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Programme
Abstracts Book

5th Meeting
International Association for the Study of Affective Touch

June 9–11, 2025
Jena, Germany

IASAT
International Association for the Study of Affective Touch

IASAT
2025

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Greetings from the organizers

Dear friends and colleagues,

It is a great pleasure to welcome you in Jena at the 5th Meeting of the International Association for the Study of Affective Touch (IASAT). Since its founding, research on affective touch has grown exponentially broadening in scope to address psychological, neuroscientific, engineering and sociological questions related to touch. Over the next few days, we will discuss emerging research, exchange ideas, and share our passion for touch science here in Jena, Germany.
Your valuable contributions have made for an exciting program featuring four keynotes covering a range of topics, including the molecular and neural mechanisms of pleasant touch in mice, the nuances of human self- and interpersonal touch, and how advanced fiber technology might mimic or enhance the human tactile sense. Additionally, there will be 40 talks and 69 posters including a new format, which we have termed "live posters" and which combine content discussions with actual touch experiences. Finally, we are proud to present an editor from Nature Human Behavior, who will provide insights from behind the scenes and help promote our field's discoveries.
We hope you enjoy the conference, connect with many of your colleagues, and find inspiration for your work.

Warm regards,
Ilona Croy & Annett Schirmer
Chairs of local organization committee

Welcome note from IASAT

The inaugural meeting of the International Association for the Study of Affective Touch (IASAT) was held in London in 2015. Since this landmark meeting, our community has very much grown, embracing multidisciplinary areas into research in affective touch, including its basic mechanisms, social benefits, and potential applications - across the lifespan. After meetings in Liverpool (2017) and Linköping (2019), we were hit by the COVID-19 pandemic which drastically reduced opportunities for interpersonal touch, so an online IASAT-sponsored SocialBRIDGES meeting was held in 2021, to continue IASAT's biannual meeting commitment to 'keep in touch'. To celebrate the world of touch after such a challenging period due to COVID, a Festival of Touch was held in Marseille in 2023, bringing together, for the first time, not only our IASAT affective touch community, but also the Research in Touch network whose focus is on discriminative touch. Due to the success of this event we aim to repeat this 'merging of the touch senses' at some future date, but for the current meeting in Jena, we are continuing to build on this solid groundwork where we are looking forward to many interesting presentations and fruitful discussions between us all. Plans are already being made for the IASAT 2027 meeting, so please spread the word around your affective touch networks. Our aim is to be a truly multidisciplinary organisation, such as showing similarities between responses of mouse spinal neurons and human C-tactile (CT) sensory fibres, highlighting how affective touch systems are conserved in all social species across evolution.

From the IASAT committee:
Presidents Rochelle Ackerley and Francis McGlone, Secretary India Morrison, and Treasurer Katerina Folopolou, as well as our Past-President Håkan Olausson.

PROGRAMME SCHEDULE

<table>
<tr><th></th><th>Mon, June 9</th><th>Tue, June 10</th><th>Wed, June 11</th></tr>
<tr><td>9:00
–
10:00
am</td><td>Arrival</td><td>Keynote
Zhou-Feng Chen
“How do you feel: molecular and neural mechanisms of pleasant touch sensation”
Chair:
Francis McGlone</td><td>Keynote
Yoel Fink
“How sophisticated could a fiber be?”
Chair:
Annett Schirmer</td></tr>
<tr><td>10:00
–
11:00
am</td><td>Welcome
10:00–10:30 am
Talk Session 1
10:30–11:15 am
Chair:
Francis McGlone</td><td>Talk Session 2
Chair:
India Morrison</td><td>Talk Session 4
Chair:
Rochelle Ackerley</td></tr>
<tr><td>11:00
am
–
1:00
pm</td><td>Coffee break
11:15–11:30 am
Talk session 1 (continued)
11:30 am –1:00 pm
Chair:
Francis McGlone</td><td>Coffee break
11:00–11:15 am
Symposium 2
11:15 am -12:45 pm
“Social touch and mental health: stress-buffering effects and neurocognitive mechanisms”
Touch through art
Neoza Goffin
12:45–1:00 pm</td><td>Coffee break
11:00–11:15 am
Symposium 3
11:15-12:45
“New frontiers and future considerations for digital social touch”
Lunch
12:45 am –1:45 pm</td></tr>
<tr><td>1:00
–
2:00
pm</td><td>Lunch</td><td>Lunch</td><td></td></tr>
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<table>
<tr><th></th><th>Mon, June 9</th><th>Tue, June 10</th><th>Wed, June 11</th></tr>
<tr><td>2:00 – 3:00 pm</td><td>Keynote
Patrick Haggard
“The multiple aspects of self-touch”
Chair:
Ilona Croy</td><td>Keynote
Uta Sailer
“The Purpose and Efficacy of Touch: Exploring Goals and Determinants in Human Interaction”
Chair:
Rochelle Ackerley</td><td>Data Blitz Session
1:45-3:00 pm

Chair:
Rochelle Ackerley and Annett Schirmer</td></tr>
<tr><td rowspan="3">3:00 – 5:00 pm</td><td>Coffee break
3:00–3:30 pm</td><td>Talk Session 3
3:00-4:00 pm
Chair:
Annett Schirmer</td><td rowspan="2">Awards & Closing Remarks
3:00–3:30 pm</td></tr>
<tr><td rowspan="2">Symposium 1
3:30-5:00 pm
“Affective touch and sensorimotor processing”</td><td>Coffee break
4:00-4:30 pm</td></tr>
<tr><td rowspan="2">Meet the editor
4:30-5:30 pm
Samantha Antusch
Publishing in Nature Human Behaviour and the Nature Portfolio</td><td>Departure</td></tr>
<tr><td rowspan="2">5:00 – 7:00 pm</td><td>Break
5:00–5:15 pm</td><td rowspan="2"></td></tr>
<tr><td>Poster session 1
5:15–7:00 pm</td><td>Break
5:30–5:45 pm</td></tr>
<tr><td>7:00 pm</td><td>Dinner (Catering)</td><td>Poster session 2
5:45–7:30 pm</td><td></td></tr>
<tr><td></td><td></td><td>Dinner (Catering)
7:45 pm</td><td></td></tr>
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KEYNOTES

Prof. Patrick Haggard

University College London

I have two major research themes. The first is the cognitive neuroscience of voluntary action. Experiments in this theme attempt to link the subjective experience of intending and performing manual actions to the brain processes that occur before and after actual movement. The second research theme is the representation of one's own body. How does the brain create and maintain a represention of one's own body as a physical object? How is this representation influenced by current sensory inputs, such as touch and pain? How do such body representations contribute to a sense of self? These questions are addressed both in perceptual experiments, and in measures of brain activity elicited when subjects refer to a cognitive representation of the body.

Monday 09 Jun 2025 | 2:00–3:00 pm
Chair: Ilona Croy

The multiple aspects of self-touch

Our own body is the first object that we know, and we know it through a process of self-touch that begins long before birth. One body part touches another almost constantly. Sometimes, such self-touch is incidental (sitting with legs crossed), sometimes it is habitual or compulsive (face-touching, hair-pulling), sometimes it is clearly goal-directed and voluntary. Self-touch allows us to discover ourselves as an active subject, but also as a physical, space-occupying object like other objects. By active control of movement, one can explore and regulate one's tactile sensations. The resulting integration of movement and tactile signals is thought to be an important enabler of a coherent self-consciousness. Despite these central roles of self-touch, experimental studies are rare – perhaps because it is difficult to intervene in the direct relation between movement and touch. We have developed a novel way of studying a laboratory analogue of self-touch by placing two haptic robots in a leader:follower configuration. The participant moves one robot with the right hand to synchronously stroke their left forearm with the other robot. By varying the gain of the spatial coupling between the robots, we have quantified the contributions of motor and tactile signals to spatial awareness of one's own body. We have further shown that the act of stroking self-touch reaffirms and re-establishes a level of bodily self-awareness that can counteract disturbances of bodily awareness, such as those caused by altered visual input. Self-touch thus appears to be a key enabler of self-representation and self-awareness. These sensorimotor perspectives have important impacts for psychological functioning generally, and perhaps for mental health.

Dr. Zhou-Feng Chen

Shenzhen Medical Academy of Research and Translation, China

Dr. Chen has made a series of seminal contributions to our understanding of molecular and neural mechanisms involved in somatosensory transmission, including sensations such as itch and pleasant touch, from the skin to the brain. A leading pioneer in itch research, Dr. Chen went on to successfully identify the specific neuropeptide and spinal circuit responsible for pleasant touch. In recent years, he led the development of new behavioral assays to study instinctive social behaviors, notably contagious itching and social grooming. His research has radically transformed our view of how somatosensory modalities are encoded by neuropeptide signaling.

Tuesday 10 Jun 2025 | 9:00–10:00 am
Chair: Francis McGlone

How do you feel: Molecular and neural mechanisms of pleasant touch sensation

Pleasant touch, manifesting in actions like hugging, embracing, and grooming, is fundamental to the well-being of social animals. However, it remains one of the least understood of somatosensory modalities. In this talk, I will explain the organizing principle by which pleasant touch sensation is encoded and distinguished from sensations with negative valence such as itch and pain. Our study indicates that the neuropeptide prokineticin (PROK2) in sensory neurons and a subset of the spinal interneurons defined by PROK2 receptor expression constitute a labeled line that encodes and conveys pleasant touch information. PROK2 mutant mice fail to engage in social grooming/licking, a primary form of affective social touch in rodents, resulting in anxiety and depressive-like behaviors. These mutant mice provide a unique animal model for exploring the mechanisms underlying the development of depressive-like behavior. I will further discuss how pain may paradoxically evoke pleasant sensations. Such crosstalk between sensory modalities significantly enhances our sensory, emotional, perceptual, and behavioral capabilities, which could be leveraged therapeutically to improve human health and well-being.

Prof. Uta Sailer

University of Oslo, Norway

My research focus is on the experience, processing and effects of rewards, i.e. events that produce a pleasant or positive affective experience. This includes social interactions and sensory stimuli. In particular, I investigate processes related to pleasant odours and touch, and the factors that underlie and affect experienced pleasantness. To unravel these mechanisms, we use self-report, psychophysical methods, peripheral physiological measures, endocrine measures and fMRI.

