Cognitive functions mediate the link between cortical thickness and social processing abilities in congenital atypical development

V. Oldrati*, E. Ferrari, N. Butti, C. Gagliardi, R. Romaniello, R. Borgatti, D. Peruzzo, C. Urgesi

* viola.oldrati@lanostrafamiglia.it

Background

The emergence of social perception skills might rely on the acquisition of different cognitive abilities

In cases of atypical development:

- ✓ Visuospatial, visual-perspective and sensorimotor difficulties may hinder the later development of social cognitive abilities (Ferrari et al., 2022; Kampis et al., 2017; Ritterband-Rosenbaum et al., 2019)

- ✓ Reduced cortical thickness (CT) across multiple brain regions (Zhang et al., 2011)

Aim: to examine the relationship between CT and social cognition abilities and whether cognitive skills do mediate this relationship.

Analysis Plan

Step 1

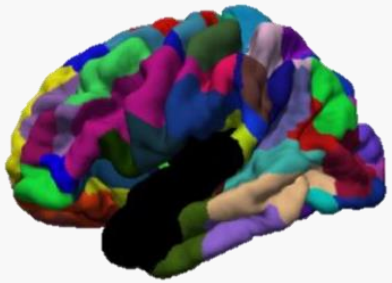
Identification of correlations between cognitive scores and brain CT

Step 2

Identification of predictors of social skills' scores among the areas identified at Step 1 by multiple regression models

Step 3

Investigation of the mediating role of cognitive scores between brain CT (identified at Step 2) and social skills scores by simple mediation models



