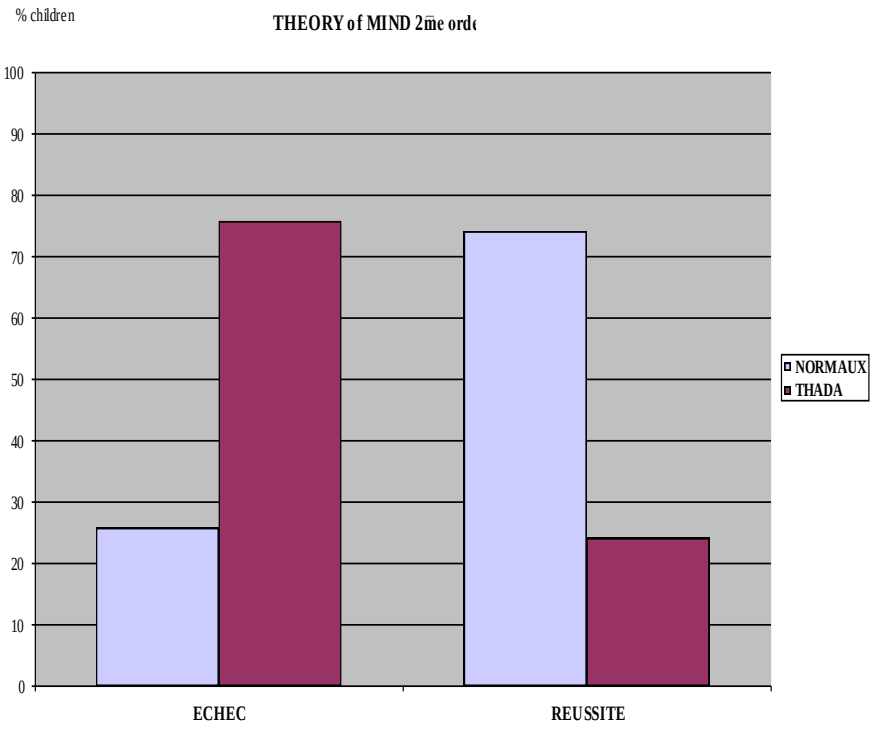
Hyperréactivité émotionnelle

(Barkley, 2009)



