

# The influence of the body processing in the development of empathy in early adolescence: a preliminary study

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**BACKGROUND.** Mental representations in various bodily formats (e.g., somatosensory, interoceptive, motoric) have been suggested to play a pivotal role in social cognition (Goldman & de Vignemont, 2009). However, data on children and adolescents are lacking.

**AIM.** To investigate whether individual differences in the sensing of the internal body state, in terms of interoceptive accuracy (IAcc) and sensibility (ISe), and in the action-oriented (aBR) and nonaction-oriented (NaBR) body representations are associated with individual differences in a core component of the social cognition, namely empathy, during the early adolescence.

**MATERIALS AND METHOD.** Thirty healthy teens (17 girls; mean age = 13.2 yrs., SD = 0.7) took part in the study. Participants were given tasks probing bodily processing and empathy (see Box 1). Spearman correlation analyses were performed between accuracy in bodily processing measures on the one hand and empathy on the other.

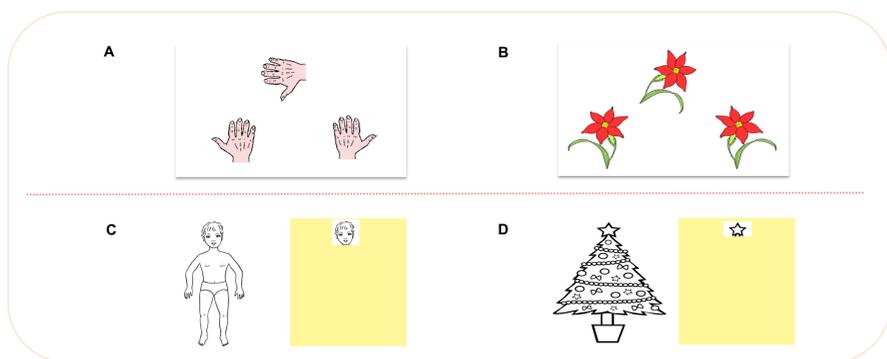


Figure 1. Examples of tasks involving body (left) and non-body (right) processing. (A) Action-oriented body representation task; (C) Nonaction-oriented body representation task.



Figure 2. Heartbeat Tracking Task. The three intervals for counting the heartbeats were 15s, 20s and 18s. Participants reported their subjectively counted heartbeats at the end of each trial (e.g., 17).

**RESULTS.** The SAQ, in particular the visceral factor, correlated positively with empathy scores (EA:  $r_s = .51$ ,  $p < .001$ ; CE:  $r_s = .37$ ,  $p = .04$ ). See also Figure 3 (panel A). A negative correlation was found between the Heartbeat Tracking Task and empathy scores (EA:  $r_s = -.69$ ,  $p < .001$ ; CE:  $r_s = -.63$ ,  $p < .001$ ). See also Figure 3 (panel B). In starking contrast there was no association with aBR (EA:  $r_s = -.05$ ,  $p = .80$ ; CE:  $r_s = .01$ ,  $p = .97$ ) and NaBR (EA:  $r_s = -.16$ ,  $p = .39$ ; CE:  $r_s = -.10$ ,  $p = .60$ ) scores.

## BOX 1.

**Body Processing Assessment:** aBR was assessed with the *Hand Laterality Task* (HLT; adapted from Raimo et al., 2021; Parsons, 1987); NaBR was assessed with the *Frontal Body Evocation* task (FBE; adapted from Raimo et al., 2021; Daurat-Hmeljiak et al., 1978). Similar control tasks not involving body processing were also administered (i.e., *Object Laterality Task*, OLT, and *Christmas Tree Task*, CTT, adapted from Raimo et al., 2021). See Figure 1.

ISe was assessed with the *Self-Awareness Questionnaire* (SAQ; Longarzo et al., 2015; adaptation for children: Raimo et al., submitted) that includes a *visceral* and a *somatosensorial* factor; IAcc was assessed with the *Heartbeat Tracking Task* (Schandry, 1981; adaptation for children: Koch & Pollatos, 2014). See Figure 2.

**Social Cognition Assessment:** Cognitive (CE) and Affective Empathy (AE) were assessed with the *Feeling and Thinking Questionnaire* (F&T; Garton & Gringart, 2005).

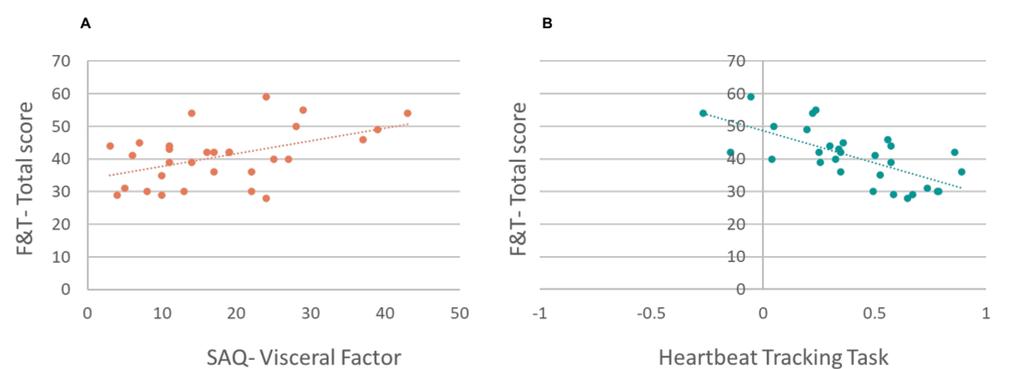


Figure 3. Relationship between ISe (panel A) and IAcc (panel B) with empathy.

**DISCUSSION.** These preliminary results suggest that teens with a higher sensibility towards visceral body changes also show a higher tendency to feel and understand another person's emotional state. In contrast, teens with higher IAcc for cardiac signals show a lower empathy level, possibly due to a more stable body self-representation that prevents the self-other overlap necessary in some form of empathy. As a corollary finding, the opposed relation between these interoceptive dimensions and empathy confirms that ISe and IAcc are two distinct constructs (Garfinkel et al., 2015) that can impact cognitive and affective abilities differently.

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