Tuesday 10 Jun 2025 | 2:00–3:00 pm
Chair: Rochelle Ackerley

The purpose and efficacy of touch: Exploring goals and determinants in human interaction

Our Touch plays a fundamental role in human interaction, functioning as a sophisticated signaling system that shapes both immediate responses and long-term relationships. This talk examines touch through the lens of goal direction – the conscious and unconscious objectives we aim to achieve through tactile interaction.
The presentation analyses some primary domains of touch effects: emotional state modulation, behavioral adaptation, and social bond formation. I examine how touch influences pleasantness and positive affect, with particular attention to mediating variables, e.g. variety. The impact of touch, for example regarding stress reduction, is discussed within the framework of ecological validity and partner dynamics. Throughout the talk I draw on concepts from different fields such as psychology, sociology and biology. This integrated approach provides insights into how touch achieves its varied purposes in human interaction.

Prof. Yoel Fink

Massachusetts Institute of Technology, USA

Yoel Fink's research interests are in the theory, design, fabrication, and characterization of multimaterial, multifunctional fibers and fiber assemblies. Fibers are among the earliest forms of human expression, yet have remained unchanged from ancient to modern times. Professor Fink's research group focuses on extending the frontiers of fiber materials from optical transmission to encompass electronic, optoelectronic, and even acoustic properties. What makes these fibers unique is the combination of a multiplicity of disparate materials arranged in elaborate geometries with features down to 10 nanometers. Two complementary approaches toward realizing sophisticated functions are used: on the single-fiber level, the integration of a multiplicity of functional components into one fiber, and on the multiple-fiber level, the assembly of large-scale fiber arrays and fabrics. Professor Fink's multimaterial fibers offer unprecedented control over material properties and function on length scales spanning the nanometer to kilometer range.

Wednesday 11 Jun 2025 | 9:00–10:00 am
Chair: Annett Schirmer

How sophisticated could a fiber be?

Fabrics cover a truly valuable tract of real estate – the surface of our bodies. Exposed to troves of data, important insights would be revealed if only fabrics could compute: sense, store, analyze, infer, alert, and act while retaining their aesthetics, comfort and resilience. My talk will focus on the development of a new class of computers, fiber-computers and discuss prospects for the transformation of fabrics into sophisticated computing and networked environments to deliver new insights and provide added value to humans.

SYMPOSIA

Monday, June 9 | 3:30–5:00 pm

Symposium 1: Affective touch and sensorimotor processing

ID	Title	Speaker
24	Modulation of the post-auricular reflex in response to social and CT-optimal touch	Birgit Hasenack
98	Sensory attenuation of self-touch and -tickle: Evidence from psychophysics and neuroimaging	Anne Hoffmann
100	Corticospinal Excitability Reflects Motor Contributions to Vicarious Affective Touch	Valentina Cazzato
104	Do sensorimotor brain responses play a role in affective touch?	India Morrison

Tuesday, June 10 | 11:15 am–12:45 pm

Symposium 2: Social touch and mental health: stress-buffering effects and neurocognitive mechanisms

ID	Title	Speaker
10	Hugging it out: Complex social touch and how it affects stress and wellbeing	Sebastian Ocklenburg
14	Processing of social touch in humans: a clinical and neuropharmacological account	Giorgia Silani
30	Schizophrenia's altered sense of self: studying multimethod self or social touch differences and interoception in patients and controls	Paula Salamone
43	Neural and Behavioral Patterns of Social Touch and the Association with Social Deficits	Danilo Postin

Wednesday, June 11 | 11:15 am–12:45 pm

Symposium 3: New frontiers and future considerations for digital social touch

ID	Title	Speaker
102	Avatar mediated social touch	Jan van Erp
103	Bridging the Distance: Exploring the Neurophysiological and Behavioural Markers of Social Connection in Pseudo-haptic VR	Irene Valori
105	The place of the 'social' in 'mediated social touch': devices and robots that touch back	Mark Paterson
106	Digital social touch technology as fundamentally interactive	Gijs Huisman
107	Creating Dynamic Social Robots that Feel Both Touch and Emotion	Rachael Burns

TALK SESSION

Monday, June 9 | 10:30–11:15 am & 11:30 am –1:00 pm

Talk session 1 | Chair: Francis McGlone

ID	Title	Speaker
5	A new model for touch detection in the Pacinian corpuscle	Slav Bagriantsev
27	The Self Beyond the Brain: Self-Other Distinction of Touch in the Spinal Cord	Reinoud Kaldewaij
88	Touch Medicine: Innovative Approaches and Clinical Applications	Michaela Arnold
67	Somatosensory Event-Related Potentials: from Simple to Complex and Social Tactile Stimulations	Claire Wardak
84	Exploring the interplay between texture and touch velocity on tactile pleasantness	Rochelle Ackerley

Tuesday, June 10 | 10:00–11:00 am

Talk session 2 | Chair: India Morrison

ID	Title	Speaker
65	From Hugs to Happiness: Associations of Partner Touch in a Large-Scale Representative Survey	Yvonne Friedrich
77	The Language of Touch: Refining Linguistic Descriptors of Social Touch	Melina-Elena Moutsia
93	Effect of C-LTMR Targeted Touch on Stress and Gut Microbiome Diversity	Francis McGlone

Tuesday, June 10 | 3:00–4:00 pm

Talk session 3 | Chair: Annett Schirmer

ID	Title	Speaker
4	When Humans Touch Robots: Decoding Emotional Tactile Communication in Human-Robot Interaction	Martina Giancane
56	A Pleasure that Lasts: EEG Insights into the Habituation to Prolonged Gentle Touch	Xiaoqin Cheng
113	Hands-on Compassion: How Social Touch Nurtures Kindness and Wellbeing	Ilona Croy

Wednesday, June 11 | 10:00–11:00 am

Talk session 4 | Chair: Rochelle Ackerley

ID	Title	Speaker
18	The Impact of Sexual Trauma on Social Touch in Daily Life: Insights from Ecological Momentary Assessment	Leehe Peled-Avron
37	The ontogenesis of socio-affective touch perception: Assessing valence and inferring relationships from observed tactile interactions	Louise Kirsch
68	Mother-Infant Touch: Contact upon first touch is optimal for eliciting responses from C-tactile mechanosensitive afferents	Gregory Gerling & Yvonne Friedrich

DATA BLITZ SESSION

Wednesday, June 11 | 1:45–3:00 pm

Data blitz session

ID	Title	Speaker
7	The Role of Tactile Friction and Surface Roughness in Perceived Pleasantness	Sairam Saikumar
9	Interpersonal neural synchrony and emotional attunement during affective touch	Alessandra Piatti
44	Identifying the impact of subtle contact changes on recognition accuracy and emotional perception in human-to-human social touch	Gregory Gerling
51	Sleeping arrangements and maternal-infant night-time touch	Ingrid Boedker
71	Social touch within romantic relationships is uniquely protective against depression: evidence from the Touch Experiences and Attitudes Questionnaire (TEAQ)	Paula Trotter
72	Somatosensory activity during the perception of vicarious social touch: an EEG-ERP study	Hanan Ez-zahraoui
94	The Impact of Early Life Adversity on the Developing Social Brain: An EEG Study	Eva Dydenkova
95	Pleasant touch mediated by Aβ-afferents: a comparative study between brush strokes and vibrotactile apparent motions	Thanh-loan Le

POSTER SESSION

Monday, June 9 | 5:15–7:00 pm

Poster session 1

Poster	ID	Title	Presenter
1-1	50	Effect of osteopathic manipulative treatment on interoceptive accuracy and sensibility in healthy subjects and patients with chronic low back pain: A randomised controlled trial	Lucas Bohlen
1-2	12	Affective touch and face recognition: effects on memory and meta-cognitive performance	Madeleine Bregulla
1-3	28	Affective Empathy and CT-touch (AffECT): Does C-fiber activity modulate pain empathy? - A pilot study	Franziska Buchmann
1-4	90	Predictive insights through statistical and machine learning approaches to explore higher-level perceptions in touch	Rosa Bufo
1-5	61	Clinical Project of Psychophysical Integration SUBTLE TOUCH METHOD COMPLEMENTARY TO CALATONIA BURINI	Elaine Burini
1-6	3	Visuo-tactile aesthetic perception: A quantitative-qualitative study on material textures	Marella Campagna
1-7	76	Unraveling the Multilevel Modulation of C-Tactile Fibers on Somatosensory Input: A Study of Spinal Neural Activity	Artur Carreira
1-8	8	Exploring the unpleasantness and threat of spiky surfaces across sensory modalities	Müge Cavdan
1-9	89	Exploring the Role of Self-Applied Touch in Dance Movement Therapy: Insights from Motion Capture and Subjective Experiences	Valentina Cazzato
1-10	48	The Legacy of Children's Social Care: Exploring Variability in Touch Experiences and Attitudes.	Shaunna Devine
1-11	87	Active inference and touch-based therapeutic modalities: A Free Energy approach to trauma and persistent physical symptoms	Jorge Esteves

Poster	ID	Title	Presenter
1-12	97	Touch in and as medicine	Merle Fairhurst
1-13	60	A psychophysical investigation of touch perception on the torso	Sophia Faresse
1-14	62	Measuring differences in social touch: Development and validation of the short Touch Experiences and Attitudes Questionnaire (TEAQ-s)	Yvonne Friedrich
1-15	42	The main factors influencing the effect of mindfulness-based massages on the well-being of seniors	Joerg Henkel
1-16	64	Feeling connected: Both dog touch and gaze boost owner positive affect	Vanessa Kaufmann
1-17	55	The Soft Palm Robot – A Novel Approach to Deliver Gentle Stroking Touch	Jingjun Liu
1-18	80	How social and emotional experience shapes touch processing in the brain: insights from brain-hormone co-modulation	India Morrison
1-19	75	From Foerster and Zotterman to the question of the 'social': Revisiting histories of the neurobiology of affective touch	Mark Paterson
1-20	22	Decoding social touch: a multi-modal exploration of tactile perception, gender and culture	Helen Powell
1-21	39	"Is Angelina Jolie a 'warm' or a 'hot' girl? Your thoughts and feelings about it." A developmental perspective on slow and fast conducting nerve fibers as an integrated system	Anita Ribeiro
1-22	112	Communication through social touch in Autsim Spectrum Condition	Saito Sakaguchi
1-23	58	Keep it calm: Self-touch dampens arousal-related responses	Daniela Seyringer
1-25	31	Touch in Action - Qigong Sensory Treatment: Evidence and future directions for affective touch in autism	Sabine Baeyens
1-26	35	#6 Touch in Action: RECLAIMING TOUCH: A Mindful Education Approach to Social-Emotional Growth	Rita Griesche