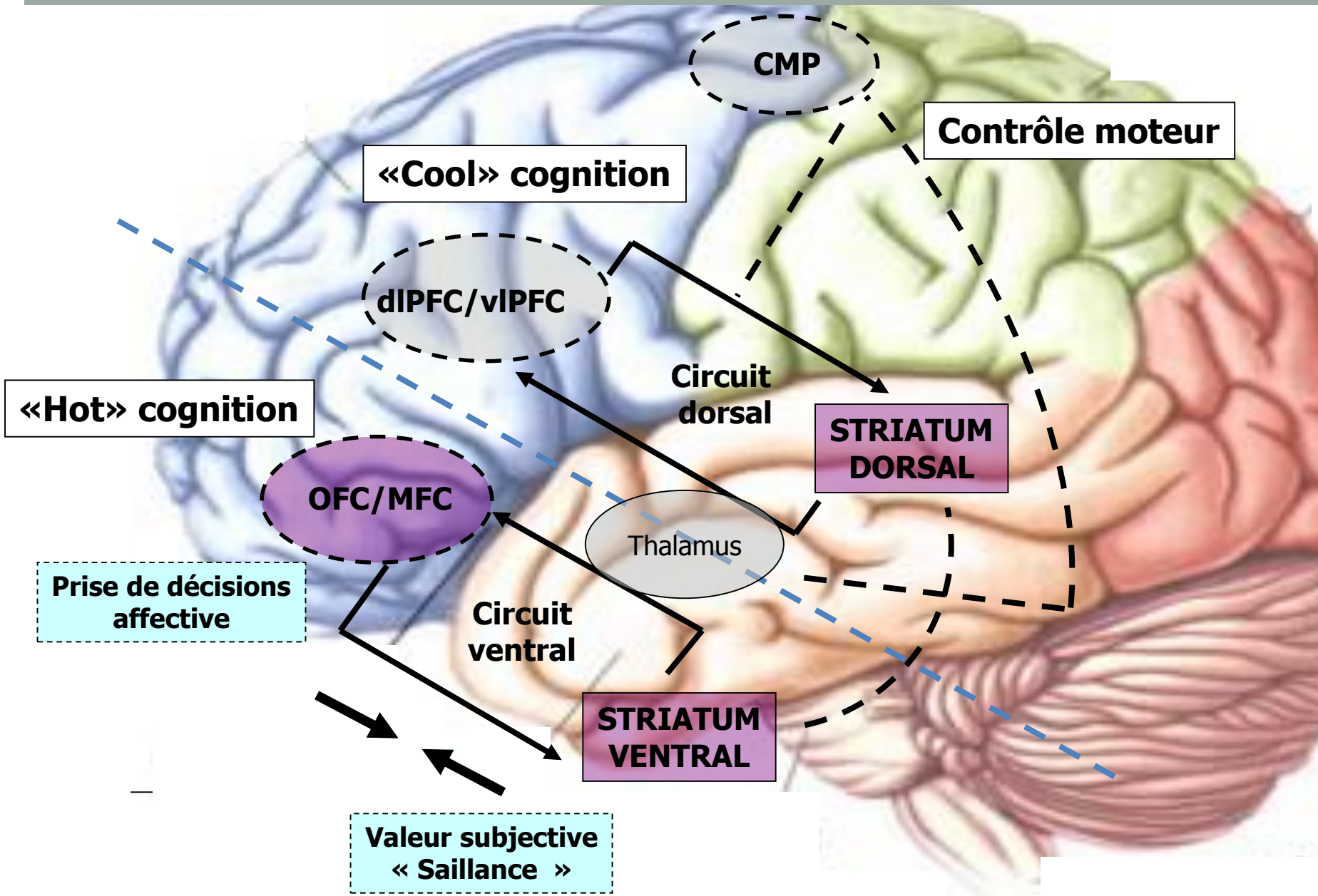
Theory of Mind and ADHD

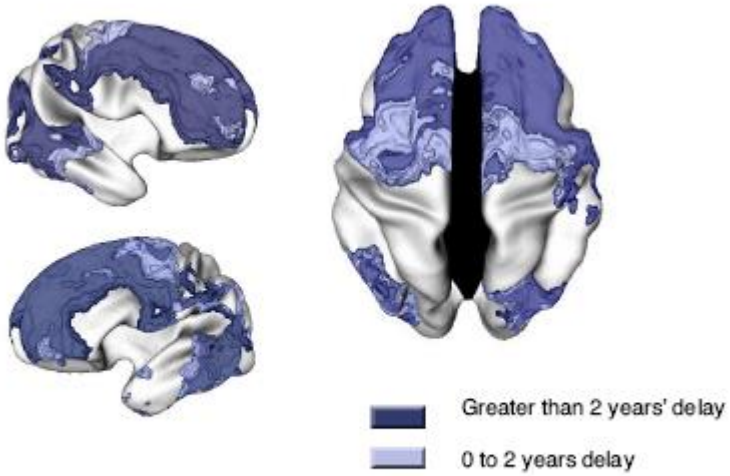




Bouvard et al , in preparation

Circuits de contrôle cognitif





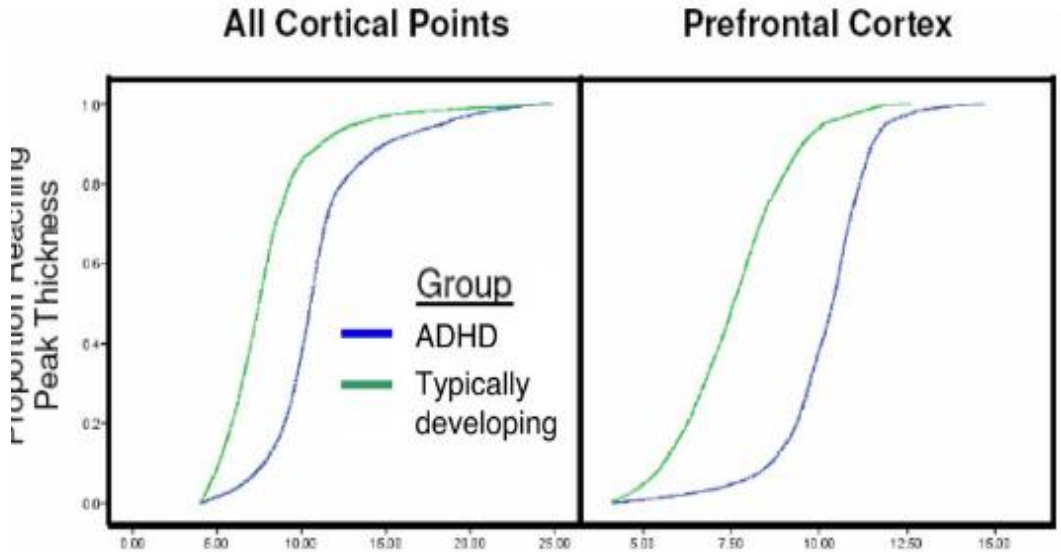


Fig. 2. Regions where the ADHD group had delayed cortical maturation, as indicated by an older age of attaining peak cortical thickness.

Age moyen pour lequel 50% de l'épaisseur corticale maximale est atteinte : 10,5 ans chez ADHD vs 7,5 ans

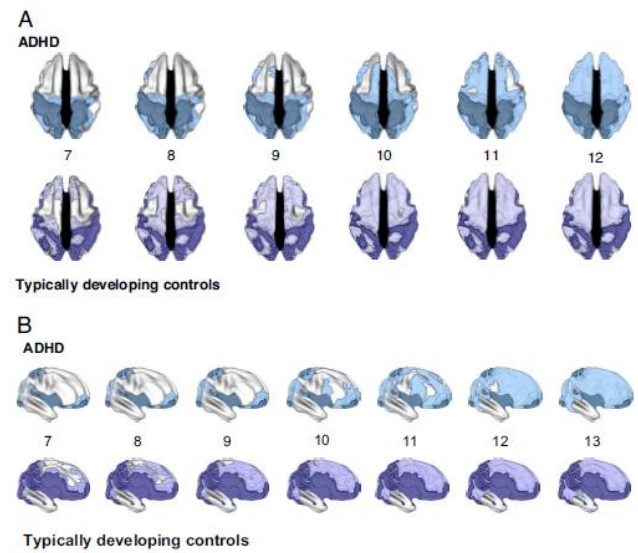


Fig. 1. The age of attaining peak cortical thickness in children with ADHD compared with typically developing children. (*A*) dorsal view of the cortical regions where peak thickness was attained at each age (shown, ages 7–12) in ADHD (*Upper*) and typically developing controls (*Lower*). The darker colors indicate regions where a quadratic model was not appropriate (and thus a peak age could not be calculated), or the peak age was estimated to lie outside the age range covered. Both groups showed a similar sequence of the regions that attained peak thickness, but the ADHD group showed considerable delay in reaching this developmental marker. (*B*) Right lateral view of the cortical regions where peak thickness was attained at each age (shown, ages 7–13) in ADHD (*Upper*) and typically developing controls (*Lower*). Again, the delay in ADHD group in attaining peak cortical thickness is apparent.

Shaw P, Proc Natl Acad Sci U S A. 2007 Dec 4;104(49):19649-54.

CORTEX XXX (2011) 1–22

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Special issue: Review

A review of fronto-striatal and fronto-cortical brain abnormalities in children and adults with Attention Deficit Hyperactivity Disorder (ADHD) and new evidence for dysfunction in adults with ADHD during motivation a attention

*Ana Cubillo, Rozmin Halari, Anna Smith, Eric Taylor and Katya Rubia**

Department of Child Psychiatry, King's College London, Institute of Psychiatry, London, UK

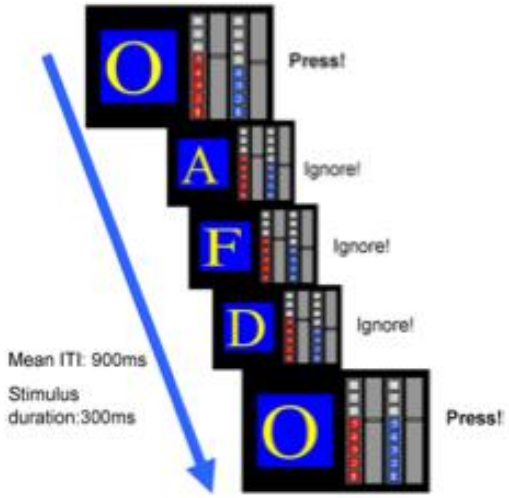

Fig. 1 – Schematic illustration of the Rewarded Continuous Performance Test. Response required to "X" or "O", not to any other letters. Reward is given for each response to one of the two target letters (which letter was rewarded was randomised across subjects). Red/blue bars indicate correct responses to targets (X/O). Three correct responses make one score on the bar for the rewarded and non-rewarded targets, but only the rewarded target scores are remunerated with £1. Up to £8 can be won on the task.

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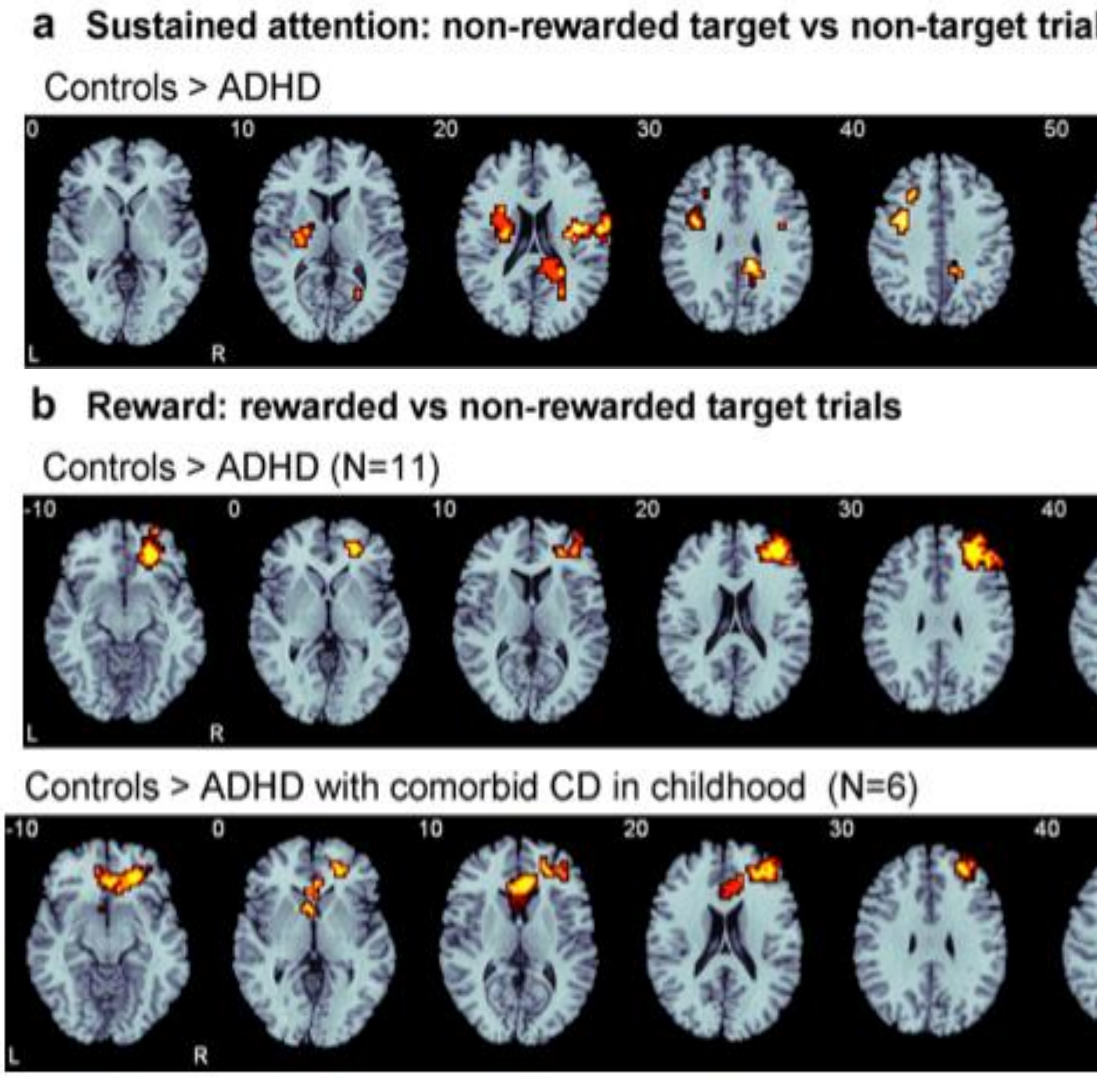
REVIEW