Cortical thickness

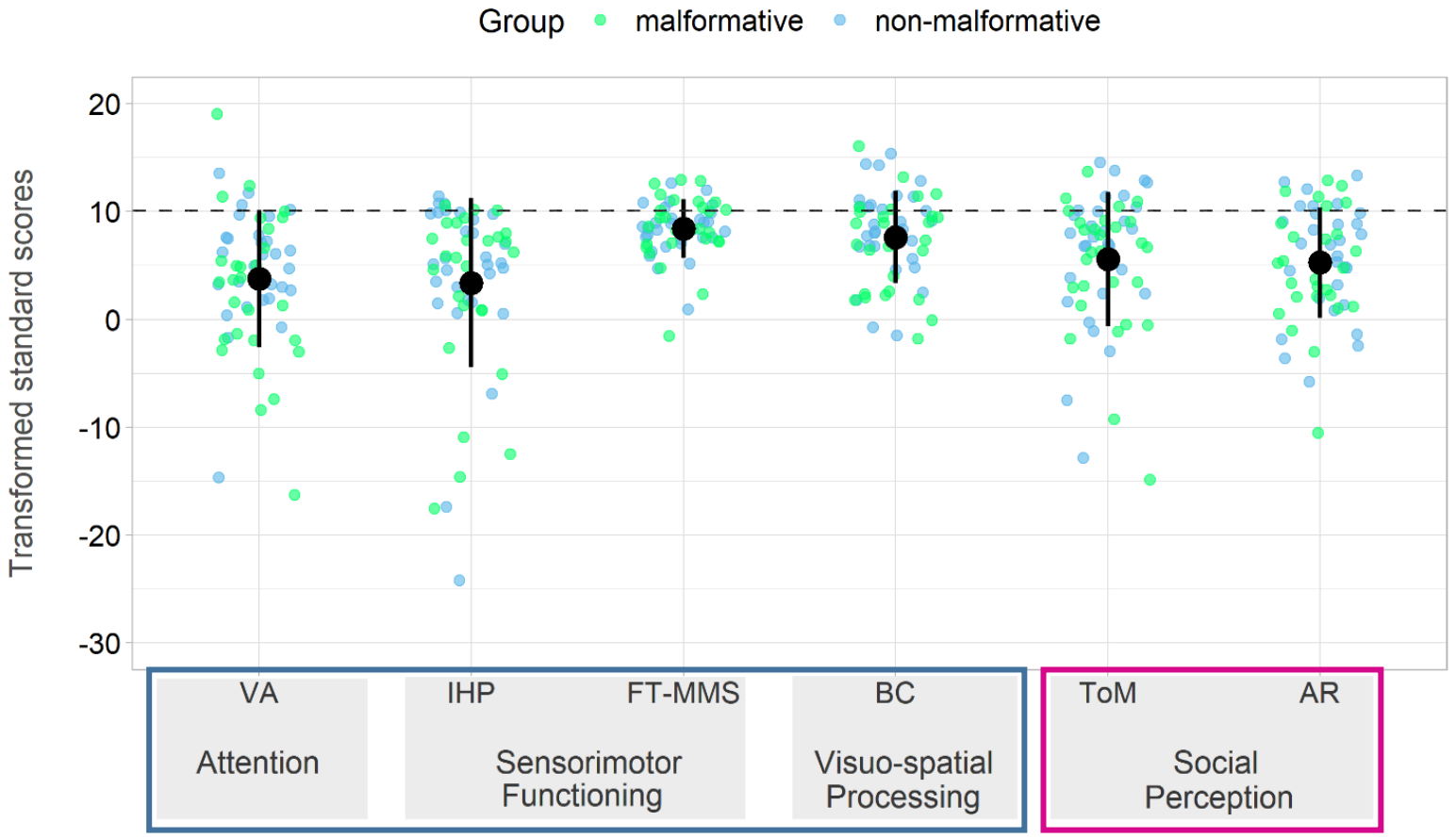
T1-weighted data

Parcellation by Destrieux

Sample and Neuropsychological measures

Children/adolescents with intellectual developmental disability (IDD) resulting from non-progressive, congenital conditions

N	Age	Sex	FSIQ
58	8.7 (2.8)	15F / 43M	70.4 (18.6)



NEPSY-II

VA: Visual Attention

IHP: Imitating Hands Position (IHP)

FT-MMS: Fingertip Tapping & Manual Motor Sequences

BC: Block construction

ToM: Theory of Mind

AR: Affect Recognition

Results

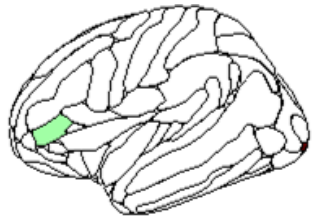
Step 1

Threshold: $r \geq 0.3$

	Area	Cognitive measure
LEFT	parieto-occipital sulcus	VA
	postcentral gyrus	VA
	postcentral gyrus	BC
	inferior frontal gyrus (p. triangularis)	BC
	middle frontal gyrus	FT-MMS
	superior occipital gyrus	FT-MMS
RIGHT	superior and trans occipital sulcus	IHP
	superior and trans occipital sulcus	BC
	superior parietal lobule	VA
	intra/inter/trans parietal sulci	BC
	cuneus	VA

Step 2

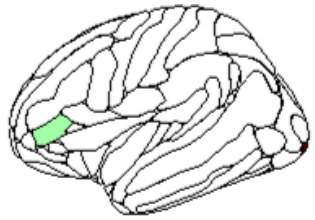
LH Model ~ ToM
Adj-R=.13 p=.03



IFG p=.03

POS p=.05

LH Model ~ AR
Adj-R=.14 p=.02



IFG p=.02

POS p=.03

RH Model ~ ToM
Adj-R=.12 p=.03

ns.