Poster	ID	Title	Presenter
1-27	46	Part of Touch in Action. Touch dialogue with learning-disabled adults who are non-verbal	Lorraine Horton
1-28	20	Affective touch in Haptotherapy. (Part of Life Poster Project Touch in Action)	Eleonore ten Thij
1-29	15	Touch in Action - Haptotherapy for people with cancer: Qualitative research outcomes	Agnes van Swaay
1-30	38	Touch in Action - Calatonia® gentle touch modality in psychotherapy: The complexity of therapeutic touch	Anita Ribeiro
1-31	40	Part of the LIVE-POSTER project - Touch in Action: Dynamic Hapto-Relaxation: an affective-touch-based application as a tactile relaxation therapeutic method	Karl Devreese

Tuesday, June 10 | 5:45–7:30 pm

Poster session 2

Poster	ID	Title	Presenter
2-1	83	Differences in discriminative and affective touch perception between self- and other-touch and in modifying the skin	Rochelle Ackerley
2-2	47	What makes the un-huggable huggable?	Alexis Block
2-3	41	The physiological correlates of the social softness illusion	Olga Dal Monte
2-4	74	The Role of Affective Touch in Modulating Attention and Perceived Pleasantness During Temporal Summation of Second Pain	Márcia da-Silva
2-5	13	The Impact of Affective and Non-Affective Touch on Face Processing in 7-month-old Infants	Antonia Düfeld
2-6	36	Does self-touch change how we perceive emotions?	Anne Felsenheimer
2-7	66	Tracking touch with ecological momentary assessment: Age-related variations in partner touch frequency	Alina Knauerhase
2-8	45	Quantitative evaluation of human brushing physics in affective touch	Gregory Gerling
2-9	63	Scratchy, sticky, and universally icky? Tactile unpleasantness judgements are similar across four countries	Zhong Jian Chee
2-10	86	C-afferent density and perception of affective touch: a corneal confocal microscopy (CCM) study	Denys Kovalenko
2-11	108	Trauma and Affective Touch: Clinical Insights from Massage Therapy Practice	Anna Maria Mazzieri
2-12	78	Fast and glabrous: fast palm stroking trumps cortical selectivity for velocity and hairy-skin stimulation during pleasant touch	India Morrison
2-13	81	Modulation of Spinal Nociceptive Processing by C-Tactile Afferents: Evidence from the Nociceptive Flexion Reflex	Rita Pereira
2-14	6	Bidirectional Temporal Coupling Between Affective Touch and Lullaby Singing in Caregiving Behaviors	Benjamin Rieger

Poster	ID	Title	Presenter
2-15	57	Do touch giving and receiving feel differently?	Christian Schranz
2-16	99	Refining the Categorization of Interpersonal Touch Behaviors: Insights from a Cross-Cultural Qualitative Study	Agnieszka Sorokowska
2-17	96	The Sensitouch Study: A Prospective Exploration of the Development of Affective Touch Sensitivity in Early Life	Louise Staring
2-18	54	Anxiolytic Effects of Social Touch: Moderating Influences of Trauma and Social Interaction Experiences	Laura Stevens
2-19	29	Bridging the Distance: Exploring the Neurophysiological and Behavioural Markers of Social Connection in Pseudo-haptic VR	Irene Valori
2-20	91	Perception threshold of younger and older adults of squeezing pressure by a soft actuator on the arm	Judith Weda
2-21	25	Characterization of human tickling behavior and associated bodily maps of ticklishness	Ziliang Xiong
2-22	11	Sensitivity and vagal reactivity to CT-mediated Affective Touch in Mild Cognitive Impairment due to Alzheimer's Disease	Ludovica Zanini
2-23	33	LIVE-POSTER project - Touch in Action - Healing tactile sensitivities: Qigong Sensory Treatment and integration in autism	Sabine Baeyens
2-24	34	Touch in Action - The Application of Affective Touch in Body Psychotherapy	Susan Frazer
2-25	19	Part of the LIVE-POSTER project - Touch in Action: Subtle Touch developmental play for preschool children	Maria Irene Gonçalves
2-26	52	Part of the LIVE-POSTER project - TOUCH in ACTION Reclaiming Touch: Bridging Emotional and Social Gaps in Schools. Mindful-Touch Education ©	Rita Griesche

Poster	ID	Title	Presenter
2-27	21	Part of the LIVE-POSTER project by Touch in Action - Subtle Touch modality Fractional Decompression Touch technique: Lifting the heaviness to find the lightness of being	Anita Ribeiro
2-28	16	Part of the LIVE-POSTER Project: Experiencing being touched as a body-object or body-subject as applied in haptotherapy for people with cancer	Agnes van Swaay
2-29	115	Affective touching behaviors among couples	Edgardo Silva
2-30	116	Early holding experience is related to DNA methylation level of the serotonin transporter promoter region in adolescence	Krisztina Lakatos
2-31	71	Social touch within romantic relationships is uniquely protective against depression: evidence from the Touch Experiences and Attitudes Questionnaire (TEAQ)	Paula Trotter
2-32	114	Affectionate touch during transition to parenthood. The role of discrepancy between what we want and what we receive.	Krzysztof Goljanek

4

When Humans Touch Robots: Decoding Emotional Tactile Communication in Human-Robot Interaction

Martina Giancane[1], Mariangela Filosa[1], Emiliano Ricciardi[2], Calogero Maria Oddo[1]

[1]Sant'Anna School of Advanced Studies, Pisa, Italy. [2]IMT School for Advanced Studies Lucca, Lucca, Italy

Objective. This study aimed to understand how humans communicate emotions through touch and translate this knowledge to improve robotic sensing and emotional intelligence. The objectives were to (1) identify distinct tactile patterns associated with emotional communication, (2) investigate how robot anthropomorphism impacts tactile emotional interaction, and (3) enable robots to discriminate emotions conveyed through touch.
Methods. Participants conveyed nine emotions through touch to both anthropomorphic and non-anthropomorphic robotic devices. Each device was equipped with sensorized artificial skin mimicking human skin receptors to capture tactile signals and extract emotion-related patterns. These patterns were then used to train a classifier enabling the device to recognize tactile emotions. Behavioral observation, physiological data, and self-assessment were collected to analyze emotional communication characteristics.
Results. Different tactile behaviors produced unique activation patterns in the robotic skin sensors, establishing a tactile lexicon of emotional messages. Participants demonstrated greater effectiveness and confidence in communicating positive emotions, as supported by self-assessments and significant physiological responses. This aligned with classification performance, which achieved higher accuracy in recognizing positive emotions, with an overall accuracy of 72%, highly above the chance level (24.05%).
Discussion. The study emphasizes the importance of human-centered approaches in enhancing robotic emotional intelligence. The identified tactile patterns and impact of anthropomorphism provide crucial insights for developing more intuitive human-robot interfaces. By enabling robots to accurately interpret emotional touch, this research advances the development of more meaningful human-robot collaboration approaches.

5

A new model for touch detection in the Pacinian corpuscle

Slav Bagriantsev

Yale University, New Haven, USA

Pacinian corpuscles are specialized mechanoreceptor end-organs that detect transient touch and high-frequency vibration in the skin and viscera of many vertebrates. Corpuscles have a complex cellular organization, which includes a mechanoreceptor afferent surrounded by lamellar Schwann cells (LSCs) and several layers of outer core cells. How these components contribute to the sensory tuning of Pacinian corpuscles is

unclear. Here, we used Focused Ion Beam Scanning Electron Microscopy (FIB-SEM) to determine the detailed 3D architecture of an entire Pacinian corpuscle, including all corpuscular components, and utilized electrophysiology to reveal the contribution of each component to touch detection.
In the prevailing textbook model, which is based on the seminal experiments performed in the 60s, the multilayered outer core of the Pacinian corpuscle serves as a mechanical filter that limits static and low- frequency stimuli from reaching the afferent terminal—the presumed sole site of touch detection in corpuscles. We show that, contrary to this model, the outer core is dispensable for the sensory tuning of Pacinian corpuscles to transient touch and high-frequency vibration; instead, these properties arise from the inner core. We show that LSCs express mechanically gated ion channels and form a gap junction-coupled syncytium around the afferent terminal. Furthermore, by acting as additional touch sensors, LSCs potentiate mechanosensitivity of the afferent terminal, which detects touch via fast inactivating ion channels.
We present a new model, in which the functional tuning of Pacinian corpuscles is enabled by an interplay between mechanosensitive LSCs and the afferent terminal in the inner core.

7

The Role of Tactile Friction and Surface Roughness in Perceived Pleasantness

Sairam Saikumar[1,2], Maja Fehlberg[1,2], Prof. Roland Bennewitz[1,2]

[1]INM-Leibniz Institute for New Materials, Saarbrücken, Germany. [2]Saarland University, Saarbrücken, Germany

Objective. To understand fingertip sliding friction on rough surfaces and its impact on affective sensations that arise from active touch.
Methods. We invited thirty participants to rate the perceived pleasantness in touch of seven randomly rough aluminium surfaces which had a wide distribution in roughness. The surfaces were explored in circular movements where the finger pad forces along the x-,y-, and z-axes were recorded.
Samples were presented in pairs and participants selected the more pleasant one in a forced- choice task. We also recorded the finger skin hydration and the skin elasticity.
Results. Friction follows a non-linear characteristic with increasing surface roughness: an initial decay due to reduction in the adhesive contribution and a subsequent increase resulting from skin deformation. Pleasantness judgements reveal that for rough aluminium surfaces, both friction and roughness contribute to the perceived pleasantness with their effects varying across two distinct roughness regimes.
Discussion. Klöcker et al. highlighted the role of fingertip friction in the perception of pleasantness for different materials1. Our findings confirm this relationship for a single material and propose a more comprehensive framework to better explain the interplay between friction and roughness in modelling pleasant touch experiences.