"Cool" Inferior Frontostriatal Dysfunction in Attention-Deficit/Hyperactivity Disorder Versus "Hot" Ventromedial Orbitofrontal-Limbic Dysfunction in Conduct Disorder: A Review

Katya Rubia

Attention-deficit/hyperactivity disorder (ADHD) and conduct disorder overlap behaviorally, clinically, and cognitively. tion of potential future clinical relevance is whether these two overlapping disorders are mediated by similar or distin substrates. This article reviews the modern neuroimaging literature on brain structure, function, and connectivity in bot



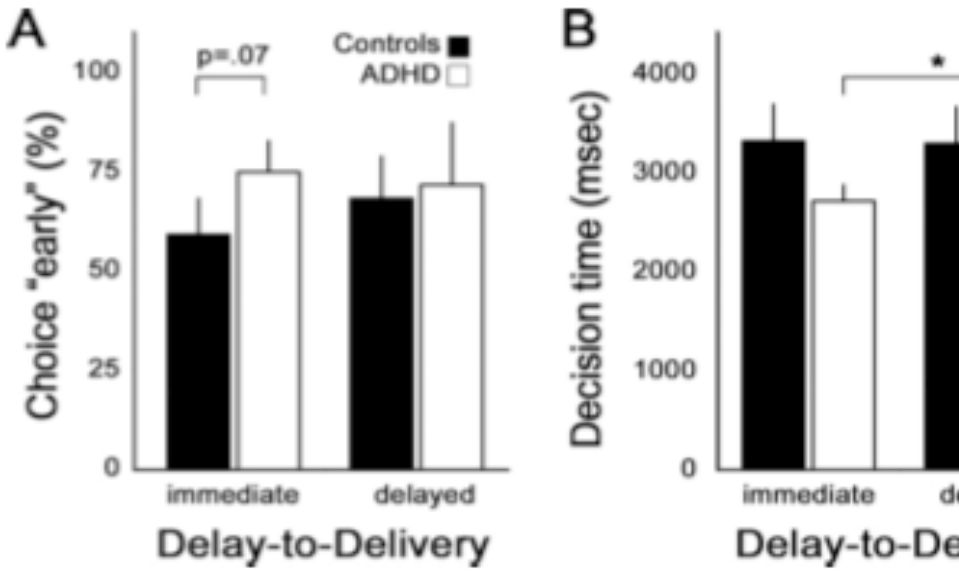
Neural Hyporesponsiveness and Hyperresponsiveness During Immediate and Delayed Reward Processing in Adult Attention-Deficit/Hyperactivity Disorder

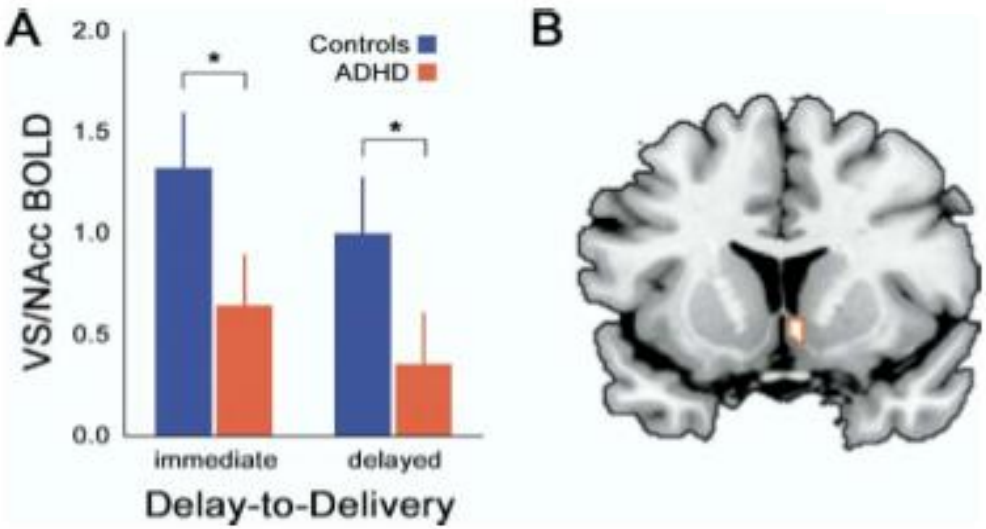
BIOL PSYCHIATRY 2009
© 2009 Society of Biological Ps

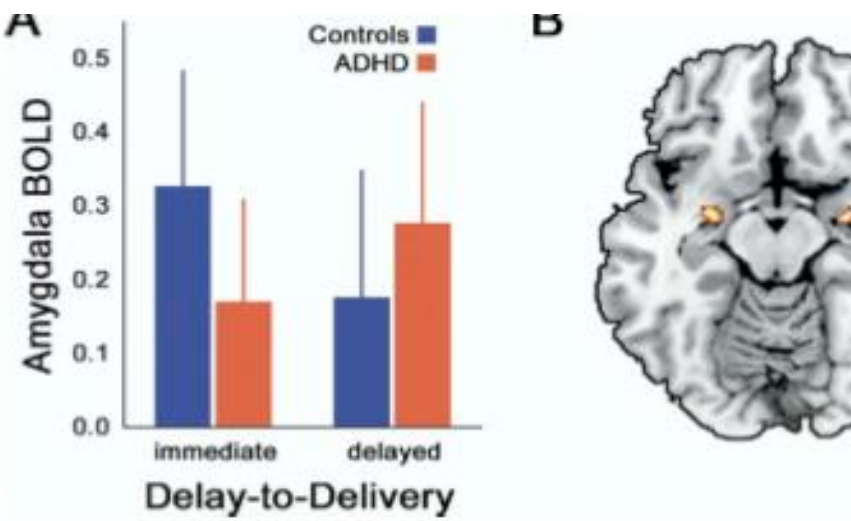
Michael M. Plichta, Nenad Vasic, Robert Christian Wolf, Klaus-Peter Lesch, Dagmar Brummer, Christian Jacob, Andreas J. Fallgatter, and Georg Grön

ADHD : hyporesponsiveness of the ventral-striatal reward system for both immediate and delayed rewards

