

## **Supplementary Material**

### **Papers identified for the selective review**

- Alfano, V., Cavaliere, C., Di Cecca, A., Ciccarelli, G., Salvatore, M., Aiello, M., Federico, G. (2023). Sex differences in functional brain networks involved in interoception: An fMRI study. *Frontiers in Neuroscience*, 17, 6. doi: 10.3389/fnins.2023.1130025
- Almarcha, M., González, I., Balagué, N., Javierre, C. (2022). Prescribing or co-designing exercise in healthy adults? Effects on mental health and interoceptive awareness. *Frontiers in Behavioral Neuroscience*, 16, 12. doi: 10.3389/fnbeh.2022.944193
- Ardizzi, M., Ferri, F. (2018). Interoceptive influences on peripersonal space boundary. *Cognition*, 177, 79-86. doi: 10.1016/j.cognition.2018.04.001
- Balconi, M., Angioletti, L., Crivelli, D. (2023). Neurofeedback as neuroempowerment technique for affective regulation and interoceptive awareness in adolescence: preliminary considerations applied to a psychogenic pseudosyncope case. *Frontiers in Rehabilitation Sciences*, 4, 7. doi: 10.3389/fresc.2023.1056972
- Boccia, M., Teghil, A., Raimo, S., Di Vita, A., Grossi, D., Guariglia, C., Palermo, L. (2023). Neural substrates of interoceptive sensibility: An integrated study in normal and pathological functioning. *Neuropsychologia*, 183, 10. doi: 10.1016/j.neuropsychologia.2023.108504
- Butler, A. A., Robertson, L. S., Wang, A. P., Gandevia, S. C., Héroux, M. E. (2021). Do interoception and attending to the upper limbs affect body ownership and body representation in the grasp illusion? *Plos One*, 16(11), 17. doi:10.1371/journal.pone.0259988
- Candia-Rivera, D., Sappia, M. S., Horschig, J. M., Colier, W., Valenza, G. (2022). Confounding effects of heart rate, breathing rate, and frontal fNIRS on interoception. *Scientific Reports*, 12(1), 14. doi: 10.1038/s41598-022-25119-z
- Ceunen, E., Vlaeyen, J. W. S., Van Diest, I. (2016). On the Origin of Interoception. *Frontiers in Psychology*, 7, 17. doi: 10.3389/fpsyg.2016.00743
- Charbonneau, J. A., Maister, L., Tsakiris, M., Bliss-Moreau, E. (2022). Rhesus monkeys have an interoceptive sense of their beating hearts. *Proceedings of the National Academy of Sciences of the United States of America*, 119(16), 8. doi:10.1073/pnas.2119868119
- Christensen, J. F., Gaigg, S. B., Calvo-Merino, B. (2018). I can feel my heartbeat: Dancers have increased interoceptive accuracy. *Psychophysiology*, 55(4), 14. doi: 10.1111/psyp.13008
- Chua, E. F., Bliss-Moreau, E. (2016). Knowing your heart and your mind: The relationships between metamemory and interoception. *Consciousness and Cognition*, 45, 146-158. doi: 10.1016/j.concog.2016.08.015
- Courtet, P., Guillaume, S. (2020). Learning From Artemisia's Lucretia: Embodied Suffering and Interoception in Suicide. *Frontiers in Psychiatry*, 11, 7.