References:
[1] Klöcker, A.; Wiertlewski, M.; Theate, V.; Hayward, V.; Thonnard, J. L., Physical Factors Influencing Pleasant Touch during Tactile Exploration. PLoS One 2013, 8 (11), e79085.

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Interpersonal neural synchrony and emotional attunement during affective touch.

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Objective. The ability to recognise the emotions of others is necessary for individuals to form meaningful relationships in their lives. Previous studies provided insights into the contribution of touch to interpersonal relationships and non-verbal communication. It remains unknown how the communication of emotional states through touch contributes to behavioural and neural aspects of interindividual interaction. Here, we explored the role of interpersonal neural synchrony (INS) in communication via touch.
Methods. Fifty-eight participants, forming 29 pairs of individuals who had not previously met each other, performed a task in which the toucher conveyed an emotion (sadness, fear, or joy) to the touched solely through forearm touch. Midway through the experiment, participants switched roles. fNIRS data were recorded, and participants rated the emotions they recognised and their own emotional experiences.
Empathy was assessed using intraclass correlation coefficients between the ratings of toucher and touched: cognitive empathy reflected the accuracy of emotion recognition, while affective empathy captured shared emotional experiences.
Results. Haemodynamic response function (HRF) varied with emotion and was stronger during fear trials among participants with higher psychotic traits. INS was calculated using phase lag consistency in HRF components aligned with task frequency. Both INS and empathy increased over the course of the experiment. Cognitive empathy exceeded affective empathy overall, but only affective empathy correlated with INS. Affective empathy was linked to interoceptive awareness.
Discussion. These findings suggest that pairs of strangers can rapidly develop a communicative code for emotions through touch, with INS underpinning the shared emotional experience within each pair.

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Hugging it out: Complex social touch and how it affects stress and wellbeing

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Hugs are an important form of social-affective touch and benefit physical and mental well-being. However, despite their high relevance for everyday well-being, hugs are an under-researched form of social touch in behavioral neuroscience, and not much is known about hugging from both the neuroscientific and the behavioral perspectives. In my talk, I will present research findings from several published and currently progressing works on hugging. In particular, I will talk about left-right asymmetries during hugging and their relation to emotion, the effects of hugging on daily mood, loneliness, and the stress-buffering effects of social touch. In more recent ongoing projects, we have focused on the movement physiology during hugging and

its relation to psychological factors such as relationship status. For example, in one ongoing project, three-dimensional movement analyses of hugs in different emotional situations provoked by auditory instructions were conducted. Participants were either in romantic relationships or platonic friends. Videos of hugs were recorded using 14 video cameras and analyzed using Theia 3D software. From the raw motion data, various biomechanical parameters were computed using custom Python scripts. Results showed that especially the duration of the embrace was significantly different between individuals who were in a romantic relationship compared to platonic friends. Romantic partners embraced longer than platonic friends. Stronger negative emotions were associated with longer embraces. These findings show that biomechanical features of hugs obtained from markerless movement analyses could be a meaningful way to assess psychological correlates of complex social touch.

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Processing of social touch in humans: a clinical and neuropharmacological account

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Autism spectrum disorder (ASD) is a complex condition characterized by social atypicalities. According to one influential theory, ASD may entail dysfunctional processing of social rewards conducive to reduced motivation to approach and engage with social stimuli. Despite this theory, a recent metanalysis has indicated a generalized atypicality in reward processing, which also pervades non-social contexts. Here, we sought to elucidate the specificity of reward processing in ASD individuals and whether potential pharmacological interventions, tested in neurotypical individuals, maybe be beneficial in boosting processing of social stimuli (vs. non-social). To this end, in this talk a clinical investigation and a neuropharmacological study will be discussed. The former will present data from 25 ASD and 25 neurotypical individuals on anticipation and consumption of matched primary social (affiliative touch) and non-social (real food) stimuli combined with functional magnetic resonance imaging (fMRI) and electromyography (EMG) investigations. The latter will report the effect of the combined action of the opioidergic (opioid antagonist naltrexone - NAL) and the oxytocinergic (OXY) systems on the processing of the social and non-social reward during fMRI, in neurotypical humans, as recent evidence in monkeys documented that the such combined exogenous manipulation can lead to supralinear effects on social attention depends on above and beyond the action of each system alone. Results will be discussed in light of the clinical relevance of social touch in autism and the possibility to synergically target more than one system to improve responses to social stimuli

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The Impact of Sexual Trauma on Social Touch in Daily Life: Insights from Ecological Momentary Assessment

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Objective. This study aimed to investigate the effects of sexual trauma on social touch experiences and psychological states in daily life. Specifically, we used Ecological Momentary Assessment (EMA) to capture real-time social touch interactions and their associations with dissociation, anxiety, and mood. *Methods.* Forty-two women with a history of sexual trauma, but without PTSD, participated in a 7-day EMA protocol. Participants completed three surveys daily, reporting instances of social touch, its intensity, and pleasantness. Psychological states, including dissociation, anxiety, and mood, were assessed concurrently. Multilevel modeling and time-lagged analyses explored within-person fluctuations and between-person differences in psychological responses to social touch. *Results.* Participants reported an average of 1.2 social touch interactions daily, with significant variability in pleasantness ratings. Multilevel modeling revealed that less pleasant touch was associated with increased dissociation (β = -0.48, $p < 0.01$) and anxiety (β = -0.35, $p < 0.05$). Time-lagged analyses showed that negative touch experiences predicted subsequent increases in hyperarousal symptoms (β = -0.30, $p < 0.05$). These findings suggest that negative touch experiences exacerbate psychological distress, while instances of positive touch were infrequent in this population. *Discussion.* This study provides preliminary evidence that survivors of sexual trauma experience altered perceptions of social touch, with negative interactions contributing to psychological dysregulation. These findings emphasize the need for trauma- informed interventions to address social touch aversion and its psychological impacts. Future research should integrate neural and behavioral measures to deepen understanding of trauma's effects on social touch.

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Modulation of the post-auricular reflex in response to social and CT-optimal touch

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The pleasantness perception of CT-optimal touch is usually assessed with subjective and explicit measures. As these can be prone to biases, it is important to develop implicit measures as well. The vestigial post-auricular muscle reflex (PAR) might be a good candidate, given its sensitivity to pleasant visual and auditory stimuli. As such, we investigated if the PAR can also be modulated by CT-optimal touch. We additionally compared how the PAR responds to social and robotic touch and conducted control experiments to replicate the reflex's specific sensitivity to primary rewards. The sample consisted of 43 non-clinical participants. PAR responses were recorded while participants were touched by an experimenter and a robot, with speeds of 3 cm/s (CT-optimal touch) and 18 cm/s (CT non-optimal touch). After each trial, participants also subjectively rated the pleasantness of the touch. Although the results revealed that CT-optimal touch was subjectively perceived to be more pleasant than CT non-optimal touch, it did not result in potentiation of the PAR.

Interestingly, social touch was subjectively perceived to be more pleasant than robotic touch and also potentiated the PAR. Furthermore, the control experiments confirmed that the PAR is particularly modulated by primary (food, erotica), and not secondary (adventure, cuteness, monetary) rewards. While additional research is needed to further investigate the relation between the PAR and CT-optimal touch, the current results do already suggest that this reflex responds to the primary reward value of social touch.

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The Self Beyond the Brain: Self-Other Distinction of Touch in the Spinal Cord

Dr. Reinoud Kaldewaij[1,2,3], Adam Enmalm[1], Robin Kämpe[1,2], Dr. Paula Salamone[1], Dr. Juergen Finsterbusch[4], Dr. Håkan Olausson[1,2], Dr. Alexandra Tinnermann[4], Dr. Rebecca Boehme[1,2]

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Our ability to differentiate between self and non-self is crucial for establishing a coherent self-concept and successful social interaction. In the domain of social touch, the distinct processing of 'being touched' and 'touching oneself' are reflected in primary sensory brain areas, but also regions associated with social cognition and interoception. As early evidence suggests that these differences extent to the level of the spinal cord, this study aimed to investigate if spinal cord activity and connectivity is altered during self-touch compared to other-touch. During simultaneous functional MRI of the brain and spinal cord, participants touched their own left forearm (self-touch), touched an object (object-touch), or were touched on their left forearm by an experimenter (other-touch). Touching consisted of slow and gentle stroking movements typical for real-life social touch (i.e. C-tactile targeted touch). Brain activation patterns for self/other/object-touch replicated previous findings. In sample 1 (cervical level 5-7), clusters of activation in the spinal cord for self/other/object-touch reflected sensory and motor processing of the touching hand. In sample 2 (cervical level 4.5-6.5), an additional spinal cord activation cluster reflected attenuated processing for self- vs. other touch on the left forearm. Preliminary analyses indicate more negative connectivity between the motor cortex and both the dorsal horn of the spine and the contra-lateral insula during self-touch.
This study shows that self-other touch differentiation already occurs at the level of the spinal cord, a process that is likely implemented by top-down control from regions initiating the self-touch action.

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Schizophrenia's altered sense of self: studying multimethod self or social touch differences and interoception in patients and controls

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Schizophrenia is often characterized as a disorder of the self, with patients frequently misidentifying self-produced sensations to external sources (e.g., misattributing their own voice as alien). However, whether basic processes related to the establishment and maintenance of the bodily self are affected remain unclear. In this study, we used a multimodal, multi-method approach to investigate bodily self-processing. A total of 70 participants (35 schizophrenia patients, 35 controls) performed self-/other-touch-tasks and interoceptive assessments during functional MRI, somatosensory evoked potentials, and/or behavioral and psychophysical tests. Patients exhibited heightened neural activity (fMRI) to touch across all conditions, with increases in the right superior temporal gyrus during self-touch and in a right temporoparietal cluster during social touch (gentle stroking by another person). Electrophysiological recordings revealed altered tactile self-other distinction in patients to be present already at the spinal cord levels. Additionally, patients demonstrated interoceptive impairments, including reduced cortical interoceptive modulation in response to their own heartbeats, lower interoceptive accuracy (heartbeat detection task), and decreased interoceptive sensitivity (self-report). Our findings highlight sensory and self-related disturbances in schizophrenia. For the first time, we report alterations already at spinal cord level. These disturbances of basic bodily signals might underlie higher order aspects of the symptomatology in schizophrenia.