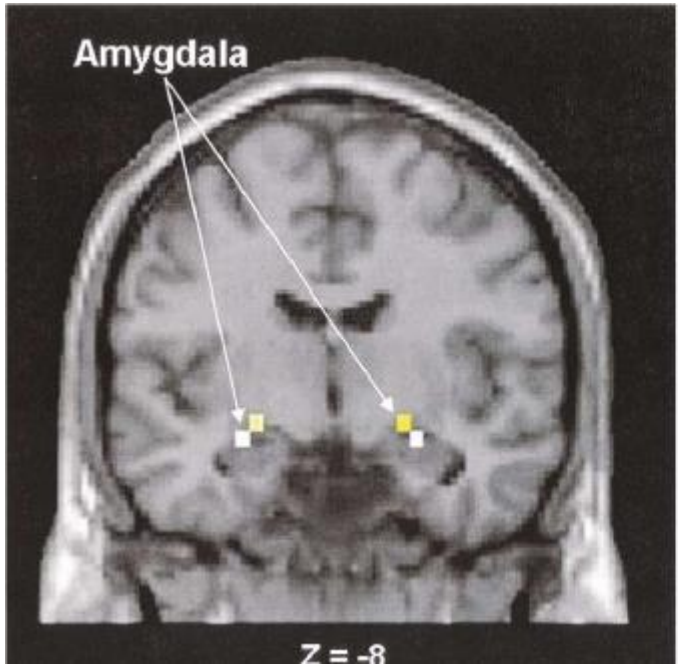
delayed rewards evoked hyperactivation in dorsal caudate nucleus and amygdala of ADHD patients.

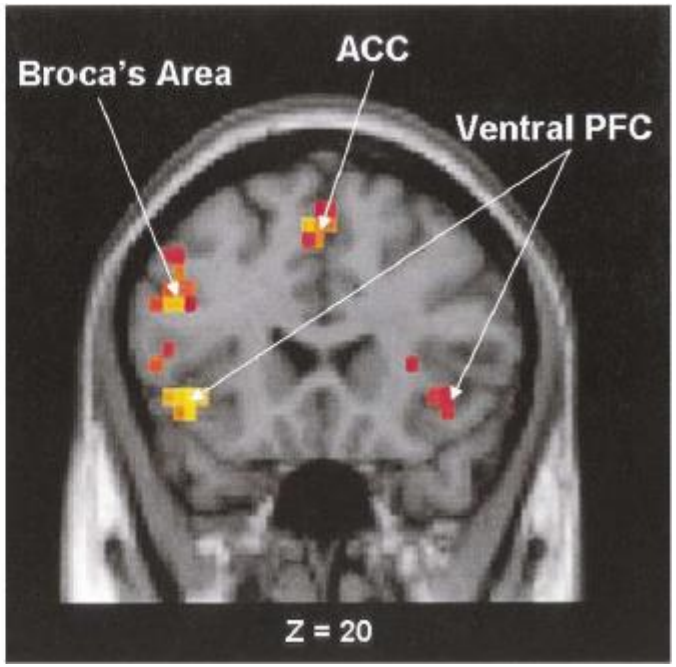






Dichotomy between Amygdala and Cortex





Le vécu *chaud* (amygdalien)

Le narratif *froid* (préfontal)

Hariri et al (2003) Biol Psychiatry, 53: 494-501

TDAH, Mortalité et pathologies somatiques

- Fréquence du recours aux soins somatiques
  - Urgences (traumatologie)
  - Adulte
- Maladies somatiques associées (Haavik, 2016)
  - Obésité
  - Troubles cardivasculaires , HTA
  - Troubles du sommeil
  - Migraines
  - Asthme
  - Maladies inflammatoires du tube digestif (maladie coeliaque)
  - Dermatites atopiques
  - …
- Anomalies génétiques et neurologiques
  - Syndromes micro délétionnels
  - Neurofibromatose type 1, Syndrome de di George (22q11)

Mortality in children, adolescents, and adults with attention deficit hyperactivity disorder: a nationwide cohort study

	Number of deaths	Person-years	Mortality rate, per 10 000 person-years	Crude model MRR (95% CI)*	Partly adjusted model, MRR (95% CI)†	Fully adjusted model, MRR (95% CI)‡
Diagnosed with ADHD	47	138 198	3·40	1·70 (1·26–2·24)	1·55 (1·14–2·04)	1·50 (1·11–1·98)
Diagnosed with ADHD and oppositional defiant disorder or conduct disorder	19	31 177	6·09	2·56 (1·57–3·90)	2·26 (1·39–3·44)	2·17 (1·33–3·31)
Diagnosed with ADHD and substance use disorder	25	9722	25·71	7·01 (4·59–10·16)	5·91 (3·87–8·57)	5·63 (3·69–8·16)
Diagnosed with ADHD, oppositional defiant disorder or conduct disorder, and substance use disorder	16	3953	40·48	10·37 (6·07–16·36)	8·74 (5·12–13·80)	8·29 (4·85–13·09)
Diagnosed with oppositional defiant disorder, conduct disorder or substance use disorder	472	330 192	14·29	4·00 (3·62–4·41)	3·65 (3·30–4·02)	3·55 (3·21–3·92)
No diagnosis of ADHD, oppositional defiant disorder or conduct disorder, or substance use disorder	5001	24 394 318	2·05	1·00 (reference)	1·00 (reference)	1·00 (reference)
p value§	..	..	..	p<0·0001	p<0·0001	p<0·0001
Overall cohort	5580	24 907 560	2·24	..	..	..

Cohort consisted of 1·92 million children born 1981–2011. MRR=mortality rate ratio. ADHD=attention deficit hyperactivity disorder. ..=not applicable. *Crude model adjusted for age, calendar year, and sex. †Partly adjusted model adjusted for age, calendar year, sex, parental history of psychiatric disorders, and maternal and paternal age at time of delivery. ‡Fully adjusted model adjusted for age, calendar year, sex, parental history of psychiatric disorders, maternal and paternal age at time of delivery, parental education, and parental employment status. §p value measures the overall effect of being diagnosed with ADHD with and without the three comorbidities, compared with individuals without ADHD or any of the three comorbidities.

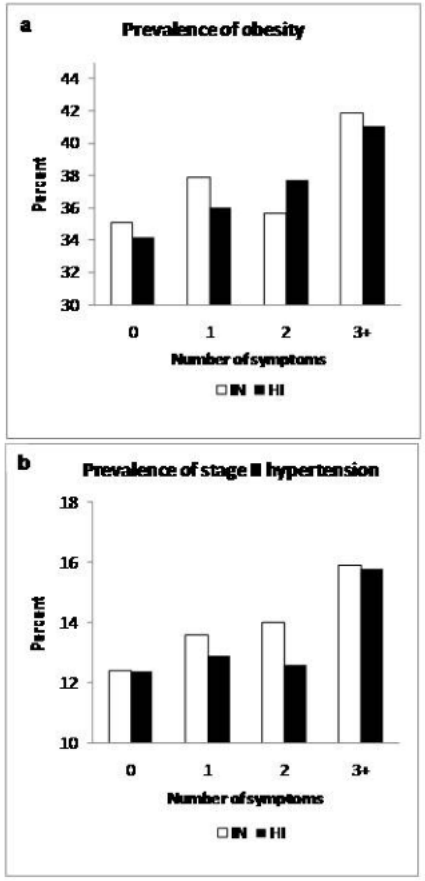
Table 3: **Mortality rate ratios in individuals with ADHD in combination with oppositional defiant disorder, conduct disorder, or substance use disorder compared with individuals with none of the four disorders, in the overall cohort**