doi:10.3389/fpsy.2020.00758

- Crucianelli, L., Krahe, C., Jenkinson, P. M., Fotopoulou, A. (2018). Interoceptive ingredients of body ownership: Affective touch and cardiac awareness in the rubber hand illusion. *Cortex*, 104, 180-192. doi:10.1016/j.cortex.2017.04.018
- Dobrushina, O. R., Arina, G. A., Dobrynina, L. A., Novikova, E. S., Gubanova, M. V., Belopasova, A. V., . . . Krotenkova, M. V. (2021). Sensory integration in interoception: Interplay between top-down and bottom-up processing. *Cortex*, 144, 185-197. doi:10.1016/j.cortex.2021.08.009
- El Ali, A., Ney, R., van Berlo, Z. M. C., Cesar, P. (2023). Is that My Heartbeat? Measuring and Understanding Modality-Dependent Cardiac Interoception in Virtual Reality. *Ieee Transactions on Visualization and Computer Graphics*, 29(11), 4805-4815. doi:10.1109/tvcg.2023.3320228
- Failla, M. D., Bryant, L. K., Heflin, B. H., Mash, L. E., Schauder, K., Davis, S., . . . Cascio, C. J. (2020). Neural Correlates of Cardiac Interoceptive Focus Across Development: Implications for Social Symptoms in Autism Spectrum Disorder. *Autism Research*, 13(6), 908-920. doi:10.1002/aur.2289
- Fiene, L., Brownlow, C. (2015). Investigating Interoception and Body Awareness in Adults With and Without Autism Spectrum Disorder. *Autism Research*, 8(6), 709-716. doi:10.1002/aur.1486
- Filippetti, M. L., Tsakiris, M. (2017). Heartfelt embodiment: Changes in body-ownership and self-identification produce distinct changes in interoceptive accuracy. *Cognition*, 159, 1-10. doi:10.1016/j.cognition.2016.11.002
- Fischer, D., Messner, M., Pollatos, O. (2017). Improvement of Interoceptive Processes after an 8-Week Body Scan Intervention. *Frontiers in Human Neuroscience*, 11, 12. doi:10.3389/fnhum.2017.00452
- Freedman, A., Hu, H., Liu, I., Stewart, A. L., Adler, S., Mehling, W. E. (2021). Similarities and Differences in Interoceptive Bodily Awareness Between US-American and Japanese Cultures: A Focus-Group Study in Bicultural Japanese-Americans. *Culture Medicine and Psychiatry*, 45(2), 234-267. doi:10.1007/s11013-020-09684-4
- Gerrans, P. (2020). Pain Asymbolia as Depersonalization for Pain Experience. An Interoceptive Active Inference Account. *Frontiers in Psychology*, 11, 10. doi:10.3389/fpsyg.2020.523710
- Gong, W. X., Gu, L. J., Wang, W., Chen, L. H. (2022). Interoception visualization relieves acute pain. *Biological Psychology*, 169, 9. doi:10.1016/j.biopsycho.2022.108276
- González-Grandón, X., Cadena-Alvear, I., Gastelum-Vargas, M. (2024). Interoceptive experiences and ecological care: an embodied approach within therapeutical realms. *Frontiers in Psychology*, 15, 16. doi:10.3389/fpsyg.2024.1246906
- Grossi, D., Longarzo, M., Quarantelli, M., Salvatore, E., Cavaliere, C., De Luca, P., . . . Aiello, M. (2017). Altered functional connectivity of interoception in illness anxiety disorder. *Cortex*, 86, 22-32. doi:10.1016/j.cortex.2016.10.018