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The ontogenesis of socio-affective touch perception: Assessing valence and inferring relationships from observed tactile interactions.

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Social touch is a very powerful means of communication and is particularly effective in providing information about social dispositions and affiliative relationships. Children can discriminate tactile stimulation with key social properties, such as strokes at CT-optimal speed. Yet, the ontogenesis of social inferences based on observing socio-affective touch is largely unknown.
To fill this gap, 108 three to five year-old children (36/age-group) were tested on their capacity to draw inferences from observing tactile interactions between two individuals. More specifically, children were tested on three complementary tasks. Children rated the valence of a range of common socio-tactile behaviours (task 1). Children observed social touch varying in speed – CT- optimal touch, 6cm/s vs. CT-suboptimal touch, 18cm/s; and had to assess the valence of these observed tactile interactions (task 2); Finally, children had to infer affiliative relationships between two characters upon different tactile interactions (task 3). Overall, results showed that children as young as 3 years of age were able to appropriately rate the valence of common tactile interactions upon their observation (task 1), but also coherently distinguish tactile interactions based on their speed: rating CT-optimal touch as nicer than CT- suboptimal touch (task 2).

In contrast, only 5-year-olds succeeded in the inference task (task 3), suggesting a developmental dissociation between the ability to infer an affiliation relationship and the ability to assess the valence of observed tactile interactions, especially based on speed. The present study highlights the central role of actual but also vicarious touch in infants' socio-cognitive development.

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Neural and Behavioral Patterns of Social Touch and the Association with Social Deficits

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Even after successful treatment of psychotic symptoms, most patients with schizophrenia suffer from persistent impairments in cognitive, occupational, and social domains. These impairments hamper participation in everyday life and are often accompanied by increasing social isolation and loneliness. Subtle changes in social behaviors can already be observed in the prodromal phase of schizophrenia and play a crucial role in the chronic course. Patients increasingly lose contact with their social environment and are deprived of the health-promoting effects of interpersonal relationships, including romantic relationships and interpersonal touch. While previous studies have demonstrated behavioral deficits in social-cognitive domains in patients with schizophrenia, little is known about changes in the behavioral and neural correlates of social touch and their relationship to clinical outcomes. In this presentation, we report the results of a study investigating differences in the behavioral and neural correlates of social touch between patients with schizophrenia and an age- and gender-matched healthy control group. Task-based functional magnetic resonance imaging (fMRI) and behavioral assessments were used to examine different facets of social touch. In addition, a comprehensive set of clinical measures was used to relate behavioral and neural findings to psychopathology. Patients with schizophrenia exhibited a more negative attitude toward social touch. At the neural level, patients showed altered processing of touch, particularly in the dorsal striatum. Behavioral and neural abnormalities were associated with levels of social functioning. The results are discussed in light of recent developments in schizophrenia research, with a focus on their implications for future diagnostic and therapeutic approaches.

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Identifying the impact of subtle contact changes on recognition accuracy and emotional perception in human-to-human social touch

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We routinely communicate distinct social and emotional intent through subtle nuances in how we touch another person. Our emotional intent likewise influences our touch delivery, due to factors such as relationship status. We investigate how toucher deliverers subtly vary their contact attributes to express such

nuances in meaning. In experiments with couples and strangers, in which touchers deliver cued emotional messages to a receiver's forearm, contact interactions are quantified using a custom 3D tracking system, while soliciting a touch receiver's recognition accuracy and perceived emotional valence and arousal. Through statistical analyses, we identified that even when using the same touch gesture, toucher deliverers could still convey distinct social messages by varying the magnitudes of their skin-to-skin contact in subtle but significant ways. Besides improving receivers' recognition of cued messages, this subtle tuning also correlates with receivers' perception of underlying valence and arousal. Moreover, romantically involved couples perceive social touch as emotionally more pleasant and intense compared to the touch from strangers. Our analyses suggest that this discrepancy could be related to fine-tuning of the partner's contact, such as specific stroking velocities that preferentially activate C-tactile afferents, and the deployment of touch over longer contact durations and larger contact areas. We also found that relationship status has the least impact on contact delivery compared to other factors, such as touch gestures, emotional messages, and individual differences.

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Sleeping arrangements and maternal-infant night-time touch

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Objective. We aimed to investigate whether different infant sleeping arrangements (being in a sidecar cot, separate cot, or in the mother's bed) beget different types of touch. *Methods.* We performed a secondary analysis on video data collected at the Durham Infancy and Sleep Centre (DISC) using three ceiling-mounted infrared cameras and Noldus Observer software. Fourteen mothers and infants each provided between one and three nights of data, for a total of 19 observations. Using ethological observation, the middle six hours of each video was coded continuously for mother-infant touch, including stroking/rubbing/caressing/massaging, patting/tapping, and static touch; and for the infant's location. Durations of different behaviours were analysed in RStudio using multilevel modelling with dyad and night as random effects. *Results.* Infants who spent more time in the mother's bed received more static touch, while infants who spent more time in a sidecar cot or separate cot received more stroke/rub/caress/massage and patting/tapping touch from the mother. *Discussion.* Possibly, the passive static touch received by infants who bed-shared signalled the mother's presence before the infants could become aroused by separation. In contrast, infants who spent time separated from the mother in a sidecar or separate cot received less static touch and the mother may have engaged in more "compensatory" touch (gentle, active touch) to soothe them.

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A Pleasure that Lasts: EEG Insights into the Habituation to Prolonged Gentle Touch

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It is well established that gentle touch elicits pleasant sensations encoded by mechanoreceptors known as C-tactile afferents (CTs) that relay tactile input to specific sensory and socio-affective regions in the brain. Yet, how the brain's response evolves during prolonged gentle touch remains unclear. In this study, we addressed this question using pleasantness ratings and the electroencephalogram (EEG). Ninety participants were stroked on their left forearm using a soft brush controlled by a cable robot at velocities of 0.5, 3, or 18 cm/s for 60 minutes. Participants occasionally rated the pleasantness of a stroke. Trials were grouped into three trial bins representing the first, second, and final third of the experiment. We analyzed pleasantness ratings alongside brain responses, focusing on the sN400 – an event-related potential (ERP) that potentially reflects CT firing – and Rolandic power, which derives from EEG oscillations in the alpha and beta band that are sensitive to Aβ firing. We found that both pleasantness and sN400 showed an inverted u-shaped relationship with velocity and were consistent over trial bins. By contrast, Rolandic power decreased monotonically with increasing velocity pointing to enhanced cortical activation. Importantly, this effect interacted with trial bin in that it declined with repeated stimulation especially for the fastest stroking. Taken together, these findings point to the possibility that CT and Aβ somatosensory mechanisms respond differently to prolonged tactile stimulation. Moreover, they suggest that CT processes are relatively resistant to repeated stimulation, which would serve to reinforce extended physical contact.

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From Hugs to Happiness: Associations of Partner Touch in a Large-Scale Representative Survey

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Partner touch is a central component of romantic relationships. Studies have emphasized its role for dyadic stress reduction, relationship quality, and individual well-being. Despite its importance, basic information about partner touch is still limited. We lack a clear idea about how often partners touch each other and which individual and relationship factors influence this behavior.
Using data from the German Family Demographic Panel Study (FReDA), we analyzed self-reported touch frequency among 16,574 individuals in a romantic relationship, drawn from a nationally representative selection of 18- to 51-year-old adults in Germany. We explored the associations between partner touch frequency and 27 variables across five domains: sociodemographic data, personality and attitudes, (mental) health,

formal relationship characteristics, and indicators of relationship quality. The high number of cases allowed us to apply both traditional statistics and machine learning techniques.
Results revealed that most individuals kissed with their partner 21-50 times and hugged or held them 1-5 times in the past week. Significant bivariate associations with partner touch frequency were identified across all domains. Extreme gradient boosting (XGBoost) outperformed other supervised machine learning approaches and explained 34.0% of variance. Six single key predictors of higher partner touch frequency were found: greater relationship satisfaction, more positive communication, shorter relationship duration, having no children, living together, and being younger.
Our findings provide insights into potential determinants of affective touch, highlight its positive connotations in romantic relationships, as well as illustrate its variance in sociodemographic contexts.

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Somatosensory Event-Related Potentials: from Simple to Complex and Social Tactile Stimulations

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Objectives: Somatosensory Event-Related Potentials (SEPs) reflect the type of stimulation and of skin receptors activated. Middle-to-late components (from 50 to 300 ms) are observed following a short stimulation of mechanoreceptors, while ultra-late potentials (ULP, 1.4-3.1 s) are seen following a brushing stimulation activating C-tactile afferents. However, these responses have mainly been studied using automated stimulators preventing the exploration of response to human touch. The objective of this study is to explore the influence of real human touch on SEPs.
Methods. We compared SEPs evoked by human-performed stimulations either with direct human touch or object touch, and for two kinds of stimulations, tapping and caressing. The onset and duration of the stimulation were recorded by interrupting a light beam. For the tapping, we also used automated stimulation (tactor, Dancer Design). A total of 32 young adults were recorded with a 64-channels EEG system, stimulated by 1 out of 4 experimenters.
Results. For the tapping, latency and amplitude of three middle-to-late components - P50, N80 and P200 - were similar across the three kinds of stimulations (tactor, object, human). For the caress, a P300 was not affected by stimulation type, after controlling for stimulation duration. The ULP was larger for caressing with an object compared to a finger.
Discussion. We recorded reliable SEPs following human-performed stimulations. A specific effect of real human touch was observed only for long caress-like stimulations.