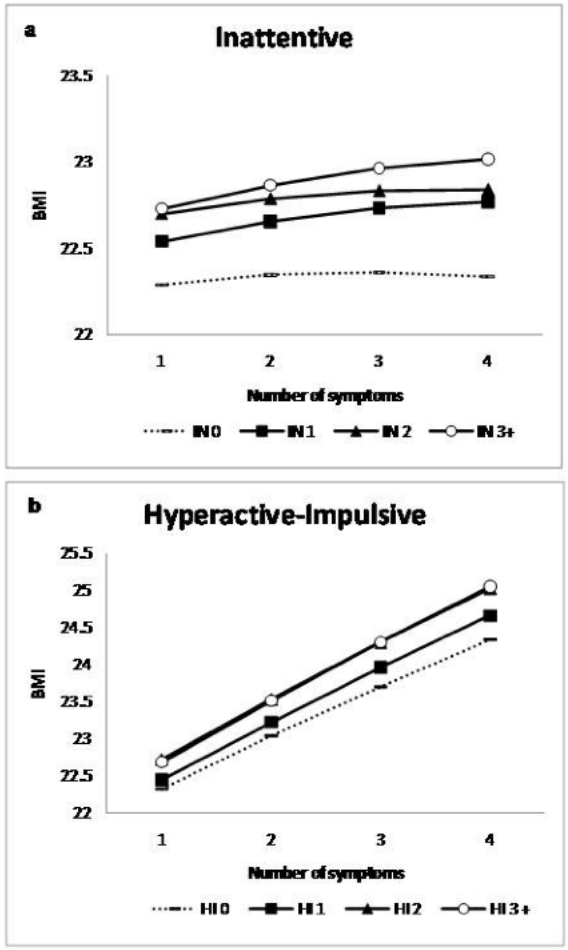
Risque de mortalité prématurée si TDAH
Surtout si **comorbidités**

Sur 79 motifs de décès connus 54 (68·4%) proviennent de causes non naturelles (dont les ¾ proviennent d'accidents)

Dalsgaard et coll, Lancet, 2015

Association between Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms and obesity and hypertension in early adulthood: A population-based study





Lien **Obésité - TDAH** et **HTA - TDAH**

Fuemmeller et coll, Int J Obes, 2011

TDAH et douleur

- Evidence clinique : recours aux soins x 5 lifetime
  - Peu d'études
  - Résultats contradictoires enfants/adultes
- Méconnaissance
  - Masqué les troubles du comportement
  - Fréquence des traumatismes → banalisation
- Biais multiples
  - Difficultés méthodologiques
    - Mesure
    - Différencier perception – comportement
- Rôle de la comorbidité ?

Perception de la douleur et TDAH Adulte

Cold pressure test

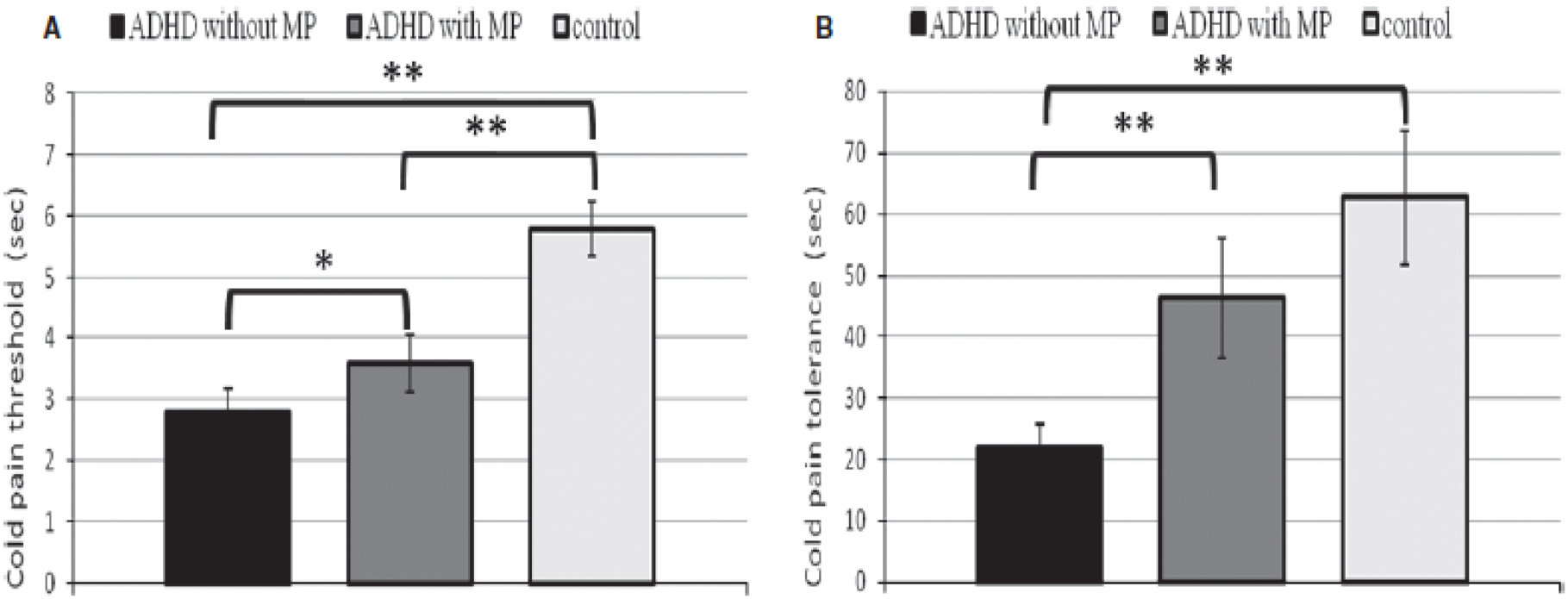


Figure 1. Cold pain threshold and cold pain tolerance in the three study conditions. Mean ± SEM of cold pain onset (A) and cold pain tolerance (B) in the controls (white bars), the Attention Deficit Hyperactivity Disorder (ADHD) subjects "with methylphenidate (MP)" (gray bars), and the ADHD subjects "without MP" (black bars). The *y*-axis represents time in seconds for threshold and tolerance. Asterisk represents significant results in the Wilcoxon signed-rank test when comparing within-group differences and the Mann–Whitney *U*-test when comparing between-subject effects. * $P < 0.05$, ** $P < 0.001$.

Treister et coll, 2013

Perception de la douleur et TDAH chez l'enfant

260 enfants et adolescents avec TDAH /Contrôle
Evaluation perception douleur Questionnaire parents/enfants