- Herbert, B. M., Pollatos, O. (2012). The Body in the Mind: On the Relationship Between Interoception and Embodiment. *Topics in Cognitive Science*, 4(4), 692-704. doi:10.1111/j.1756-8765.2012.01189.x
- Isomura, T., Watanabe, K. (2020). Direct gaze enhances interoceptive accuracy. *Cognition*, 195, 5. doi:10.1016/j.cognition.2019.104113
- Ketai, L. H., Komesu, Y. M., Dodd, A. B., Rogers, R. G., Ling, J. M., & Mayer, A. R. (2016). Urgency urinary incontinence and the interoceptive network: a functional magnetic resonance imaging study. *American Journal of Obstetrics and Gynecology*, 215(4), 17. doi:10.1016/j.ajog.2016.04.056
- Koreki, A., Goeta, D., Ricciardi, L., Eilon, T., Chen, J. Y., Critchley, H. D., . . . Yogarajah, M. (2022). The relationship between interoception and agency and its modulation by heartbeats: an exploratory study. *Scientific Reports*, 12(1), 10. doi:10.1038/s41598-022-16569-6
- Li, X. R., Peng, C. Y., Qin, F. C., Luo, Q., Ren, Z. T., Wang, X. Y., . . . Qiu, J. (2024). Basolateral Amygdala Functional Connectivity in Alexithymia: Linking Interoceptive Sensibility and Cognitive Empathy. *Neuroscience*, 539, 12-20. doi:10.1016/j.neuroscience.2023.12.014
- Line, C., Agostinucci, M., Andrieu, B., Paintendre, A. (2023). Articulating the emersion of the living body in the lived body: The example of postural practice with interoception. *Staps-Sciences Et Techniques Des Activites Physiques Et Sportives*(141), 21-34. doi:10.3917/sta.141.0021
- Liné, C., Lachal, J., Andrieu, B. (2022). Obesity and interoceptive awareness: a preliminary qualitative study of hospitalized adolescent girls with obesity. *Evolution Psychiatrique*, 87(1), 31-50. doi:10.1016/j.evopsy.2020.10.010
- Liné, C., Lachal, J., Andrieu, B. (2022). Obesity and interoceptive awareness: A preliminary qualitative study of hospitalized adolescent girls with obesity. *Evolution Psychiatrique*, 87(1), E1-E18. doi:10.1016/j.evopsy.2021.12.001
- Longarzo, M., D'Olimpio, F., Chiavazzo, A., Santangelo, G., Trojano, L., Grossi, D. (2015). The relationships between interoception and alexithymic trait. The Self-Awareness Questionnaire in healthy subjects. *Frontiers in Psychology*, 6, 8. doi:10.3389/fpsyg.2015.01149
- Longarzo, M., Mele, G., Alfano, V., Salvatore, M., Cavaliere, C. (2021). Gender Brain Structural Differences and Interoception. *Frontiers in Neuroscience*, 14, 6. doi:10.3389/fnins.2020.586860
- Maister, L., Tang, T., Tsakiris, M. (2017). Neurobehavioral evidence of interoceptive sensitivity in early infancy. *eLife*, 6, 12. doi:10.7554/eLife.25318
- Maqueda, A. E., Valle, M., Addy, P. H., Antonijoan, R. M., Puntes, M., Coimbra, J., . . . Riba, J. (2015). Salvinorin-A Induces Intense Dissociative Effects, Blocking External Sensory Perception and Modulating Interoception and Sense of Body Ownership in Humans. *International Journal of Neuropsychopharmacology*, 18(12), 14.