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Mother-Infant Touch: Contact upon first touch is optimal for eliciting responses from C-tactile

mechanosensitive afferents

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Prior works have articulated the importance of the first touch between mothers and their newborn infants. This has led to protocols to allow time immediately post-birth to afford such exchanges. However, the detailed nature of such interactions have been studied less. We have developed a semi-automated analysis pipeline to define and quantify the nature of holding, resting, and stroking interactions that tend to take place. In particular, we recorded 10-minute videos of first touch for 9 mother-infant dyads. Videos were recorded from the direction most readily available while allowing mothers to position their infant naturally. Then, we developed a machine learning pipeline using DeepLabCut in addition to custom designed touch analysis software, allowing an analyst to track the positions and movements of the mother's fingers relative to body regions of the infant. On the aggregate, the results indicated that mothers tended to stroke at velocities near 3 cm/s, which has been reported at being optimal to elicit firing from C-tactile mechanosensitive afferents. The contact duration of their sessions involved about ½ of the time resting the hand on the infant and ¼ of the time stroking.When engaged in a stroking interaction, they tended to touch the head/face of the infant, and to a lesser degree on the arm and torso. At the level of interaction between individual mothers and infants, we saw variance in terms of direct skin contact, versus that through a blanket, as well as amount of time devoted to touching distinct anatomical parts of the baby.

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Social touch within romantic relationships is uniquely protective against depression: evidence from the Touch Experiences and Attitudes Questionnaire (TEAQ)

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Background: stressful life events, compounded by a lack of social support, are a key risk factor for depression. Additionally, childhood trauma doubles the risk of depression in adulthood. This study investigated whether a lack of social touch uniquely contributes to depression, after accounting for known circumstantial factors associated with depression: negative life events, childhood adversity and a lack of social support.
Methods: online questionnaires were completed by 1308 participants, including the Touch Experiences and Attitudes Questionnaire (TEAQ), together with questionnaires measuring adverse life events, lack of social support and childhood adversity, as well as depressive symptoms and history. Results were analysed using correlational and regression analyses on current depressive symptoms and previous history of depression in currently well participants.
Results: lack of social touch, particularly within romantic relationships (TEAQ current intimate touch subscale), was identified as uniquely predictive of depression, after accounting for the

effect of negative life events, social support and childhood adversity. Additionally, after accounting for the effects of childhood adversity, positive experiences of childhood touch (TEAQ Childhood Touch subscale), had a significant influence on previous vs no history of depression in those with no current symptoms.
Conclusions: this study highlights the unique role of social touch in mitigating against depression, particularly within romantic relationships and during childhood. This underscores the profound emotional buffering effect of romantic tactile bonds, particularly in the face of adversity, which surpasses the benefits of broader social support networks. Additionally, it highlights the therapeutic potential of social touch interventions to alleviate depression.

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Somatosensory activity during the perception of vicarious social touch: an EEG-ERP study

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When observing someone else receiving a hug, we can extract meaningful information which helps us navigate social interactions. To support that ability, neuroimaging studies have highlighted an overlap in the brain regions activated during the observation and the physical experience of touch, especially in the somatosensory cortex. In the present study, we aimed to investigate the neural underpinning of social touch observation and to understand how individual differences impact neural responses to social touch observation.
To this aim, we designed an ERP-EEG study to be tested in 45 neurotypical young adults (aged18-40), combining tactile stimulations and picture observation to isolate somatosensory activity from concomitant visual activity. A pre-validated set of pictures was used, including a social touch condition depicting positive touch gestures and two control conditions: a social no-touch condition, and a non-social touch condition. Additionally, we measured participants' levels of empathy, loneliness, touch experience and attitude through questionnaires.
We hypothesised that the amplitude of somatosensory evoked potentials (SEPs) will be greater in the social touch condition compared to control conditions; and that individual differences will mediate the SEPs' amplitude during the observation of social touch. Preliminary results (n=12) suggest a significant difference between the stimulus conditions in the Late Positive Complex, which is involved in socio-emotional perception. Further investigations with a full sample are underway to draw firmer conclusions. Altogether, this study will help us understand whether we mirror others' sensations on a sensory and/or on a higher level, and how individual differences shape neural responses.

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The Language of Touch: Refining Linguistic Descriptors of Social Touch

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The subjective experience of social touch is often complex and multidimensional, requiring valid linguistic descriptors to capture its full perceptual range. In 2011, Guest et al. developed a list of sensory and emotional adjectives to describe tactile experiences – the so-called touch perception task (TPT). However, the TPT has only been validated for non-human object touch, leaving its applicability to social touch unexplored. We aimed to evaluate the original list of Guest et al. in an interpersonal setting and adapt it to the social context. We therefore conducted two studies.
In study 1, n = 214 participants provided free-response adjectives for positive and negative touch experiences. These adjectives were compared to the original list, so that suitable adjectives could be identified to expand the TPT for interpersonal contexts. In study 2, we used an adaptation of the Hertenstein paradigm (2006) to create interpersonal touch experiences. 74 participants, acting both as touch givers and receivers, conveyed emotions through touch and performed different touch types. To test the validity of the TPT for social touch, participants rated their experience of the received touches using the original TPT, supplemented by the newly identified adjectives from study 1.
Results highlight the centrality of emotional adjectives and the reduced relevance of some sensory adjectives for social touch. Exploratory factor analyses suggested five key dimensions: positive affect, wetness, negative affect, intensity, and arousal. We propose a revised list of descriptors, offering a possible tool for studying interpersonal touch.

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Exploring the interplay between texture and touch velocity on tactile pleasantness

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Much research has focused on the relationship between stroking velocity and tactile pleasantness, finding that pleasantness follows an inverted U-shaped curve, with very slow and very fast velocities perceived as less pleasant. The vast majority of studies have used soft brushes and few velocities, leaving gaps in our understanding. We aimed to expand this by examining pleasantness ratings across a wider range of velocities (19 velocities, between 0.2-29 cm/s) and different textures (soft brush, hard brush, satin, linen). 26 participants were stroked on their forearm using a rotary tactile stimulator over these conditions, rating the pleasantness. We used segmental regression of the ratings with a break at 1 cm/s for fitting the data. Results showed that slower velocities were always less pleasant, but that faster velocities elicited high pleasantness. Rougher textures were rated as less pleasant compared to smoother ones, where the shapes of the curves were similar, apart from the hard brush's curve that was flat showing little

change in pleasantness over stroking velocities. We also found that rating variability was higher for slower velocities up to around 5 cm/s, than the faster ones. These findings refine our understanding of affective touch, highlighting that tactile pleasantness is highly influenced by stroking velocity and texture, but that there is an interaction between these. Our study adds to previous work on the relationship between stroking velocity and pleasantness, showing that both ends of the inverted U-shaped curve are not necessarily equivalent and that fast stroking can be pleasant.

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Touch Medicine: Innovative Approaches and Clinical Applications

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The clinical picture of depressive disorders is characterized by a plethora of somatic symptoms, psychomotor retardation, and, particularly, anhedonia. The number of patients with residual symptoms or treatment resistance is high. Touch is the basic communication among humans and animals. Its application professionally in the form of, e.g., psychoactive massage therapy, has been shown in the past to reduce the somatic and mental symptoms of depression and anxiety. Here, we investigated the effects of a specially developed affect-regulating massage therapy (ARMT) vs. individual treatment with a standardized relaxation procedure, progressive muscle relaxation (PMR), in 57 outpatients with depression. Patients were given one ARMT or PMR session weekly over 4 weeks. Changes in somatic and cognitive symptoms were assessed by standard psychiatric instruments (Hamilton Depression Scale (HAMD) and the Bech-Rafaelsen-Melancholia-Scale (BRMS)) as well as a visual analogue scale. Furthermore, oral statements from all participants were obtained in semi-structured interviews. The findings show clear and statistically significant superiority of ARMT over PMR. The results might be interpreted within various models. The concept of interoception, as well as the principles of body psychotherapy and phenomenological aspects, offers cues for understanding the mechanisms involved. Within a neurobiological context, the significance of C-tactile afferents activated by special touch techniques and humoral changes such as increased oxytocin levels open additional ways of interpreting our findings.

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Effect of C-LTMR Targeted Touch on Stress and Gut Microbiome Diversity.

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Introduction. Chronic stress causes many adverse changes in the gut and the brain

such as increased release of glucocorticoids and widespread inflammation. Imbalance in the gut microbiome leads to gut microbiota contributing to intestinal permeability allowing bacteria to cross the intestinal mucosa, accessing both immune cells and neuronal cells of the enteric nervous system. Stress decreases gut bacteria diversity - Affiliative tactile interactions buffer social mammals against neurobiological and behavioural effects of stress. Here we ask 'does C-LTMR directed touch impact on diversity of the gut microbiome?'
Methods. Female Lister hooded rats stroked for 1-minute at the C-LTMR targeted velocity or non C-LTMR velocity, 18 times over 7 days. Anxiety scores measured; extraction for microbial DNA from fecal pellets; nanopore sequencing performed using 10 ng of extracted DNA from each sample.
Results. Slow stroking was associated with a significant reduction in anxiety-related behaviour; a significant increase in diversity and richness in the microbiome; significant increases and decreases in several specific genera of bacteria, many of which are known to have important roles in regulating inflammation and gut health.
Discussion. Anxiety and stress are linked to altered microbiome composition, with reduced diversity and richness, measures associated with poorer physical and mental health, obesity and inflammatory diseases. Results presented here are the first to suggest the existence of a Skin-Gut-Brain Axis where C-LTMR directed stimulation (gentle touch) could modify the gut microbiome, impacting positively on improving gut and brain health.