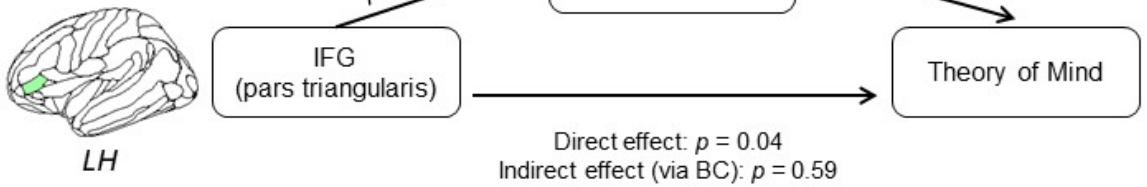
RH Model ~ AR
Adj-R=.09 p=.07

SPL p=.05

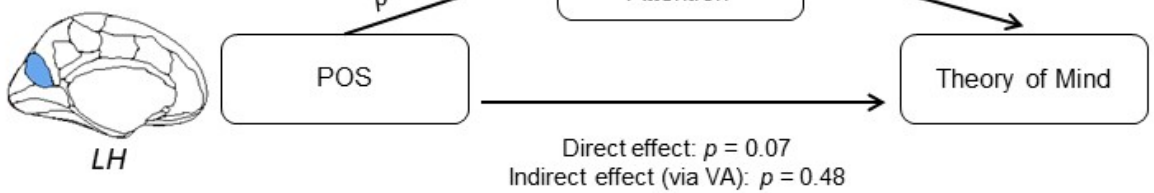
Results

Step 3

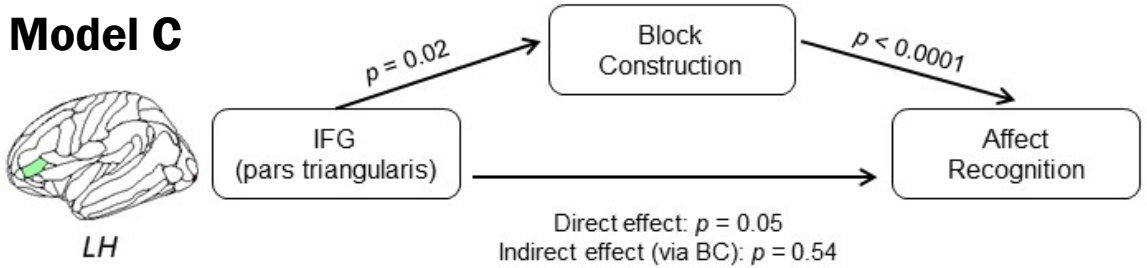
Model A



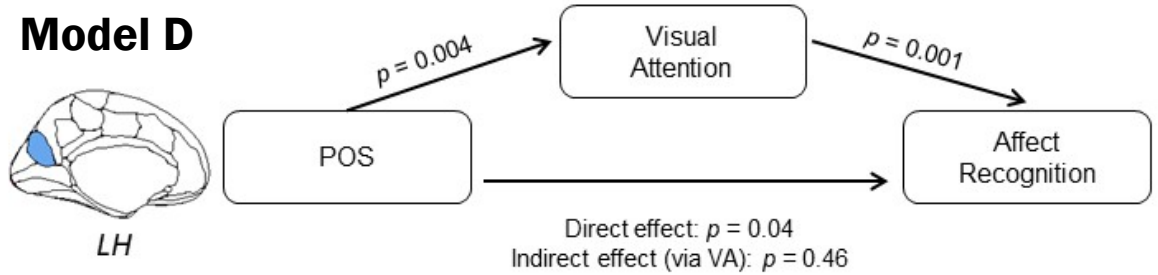
Model B



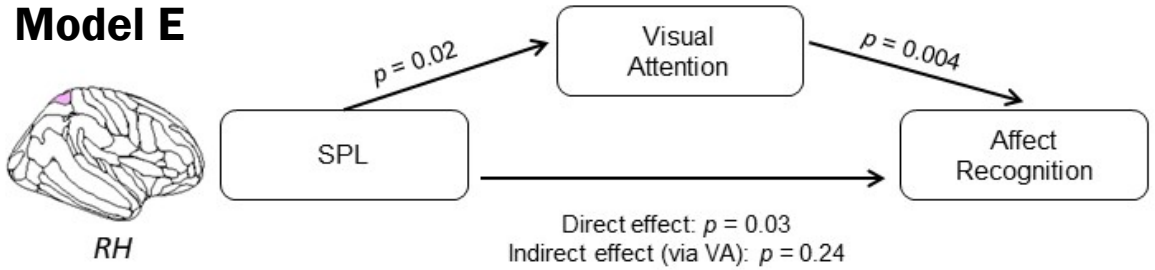
Model C



Model D



Model E



Cognitive outcomes mediated the relationship between brain CT and social skill scores' in all models

Discussion

Inferior frontal gyrus
emotion processing (Johnston et al., 2013)
action simulation (Oliver et al., 2018) and
control of facial/body movements (Heyes, 2001)

Parieto-occipital sulcus
self-referential processing (Chrastil, 2018)
perspective/heading changes in spatial
navigation (Sulpizio et al., 2016)

Superior parietal lobule
imagined self-rotations (Wraga et al., 2005)
visual perspective-taking (Gunia et al., 2021)

Neuro-constructivism framework

Intervening role of
spatial attention and
visuo-constructive abilities in
social perception

Rehabilitative training for IDD patients
targeting visuospatial skills may yield
positive outcomes also in social abilities

Credits

IRCCS E. Medea
Viola Oldrati
Elisabetta Ferrari
Niccolò Butti
Denis Peruzzo
Cosimo Urgesi

University of Udine
Cosimo Urgesi

IRCCS C. Mondino
Renato Borgatti
Romina Romaniello

Catholic University of Milan
Chiara Gagliardi

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