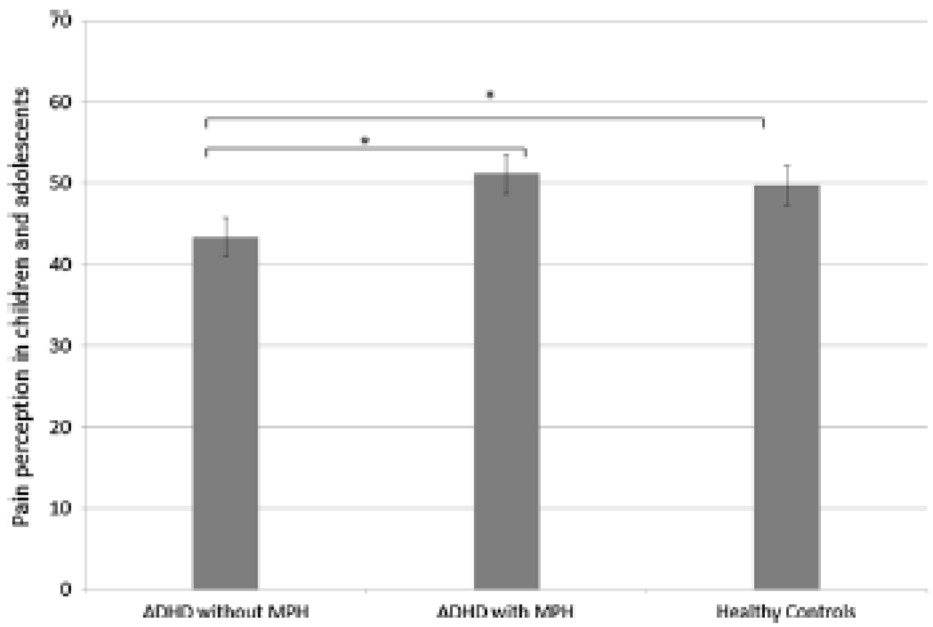
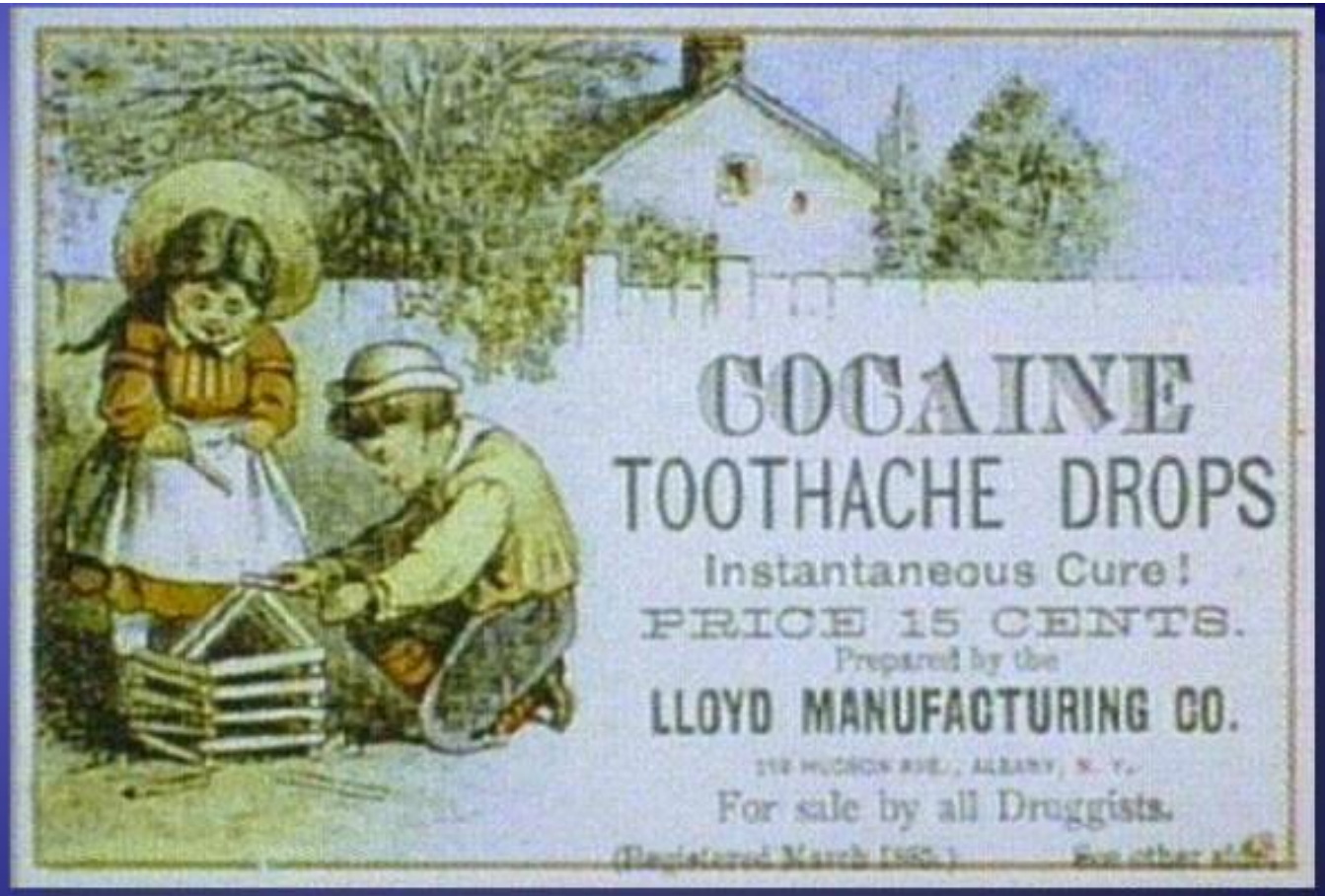


Fig. 1 Differences in pain perception (0 = hardly noticeable pain to 100 = maximum imaginable pain) in children and adolescents with ADHD without MPH treatment (n = 65), children and adolescents with ADHD with MPH treatment (n = 65) and HC (n = 130). All children and adolescents were in the age range between 7 and 17 years. *Error bars* depict standard errors of the mean. The asterisk represents a significant difference on the p <.05 level

Wolff et coll. 2016



Cocaine was recognized as being highly effective in relieving mouth pain

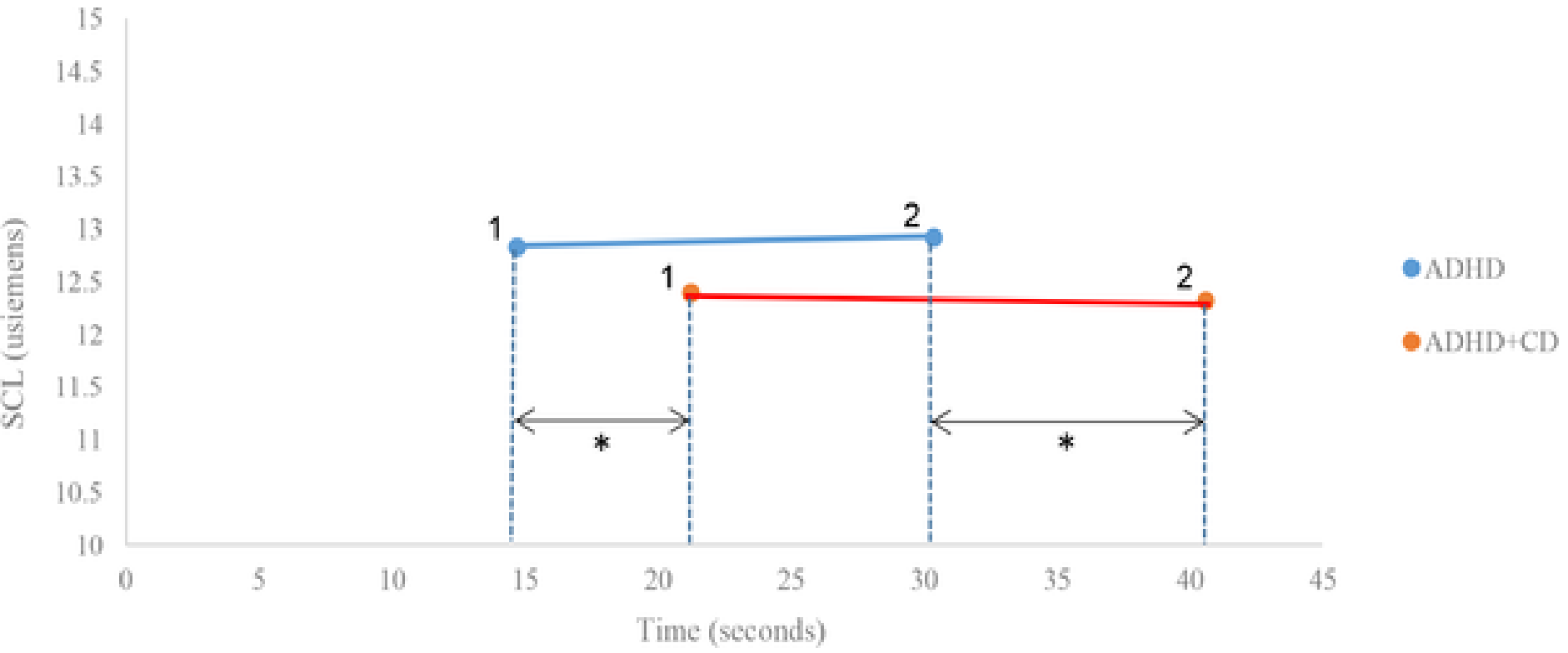
TDAH et douleur :