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The Impact of Early Life Adversity on the Developing Social Brain: An EEG Study

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*Introduction.*The importance of nurturing touch in early life resonates across the lifespan. A population of mechanosensitive nerves, c-tactile afferents (CTs), are hypothesised to be the neurobiological substrate largely responsible for the beneficial effects on neurodevelopment. However, their role at early stages of ontogenesis (and even in utero!) in the development of disorders similar to those described for autism spectrum conditions (ASC), is not yet fully known. Previous research from our lab has reported the adverse consequences of an early life spent in institutions, compared with family reared children, on cortisol [Nikolaeva et al., 2024] and here we study similar cohorts but this time using EEG to compare differences in neural oscillations between these groups within social touch processing networks [von Mohr et al., 2018].
Methods. EEG and ECG are recorded in 25 orphanage infants during rest, CT stimulation (~5 cm/sec) and non-CT-stimulation (~30 cm/sec). 10 infants (1.1±0.6 years) served as a control group. Standardized video recordings of the interaction were taken for assessment

using the ADBB.
Results/*Discussion*. A growing body of research is exposing the vital importance of the affective component of tactile stimulation, elucidating the endocrinological and neural mechanisms that are hypothesised to be influenced by CT stimulation. This study extends research into affective touch mechanism comparing brain EEG responses from infants reared in an affective touch rich environment with institutionalised infants where we have previously shown that implementing a peer-to-peer touch intervention has a positive impact of stress regulation as measured with cortisol.

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Pleasant touch mediated by Aβ-afferents: a comparative study between brush strokes and vibrotactile apparent motions

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Affective touch is crucial for social bonding. While the role of CT-afferents in the perceived pleasantness during gentle strokes has been extensively studied, the role of Aβ-afferents remains less clear. Our study aims to compare the perceived pleasantness of brush strokes, triggering both CT and Aβ-afferents, and strokes made of vibrotactile apparent motion that activates exclusively Aβ-afferents. The first experiment examined the impact of contrast bias on the pleasantness of 3 cm/s strokes by contrasting them to strokes with slower and faster velocities (0.5, 1, 10, and 30 cm/s). The second and third experiments assessed how visual stroke velocity during intrapersonal touch (1 and 10 cm/s) influenced pleasantness at different levels of incongruence. A congruence perception test was also conducted to determine whether individuals consciously perceive the visio-haptic incongruence in the stimuli. The data showed that the pleasantness of 3 cm/s strokes was stable despite contrast bias, independently of stroke type. Although vibrotactile and brush strokes followed a similar inverted U-shaped curve, brush strokes were more pleasant at higher velocities. Pleasantness of brush strokes remained constant regardless of incongruence, whereas vibrotactile strokes at 1 cm/s became more pleasant as visual speed increased. The results indicate that perceived incongruity does not impact pleasantness, suggesting instead an unconscious process. These findings suggest that Aβ-afferents also mediate pleasantness but that pleasantness of vibrotactile strokes rely more on velocity inference than by speed-driven activation of the receptors. This is significant for developing affective haptic devices in social domains.

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Sensory attenuation of self-touch and -tickle: Evidence from psychophysics and neuroimaging

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How do we distinguish self-touches (e.g.,

feeling our hand caressing our leg) from touches from external causes (e.g., feeling the touch of an insect on our leg) to generate the appropriate behavior? While this classification might seem trivial, it poses a demanding task for the brain given the massive amount of somatosensory information that needs processing at any given moment. Dominant motor control theories have suggested that cerebellar internal models predict the somatosensory reafference and attenuate, or even cancel, the perception of self-touches, thereby increasing the relative salience of externally generated touches. These predictive mechanisms have also been used to explain why our own touch is perceived as less ticklish compared to external stimulation. In this talk, I will provide a brief overview of our work on somatosensory attenuation, focusing on when these predictive processes are engaged, how they are implemented in the brain, and how they relate to tickle perception.

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Corticospinal Excitability Reflects Motor Contributions to Vicarious Affective Touch

Dr Niccolo' Butti[1], Dr Cosimo Urgesi[2,3], Dr Stergios Makris[4], Prof Francis McGlone[5,6], Prof Rosario Montirosso[1], Dr Valentina Cazzato[7,8]

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Interpersonal touch, particularly affective touch targeting CT fibres, plays a crucial role in social interactions. Research shows that observing others being touched activates cortical areas involved in direct tactile experiences. Additionally, observing interpersonal touch engages the motor system, suggesting an inner simulation of the observed movements. Given the social and affective relevance of CT-optimal touch, this study hypothesized that observing stroking touches—targeting or not targeting the CTs system—differentially influences motor resonance to vicarious touch.
To test this, we employed single-pulse transcranial magnetic stimulation (TMS) and recorded motor-evoked potentials (MEPs) while participants (n=28, 15 females, 13 males; age mean = 27.5 years, SD = 5.7) viewed video clips of interpersonal touch at varying stroking velocities (5 cm/s as CT-optimal stroking and 0 cm/s (static) and 30 cm/s (fast) as non-CT-optimal velocities). Touch was applied on the hand dorsum and on the palm. Furthermore, we explored the relationship between individual differences in touch experiences and attitudes, as well as in interoceptive awareness, and motor resonance to interpersonal touch.
Observing CT-optimal touch led to a

significant decrease in corticospinal excitability compared to non-CT-optimal velocities. This suppression may facilitate the observer's understanding of the touchee's emotional state during vicarious touch. Individuals with a greater reliance on bodily cues for emotional awareness demonstrated enhanced motor suppression for CT-optimal velocities relative to non-CT-optimal ones. These findings highlight the intricate interplay between motor and somatosensory systems in processing social touch and underscore the unique role of affective touch in human social interactions.

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Avatar mediated social touch

Prof. Dr. Jan van Erp

TNO, Soesterberg, Netherlands. University of Twente, Enschede, Netherlands

Social Touch Technologies offers the possibility to engage in social touch interaction over distance. This intersection of digital technologies and social touch provokes questions on how we experience social touch and what role touch can play in mediated social interactions. These timely, relevant and important questions are central to this symposium on "New frontiers and future considerations for digital social touch". In my contribution, I will focus on avatar mediated social touch and report on the theoretical background as well as several experiments done in our lab using for instance virtual agents, interactive stuffed bears and live-seized humanoid robots. I will explore the concepts of embodiment, telepresence and social presence (defined as "sense of being with another in a mediated environment") and how these psychological constructs can help to design tangible avatars. The examples show that there is more to Social Touch Technology than devices that stimulated the c-tactile afferents.

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Bridging the Distance: Exploring the Neurophysiological and Behavioural Markers of Social Connection in Pseudo-haptic VR

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Social touch is fundamental to fostering human connection, intimacy and well-being. Yet, with increasing social interactions occurring at a distance, new approaches are needed to bridge the physical gap. Embodied Telepresent Connection (ETC) is a VR experience where participants embody light particle avatars and interact through pseudo-haptics: visual and auditory cues to proximity and touch designed to create an illusionary feeling of co-presence and bodily contact (Desnoyers-Stewart et al., 2023). For instance, particles get warmer in color as users get closer and, when they touch, fireworks are emitted from the location of touch. Exploring whether pseudo-haptics

facilitate social connection, the present study investigates the subjective, behavioural and neurophysiological correlates of the ETC experience. Forty pairs of friends were immersed in the ETC with or without pseudo-haptics. Each pair was instructed to freely move or to touch the partner. We measured interpersonal synchrony across the neural (fNIRS), physiological (ECG), and behavioral (motion energy) scales, as well as self-reported levels of embodiment, engagement and co-presence, and observed tactile behaviours.
Preliminary results suggest that the experience with pseudo-haptics is rated higher in terms of body ownership, sense of agency, engagement and co-presence. We hypothesise pseudo-haptics also increase touch frequency, approaching behaviours, and interpersonal synchrony. This would support the potential use of pseudohaptics to create illusions of social touch, overcoming the technical hurdles of bringing touch into extended reality and remote social exchanges. Rather than simply replicating the haptic sensation of physical contact, this approach creates new forms of digital tactile communication.

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Do sensorimotor brain responses play a role in affective touch?

Dr India Morrison

Linköping University, Linköping, Sweden

Affective touch carries subjective valence, but its behavioral correlates remain less well understood. This talk addresses the question of whether sensorimotor processes in the brain play any role in affective touch, and if so, how. An initial step is to identify the relevant functional organization between peripheral afferent tactile inputs (via anterolateral tract and dorsal column) and efferent motor outputs (via the pyramidal tract). Cortical regions posterior and anterior to the central sulcus (S1 and M1) play central roles in discriminative touch functions and sensorimotor coordination of voluntary actions. Medial and lateral premotor regions play a role in action planning and selection, often on the basis of information that includes tactile encoding. Likewise, the cerebellum participates in cortical somatomotor networks, particularly via crus I and II. On the other hand, evidence from humans and nonhuman primates so far indicates that processing within the posterior insular and parietal opercular cortex shows selectivity for affective touch.
These regions have reciprocal connectivity with parietal somatosensory cortices. Yet it is unclear how processing in these regions and networks interfaces with those involved in producing behavior via intentional and motivated movement. Do affective and sensorimotor touch pathways converge, and if so, how and under what conditions? Another possibility is that affective touch does not influence muscle synergies in a direct manner, but that its predominant efferent influence is upon the autonomic nervous system. An outline of the relevant neuroanatomy and tentative conclusions will provide a firmer basis for research into sensorimotor processing in affective touch.

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The place of the 'social' in 'mediated social touch': devices and robots that touch back

Professor Mark Paterson

University of Pittsburgh, Pittsburgh, USA

For Huisman and Fairhurst symposium. 'New frontiers and future considerations for digital social touch'

The idea of 'Mediated Social Touch' continues to have currency in design, engineering and robotics. The idea extends existing haptics work on the engineering of the presence of another at a distance. Yet their explicit aspiration to "enhance feelings of social presence and emotional closeness" (Haans & Ijsselsteijn 2006) is something which designers and researchers have been working on for decades (e.g. Huisman 2017), and roboticists are now slowly waking up to. How is the *social* aspect of 'mediated social touch' actually being achieved? What neurophysiological mechanisms are involved, and how are the affective aspects being intentionally embraced in human- robot interaction? This talk will be illustrated with examples of past and present experiments in this area, from haptic interfaces, experiments in interaction design, and a more substantial case study of the possibilities of affective touch within human-robot interaction (HRI).