doi:10.1093/ijnp/pyv065

- Marshall, C. R., Hardy, C. J. D., Russell, L. L., Clark, C. N., Dick, K. M., Brotherhood, E. V., . . . Warren, J. D. (2017). Impaired Interoceptive Accuracy in Semantic Variant Primary Progressive Aphasia. *Frontiers in Neurology*, 8, 6. doi:10.3389/fneur.2017.00610
- Messina, A., Basilico, S., Bottini, G., Salvato, G. (2022). Exploring the role of interoception in autobiographical memory recollection. *Consciousness and Cognition*, 102, 11. doi:10.1016/j.concog.2022.103358
- Musculus, L., Tünte, M. R., Raab, M., Kayhan, E. (2021). An Embodied Cognition Perspective on the Role of Interoception in the Development of the Minimal Self. *Frontiers in Psychology*, 12, 7. doi:10.3389/fpsyg.2021.716950
- Nicholson, T. M., Williams, D. M., Grainger, C., Christensen, J. F., Calvo-Merino, B., Gaigg, S. B. (2018). Interoceptive Impairments Do Not Lie at the Heart of Autism or Alexithymia. *Journal of Abnormal Psychology*, 127(6), 612-622. doi:10.1037/abn0000370
- Palmer, C. E., Tsakiris, M. (2018). Going at the heart of social cognition: is there a role for interoception in self-other distinction? *Current opinion in psychology*, 24, 21-26. doi:10.1016/j.copsyc.2018.04.008
- Paolucci, T., Zangrandi, F., Iosa, M., De Angelis, S., Marzoli, C., Piccinini, G., Saraceni, V. M. (2017). Improved interoceptive awareness in chronic low back pain: a comparison of Back school versus Feldenkrais method. *Disability and Rehabilitation*, 39(10), 994-1001. doi:10.1080/09638288.2016.1175035
- Penton, T., Thierry, G. L., Davis, N. J. (2014). Individual differences in attributional style but not in interoceptive sensitivity, predict subjective estimates of action intention. *Frontiers in Human Neuroscience*, 8, 6. doi:10.3389/fnhum.2014.00638
- Quattrocki, E., Friston, K. (2014). Autism, oxytocin and interoception. *Neuroscience and Biobehavioral Reviews*, 47, 410-430. doi:10.1016/j.neubiorev.2014.09.012
- Raimo, S., Boccia, M., Di Vita, A., Cropano, M., Guariglia, C., Grossi, D., Palermo, L. (2021). The Body Across Adulthood: On the Relation Between Interoception and Body Representations. *Frontiers in Neuroscience*, 15, 12. doi:10.3389/fnins.2021.586684
- Raimo, S., Boccia, M., Di Vita, A., Iona, T., Cropano, M., Ammendolia, A., . . . Palermo, L. (2020). Interoceptive awareness in focal brain-damaged patients. *Neurological Sciences*, 41(6), 1627-1631. doi:10.1007/s10072-019-04172-z
- Raimo, S., Boccia, M., Gaita, M., Canino, S., Torchia, V., Vetere, M. A., . . . Palermo, L. (2023). The bodily fundament of empathy: The role of action, nonaction-oriented, and interoceptive body representations. *Psychonomic Bulletin Review*, 30(3), 963-973. doi:10.3758/s13423-022-02231-9
- Raimo, S., Di Vita, A., Boccia, M., Iona, T., Cropano, M., Gaita, M., . . . Palermo, L. (2021). The Body across the Lifespan: On the Relation between Interoceptive Sensibility and High-Order Body Representations. *Brain sciences*, 11(4), 15. doi:10.3390/brainsci11040493
- Raimo, S., Iona, T., Di Vita, A., Boccia, M., Torchia, V., Canino, S., . . . Palermo, L. (2024). The