- Age ?:
  - augmentation de la perception douloureuse avec le temps
  - Non développement des processus de contrôle cognitifs de la perception ?
- Comorbidité ?
  - Troubles des conduites → diminution de la perception à la douleur
  - Troubles anxieux → augmentation de la perception à la douleur
- Dimensions psychologiques ?
  - Callous/Unemotional
  - Réactivité émotionnelle

Rôle des troubles des conduites Northover et coll., 2015

- 204 adolescents TDAH
- Protocole d’induction nociceptive thermique
- Evaluation
  - Comorbidité
  - Youth Psychopathic Inventory
  - Perception douloureuse
  - Skin conductance

skin conductance level at threshold and tolerance time for the ADHD and ADHD+CD groups.



Northover C, Thapar A, Langley K, van Goozen SH (2015) Pain Sensitivity in Adolescent Males with Attention-Deficit/Hyperactivity Disorder: Testing for Associations with Conduct Disorder and Callous and Unemotional Traits. PLOS ONE 10(7): e0134417. https://doi.org/10.1371/journal.pone.0134417
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0134417

correlations between clinical and pain sensitivity measures.

	ADHD	CD	CU	SDQ emotion	Threshold time	Tolerance time	$SCL_{threshold}$	$SCL_{tolerance}$	Pain ratio
ADHD	-								
CD	.19**	-							
CU	.11	.40**	-						
SDQ emotion	-.10	-.05	-.05	-					
Threshold time	-.18*	.17*	.12	-.04	-				
Tolerance time	-.14	.19*	.21**	.10	.68**	-			
$SCL_{threshold}$	.06	-.07	-.04	.14	-.03	-.06	-		
$SCL_{tolerance}$	.09	-.07	-.05	.10	-.10	-.11	.98**	-	
Pain ratio	.17*	-.01	-.17*	-.04	-.31**	-.50**	.36**	.43**	-

Note

* = $p < .05$

** = $p < .001$. ADHD = ADHD symptom score; CD = CD symptom score; CU = callous/unemotional trait score; SDQ emotion = Strengths and Difficulties emotional symptom subscale score; Threshold time = time at which first experience of pain is reported; Tolerance time = length of time until procedure is terminate; $SCL_{threshold}$ = Skin conductance level at threshold time; $SCL_{tolerance}$ = Skin conductance level at tolerance time; Pain ratio = Skin Conductance increase divided by tolerance time.

doi:10.1371/journal.pone.0134417.t002

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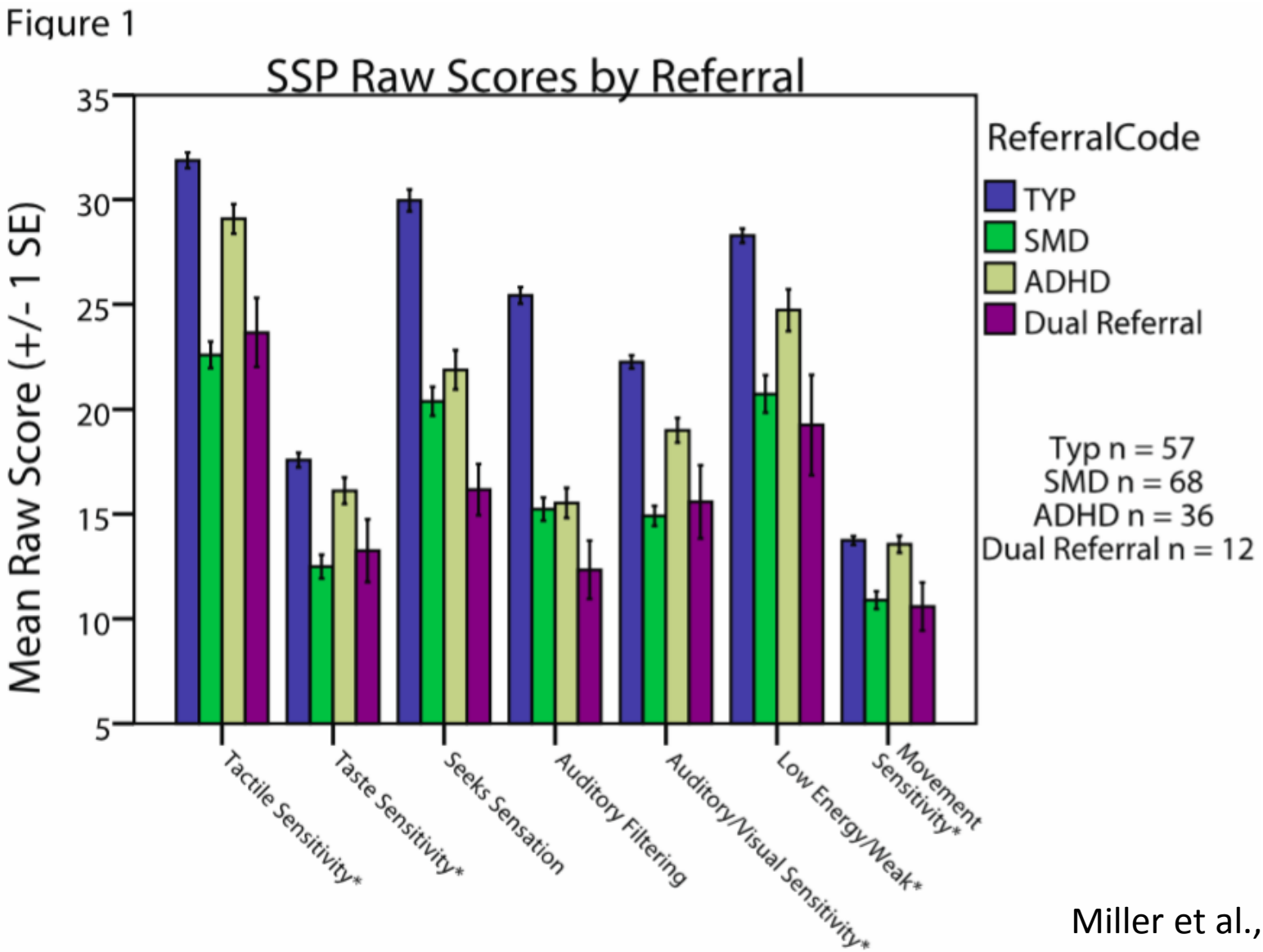
Perception de la douleur dans le TDAH Mécanismes ?

- Contrôle cognitif: déficit des fonctions exécutives
- Déficit social : empathie et imitation
- Attention sélective
  - Mode par défaut
- Dysfonctionnement dopaminergique et noradrénergique
- Troubles de l’intégration sensorielle

Intégration sensorielle et TDA/H



Miller et al., 2012

Intégration sensorielle, TSA et TDA/H

Table 4
Correlations between the SPM variables (SOC, PLA and TOT) and children's Non-verbal IQ, Autism severity, and the number of ADHD symptoms (inattention and hyperactivity/impulsivity) in the home and classroom.

		Home			Classroom		
		SOC	PLA	TOT	SOC	PLA	TOT
Non-verbal IQ	*r*	−.147	−.256	−.090	−.138	−.268	−.069
	p	.360	.106	.574	.391	.090	.667
Autism severity	*r*	.691**	.491**	.635**	.659**	.407*	.660**
	p	.000	.001	.000	.000	.008	.000
Inattention	*r*	.567**	.400*	.393*	.357*	.152	.329
	p	.000	.010	.011	.022	.342	.036
Hyperactivity–impulsivity	*r*	.364*	.365*	.343*	.237	.153	.184
	p	.019	.019	.028	.135	.341	.248

** $p <$ Holm–Bonferroni correction.
* $p < .03$.

Sanz-Cervera et al., 2015

LSEVIER Neuroscience and Biobehavioral Reviews 31 (2007) 977–986
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Review

Spontaneous attentional fluctuations in impaired states and pathological conditions: A neurobiological hypothesis

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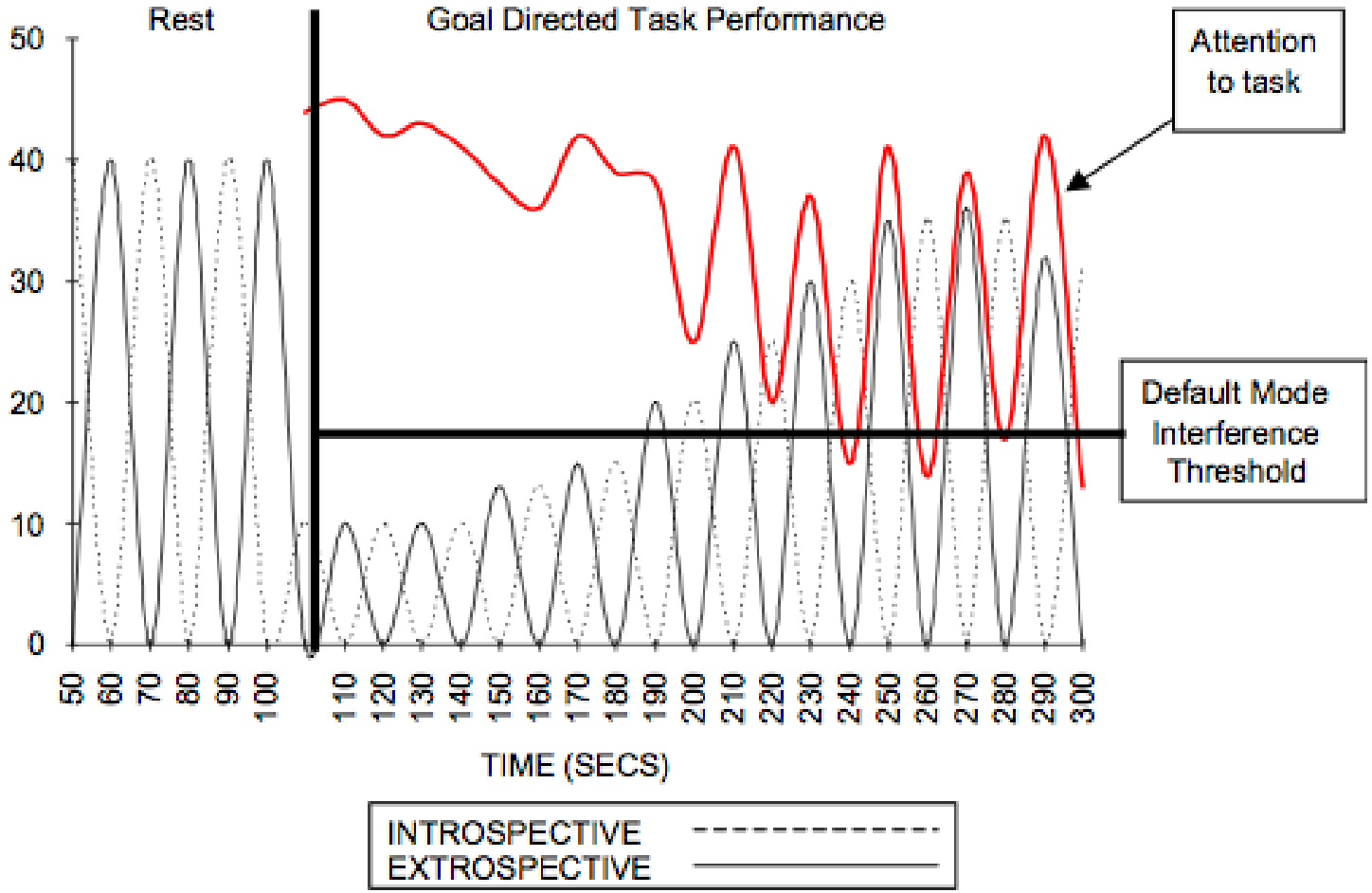
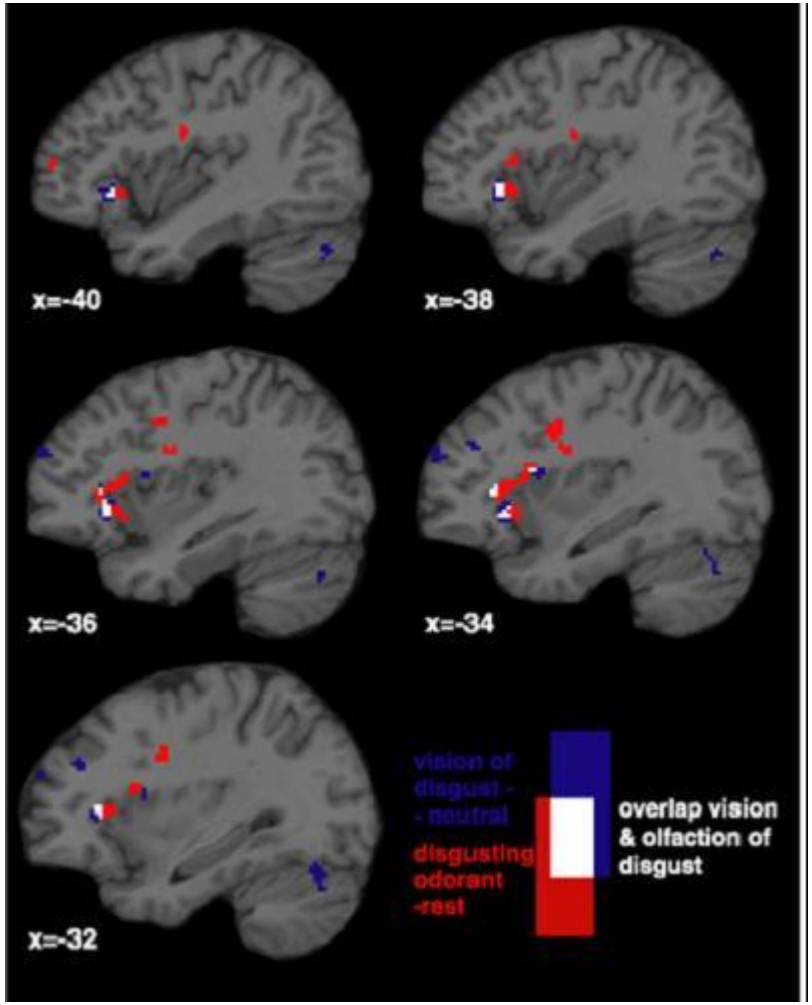


Neurones miroirs et emotion



Wicker et al., Neuron 2003

En conclusion

- Douleur , trouble somatiques, TDAH des relations à explorer
- Des recommandations ?
  - Dans le TDAH: prévenir les troubles somatiques
    - Enjeu majeur sur la morbi-mortalité
  - Dans les troubles somatiques : identifier le TDAH
    - Enjeu majeur dans le traitement
- Un modèle pour comprendre le traitement de l’information nociceptive ?

Service universitaire de psychiatrie de l'enfant et de l'adolescent

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28 - 29 juin 2018

Centre de Congrès de Beaulieu, Lausanne

Journée grand public 30 juin 2018