- interoceptive sensibility in middle childhood: the Italian validation of the Self-Awareness Questionnaire. *European Journal of Developmental Psychology*, 21(1), 138-153. doi:10.1080/17405629.2023.2250121
- Raimo, S., Martini, M., Guariglia, C., Santangelo, G., Trojano, L., Palermo, L. (2022). Editorial: Body Representation and Interoceptive Awareness: Cognitive, Affective, and Social Implications. *Frontiers in Psychology*, 13, 3. doi:10.3389/fpsyg.2022.928952
- Raimo, S., Martini, M., Guariglia, C., Santangelo, G., Trojano, L., Palermo, L. (2023). Editorial: Community series in body representation and interoceptive awareness: cognitive, affective, and social implications. *Frontiers in Psychology*, 14, 3. doi:10.3389/fpsyg.2023.1256811
- Re, A., Malvica, S., Lucifora, C., Perconti, P., Bruni, D. (2023). Gender differences in the interoceptive awareness: a pilot study on Italian people. *Mediterranean Journal of Clinical Psychology*, 11(1), 1. doi:10.13129/2282-1619/mjcp-3571
- Ricciardi, L., Demartini, B., Crucianelli, L., Edwards, M. J., Fotopoulou, A. (2014). INTEROCEPTIVE SENSITIVITY AND SENSE OF BODY OWNERSHIP IN PATIENTS WITH FUNCTIONAL NEUROLOGICAL SYMPTOMS. *Journal of Neurology Neurosurgery and Psychiatry*, 85(8), 1. doi:10.1136/jnnp-2014-308883.39
- Ricciardi, L., Demartini, B., Crucianelli, L., Fotopoulou, A., Edwards, M. J. (2014). Interoceptive sensitivity and sense of body ownership in patients with functional neurological symptoms. *Movement Disorders*, 29, S201-S201.
- Salamone, P. C., Legaz, A., Sedeño, L., Moguilner, S., Fraile-Vazquez, M., Campo, C. G., . . . Ibañez, A. (2021). Interoception Primes Emotional Processing: Multimodal Evidence from Neurodegeneration. *Journal of Neuroscience*, 41(19), 4276-4292. doi:10.1523/jneurosci.2578-20.2021
- Salvato, G., Richter, F., Sedeño, L., Bottini, G., Paulesu, E. (2020). Building the bodily self-awareness: Evidence for the convergence between interoceptive and exteroceptive information in a multilevel kernel density analysis study. *Human Brain Mapping*, 41(2), 401-418. doi:10.1002/hbm.24810
- Scarpazza, C., Zangrossi, A., Huang, Y. C., Sartori, G., Massaro, S. (2022). Disentangling interoceptive abilities in alexithymia. *Psychological Research-Psychologische Forschung*, 86(3), 844-857. doi:10.1007/s00426-021-01538-x
- Schauder, K. B., Mash, L. E., Bryant, L. K., Cascio, C. J. (2015). Interoceptive ability and body awareness in autism spectrum disorder. *Journal of Experimental Child Psychology*, 131, 193-200. doi:10.1016/j.jecp.2014.11.002
- Schmitz, N., Napieralski, J., Schroeder, D., Loeser, J., Gerlach, A. L., Pohl, A. (2021). Interoceptive Sensibility, Alexithymia, and Emotion Regulation in Individuals Suffering from Fibromyalgia. *Psychopathology*, 54(3), 144-149. doi:10.1159/000513774
- Schroter, F. A., Siebertz, M., Jansen, P. (2023). The Impact of a Short Body-Focused Meditation on Body Ownership and Interoceptive Abilities. *Mindfulness*, 14(1), 159-173. doi:10.1007/s12671-022-02039-7

- Sedeño, L., Couto, B., Melloni, M., Canales-Johnson, A., Yoris, A., Baez, S., . . . Ibanez, A. (2014). How Do You Feel when You Can't Feel Your Body? Interoception, Functional Connectivity and Emotional Processing in Depersonalization-Derealization Disorder. *Plos One*, 9(6), 17. doi:10.1371/journal.pone.0098769
- Sel, A., Azevedo, R. T., Tsakiris, M. (2017). Heartfelt Self: Cardio-Visual Integration Affects Self-Face Recognition and Interoceptive Cortical Processing. *Cerebral Cortex*, 27(11), 5144-5155. doi:10.1093/cercor/bhw296
- Seth, A. K. (2013). Interoceptive inference, emotion, and the embodied self. *Trends in Cognitive Sciences*, 17(11), 565-573. doi:10.1016/j.tics.2013.09.007
- Shah, P. (2016). Interoception: The Eighth Sensory System: Practical Solutions for Improving Self-Regulation, Self-Awareness and Social Understanding of Individuals with Autism Spectrum and Related Disorders. *Journal of Autism and Developmental Disorders*, 46(9), 3193-3194. doi:10.1007/s10803-016-2848-8
- Sun, W. Y., Ueno, D., Narumoto, J. (2022). Brain Neural Underpinnings of Interoception and Decision-Making in Alzheimer's Disease: A Narrative Review. *Frontiers in Neuroscience*, 16, 12. doi:10.3389/fnins.2022.946136
- Suzuki, K., Garfinkel, S. N., Critchley, H. D., & Seth, A. K. (2013). Multisensory integration across exteroceptive and interoceptive domains modulates self-experience in the rubber-hand illusion. *Neuropsychologia*, 51(13), 2909-2917. doi:10.1016/j.neuropsychologia.2013.08.014
- Tajadura-Jiménez, A., Tsakiris, M. (2014). Balancing the "Inner" and the "Outer" Self: Interoceptive Sensitivity Modulates Self-Other Boundaries. *Journal of Experimental Psychology-General*, 143(2), 736-744. doi:10.1037/a0033171
- Teghil, A., Boccia, M., Nocera, L., Pietranelli, V., Guariglia, C. (2020). Interoceptive awareness selectively predicts timing accuracy in irregular contexts. *Behavioural Brain Research*, 377, 5. doi:10.1016/j.bbr.2019.112242
- Terasawa, Y., Oba, K., Motomura, Y., Katsunuma, R., Murakami, H., Moriguchi, Y. (2021). Paradoxical somatic information processing for interoception and anxiety in alexithymia. *European Journal of Neuroscience*, 54(11), 8052-8068. doi:10.1111/ejn.15528
- Torregrossa, L., Snodgress, M., Amedy, A., Nummenmaa, L., Park, S. (2019). Interoception, internal noise and minimal self-disturbances in schizophrenia. *Schizophrenia Bulletin*, 45, S106-S106. doi:10.1093/schbul/sbz022.044
- Tsakiris, M., Critchley, H. (2016). Interoception beyond homeostasis: affect, cognition and mental health. *Philosophical Transactions of the Royal Society B-Biological Sciences*, 371(1708), 6. doi:10.1098/rstb.2016.0002
- Tsakiris, M., Tajadura-Jiménez, A., Costantini, M. (2011). Just a heartbeat away from one's body: interoceptive sensitivity predicts malleability of body-representations. *Proceedings of the Royal Society B-Biological Sciences*, 278(1717), 2470-2476. doi:10.1098/rspb.2010.2547

- Ubukata, S., Watanabe, K., Isomura, T. (2023). Cultural Differences in Interoceptive Accuracy: Comparison Between Japan and Europe<sup>1</sup>. *Japanese Psychological Research*, 65(4), 294-309. doi:10.1111/jpr.12468
- Valenzuela-Moguillansky, C., Reyes-Reyes, A., Gaete, M. I. (2017). Exteroceptive and Interoceptive Body-Self Awareness in Fibromyalgia Patients. *Frontiers in Human Neuroscience*, 11, 14. doi:10.3389/fnhum.2017.00117
- van Elk, M., Lenggenhager, B., Heydrich, L., Blanke, O. (2014). Suppression of the auditory N1-component for heartbeat-related sounds reflects interoceptive predictive coding. *Biological Psychology*, 99, 172-182. doi:10.1016/j.biopspsycho.2014.03.004
- Weiniger, S. P., Schilaty, N. D. (2024). Interoceptive posture awareness and accuracy: a novel photographic strategy towards making posture actionable. *Frontiers in Neuroscience*, 18, 7. doi:10.3389/fnins.2024.1359594
- Yang, H. X., Hu, H. X., Zhang, Y. J., Wang, Y., Lui, S. S. Y., Chan, R. C. K. (2022). A network analysis of interoception, self-awareness, empathy, alexithymia, and autistic traits. *European Archives of Psychiatry and Clinical Neuroscience*, 272(2), 199-209. doi:10.1007/s00406-021-01274-8
- Zamariola, G., Cardini, F., Mian, E., Serino, A., Tsakiris, M. (2017). Can you feel the body that you see? On the relationship between interoceptive accuracy and body image. *Body Image*, 20, 130-136. doi:10.1016/j.bodyim.2017.01.005
- Zucker, N. L., LaVia, M. C., Craske, M. G., Foukal, M., Harris, A. A., Datta, N., . . . Maslow, G. R. (2019). Feeling and body investigators (FBI): ARFID division-An acceptance-based interoceptive exposure treatment for children with ARFID. *International Journal of Eating Disorders*, 52(4), 466-472. doi:10.1002/eat.22996