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Digital social touch technology as fundamentally interactive

Dr. Gijs Huisman

Delft University of Technology, Delft, Netherlands

Social and affective touch have been extensively studied from from the perspective of the receiver of touch. This has yielded valuable insights into passive touch perception, touch experiences, and their neuro-physiological underpinnings. These insights have also informed the design of technologies that stimulate the sense of touch. There are many examples of such haptic technologies that provide sophisticated ways of stimulate the sense of touch. However, actual social touch occurs in interaction, and the opportunities to engage in touch interactions are often lacking in digital social touch technologies. In this talk I will discuss, building on the enactive approach, how centering interactions in the study of social touch opens up new ways to conceive of designs of digital social touch technologies.

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Creating Dynamic Social Robots that Feel Both Touch and Emotion

Dr. Rachael Bevill Burns

University of Tennessee Knoxville, Knoxville, USA

Social touch, such as a hug or a poke on the shoulder, is an essential aspect of everyday interaction. Humans use social touch to gain attention, communicate needs, express emotions, and build social bonds. Despite its importance, touch sensing is very limited in most commercially available robots. By endowing robots with enhanced touch perception, one can unlock a myriad of new interaction possibilities. In this talk, I will present the Haptic Empathetic Robot Animal (HERA), a touch-perceptive, koala-like robot designed for children with autism. I will demonstrate the importance

of establishing design guidelines for robots based on one's target audience and use case, which we investigated through interviews with autism specialists. I will share our work on iteratively creating full-body tactile sensing for robots using low-cost, do-it- yourself (DIY) methods, which enables them to detect several types of affective touches. I will also introduce a mathematical approach which models long-term robot emotions in response to those perceived touches and is rooted in both engineering and classical psychology approaches.

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Hands-on Compassion: How Social Touch Nurtures Kindness and Wellbeing

Prof. Ilona Croy

Department of Psychology, Friedrich-Schiller-University, Jena, Germany

Because kindness promotes both physical and mental wellbeing it should be a public health priority. Yet, how to increase kindness so as to improve wellbeing remains unclear. Based on research linking both variables to social touch, we speculate that social touch could be relevant. Specifically, we hypothesize that social touch improves wellbeing mediated by touch benefits on kindness. A multi-national ecological momentary assessment (EMA) study will probe this possibility by assessing social touch, wellbeing, and kindness five times a day for 14 days (N>200). We will present first results from that study.

3

Visuo-tactile aesthetic perception: A quantitative-qualitative study on material textures

PhD candidate Marella campagna, Dr Alexander Pastukhov, Prof. Dr. Claus-Christian Carbon

University of Bamberg, Bamberg, Germany

In real-world interactions, material textures create a complex sensory interplay, primarily involving touch and vision. While recent research has explored material perception through visual and haptic systems, a clear understanding of the cognitive and affective processes in visuo-tactile aesthetics remains limited. This study investigates how texture interactions shape sensory, affective and aesthetic experiences using a multi-methodological approach.
Thirty right-handed participants with normal or corrected-to-normal vision engaged in a Touch Perception Task (TPT) with varied textures. A think-aloud protocol captured qualitative insights on affective responses during exploration, while self- reports detailed sensory, emotional experiences, personality traits, and need for touch. Eye-tracking assessed fixation and pupillary responses, alongside video analysis of hand movements, and facial expressions.
Our analysis revealed contrasting sensory and affective profiles among materials: Sandpaper K40, though rough, was surprisingly pleasant due to smoother particles and potential low-frequency vibrations, while K1200, despite a softer appearance, felt irritating due to its fine grain. Faux fur emerged as the most preferred, evoking comfort and safety. Hand movements deviated from traditional lateral assessment, suggesting an influence of cognitive, affective, and aesthetic factors.
This integrative approach, combining physiological and behavioural data, offers new insights into the cognitive-affective dynamics of visuo-tactile experience. The findings suggest that visual complexity, congruence between visual expectation and tactile experience, and texture properties like vibration significantly influence aesthetic judgments, expanding our understanding of sensory integration beyond isolated dimensions.

6

Bidirectional Temporal Coupling Between Affective Touch and Lullaby Singing in Caregiving Behaviors

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Objective. Affective touch and lullaby singing are universal caregiving behaviors essential for healthy development and emotional regulation. Both share a temporal dimension: affective touch is most effective at stroking velocities of 1-10 cm/s, activating C-tactile fibers, while lullabies are typically performed at slow tempos. In two online experiments, we investigate whether the type and tempo of touch influence the tempo of sung lullabies, and

conversely, whether the tempo and type of children's songs influence touch speed. *Methods.* In Experiment 1, participants watched videos depicting either optimal-speed and fast-speed affective stroking, and optimal-speed and fast-speed tapping. While viewing each video, participants were asked to sing a lullaby. In Experiment 2, participants listened to lullabies and playsongs at slow, medium, or fast speeds and were asked to stroke their smartphones screens imagining touching another human. *Results.* In Experiment 1, participants sang at slower tempos when viewing optimal-speed touch compared to fast-speed touch. Additionally, affective stroking videos led to slower singing tempos. Participants with children and males tended to sing at slower tempos. In Experiment 2, results indicate that song tempo influences touch speed, with slower songs leading to slower touch velocities. *Discussion.* Findings from both experiments suggest a bidirectional temporal coupling between affective touch and lullaby singing. This interplay supports the notion that these caregiving behaviors are interconnected along their temporal dimensions, potentially enhancing their effectiveness in emotional regulation. Understanding this relationship enriches our knowledge of multisensory integration in caregiving contexts and may inform interventions aimed at strengthening caregiver-infant bonding.

8

Exploring the unpleasantness and threat of spiky surfaces across sensory modalities

Dr Müge Cavdan, Prof. Dr. Knut Drewing

Justus Liebig University Giessen, Giessen, Germany

Humans tend to favor curved objects over sharp counterparts, as the latter are perceived as threatening. For instance, spheres are rated more pleasant than cubes and angular shapes when assessed visually and tactually (Etzi et al., 2012). While prior research has explored object preferences, it is often limited to specific shapes and forms. In this study, we investigated how various parameters of angular spiky shapes influence the unpleasantness of objects. We designed and 3D-printed 13 spiky surfaces, systematically varying the space between spikes, their length, and thickness. Participants evaluated the unpleasantness and threat-related qualities of 13 surfaces, presented under haptic, visuo-haptic, and visual exploration conditions. Using a custom setup with a load sensor, we measured the forces applied during haptic and visuo- haptic exploration. Each condition consisted of two different blocks: In the first block, participants rated unpleasantness after 4 seconds of exploration; in the second block, they rated threat-related qualities. Using a linear mixed model, we controlled for the forces individuals applied in the haptic and visuo-haptic conditions, as they could influence unpleasantness. The analysis identified key parameters relating to the extent of skin contact that influence the unpleasantness of the objects and revealed a positive correlation between threat and unpleasantness judgements. These results provide first insights into the processing of the unpleasantness across visual, haptic, and visuo-haptic modalities.

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Sensitivity and vagal reactivity to CT-mediated Affective Touch in Mild Cognitive Impairment due to Alzheimer's Disease

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Objective. C-tactile (CT) afferents preferentially activate in response to slow caress-like touch, evoking a diffuse pleasant sensation and promoting autonomic regulation. According to Braak's classic model, the neurodegenerative process in Alzheimer's Disease (AD) only affects somatosensory cortices in advanced disease stages; however, the processing of complex sensory stimuli, such as CT-mediated Affective Touch, may be impacted in earlier phases. The present study therefore aimed to assess the behavioral and psychophysiological response to CT-targeted touch in a group of biomarker-tested patients with Mild Cognitive Impairment (MCI) due to AD, compared to a group of age, sex, and education matched controls.
Methods. The preference for CT-optimal stimulations (3cm/s) over non-CT-optimal stimulations (30cm/s) was first assessed in both groups in terms of perceived pleasantness. The behavioral (i.e., perceived pleasantness) and psychophysiological (i.e., Heart Rate and Heart Rate Variability) responses to 16 minutes of continuous CT-targeted stimulations were then evaluated. All participants also underwent quantitative sensory testing for the screening of tactile sensitivity, tactile acuity, nociception, and interoception.
Results. Despite both groups rating CT-optimal stimulations as more pleasant than non-CT-optimal ones, MCI patients specifically exhibited an altered response to prolonged CT-targeted stimulations, characterized by a progressive reduction of their perceived pleasantness and by an unvaried Heart Rate Variability. No group-differences emerged in other somatosensory-related functions.
Discussion. A specific multi-level alteration of the pleasant and soothing features of CT-optimal touch was identified as a potential prodromal marker of AD, providing the first indications of how the CT system may degrade in conditions of pathological ageing.

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Affective touch and face recognition: effects on memory and meta- cognitive performance

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Objective. Sensory contexts such as odors or music strongly influence episodic memories. While social interactions often

involve tactile information, it remains unclear whether affective touch alters memory for faces. In this study, we investigated whether static and affective touch during encoding impact the recognition of face stimuli.
Methods. We recruited n = 57 healthy adults (40 women , mean age = 27.3±9.5 years,) who viewed neutral faces from the Oslo Face Database while receiving static touch, affective touch, or no touch. During the encoding phase, participants rated the attractiveness and trustworthiness of the faces. Recognition memory was assessed two days later, and participants additionally rated their confidence in their decisions.
Results. We plan to analyze the data using multilevel models. The primary outcome measure of memory performance will be *d-prime*, a metric that accounts for response bias. As a secondary outcome, meta-cognitive accuracy will be assessed using *meta d-prime*. Additionally, we will explore the effects of static and affective touch on the perceived attractiveness and trustworthiness of the faces.
Discussion. The findings from this study may offer novel insights into the role of sensory integration in the formation of episodic memories.

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The Impact of Affective and Non-Affective Touch on Face Processing in 7-month-old Infants

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Touch is one of the primary senses and means through which infants learn about the environment and themselves (Narvaez et al., 2019). It implies physical proximity and provides social signals (Carozza & Leong, 2021), which is particularly relevant for infants, who are entirely dependent on their caregiver and only learn to navigate their social environment. Furthermore, also in infants, C- tactile afferents are of special interest, as they encode gentle, dynamic touch signals (Ackerley, 2022). Hence, touch seems to be essential for early social development, yet we know little about how it affects social learning in other modalities.
The present study investigates how touch influences the neural processing of happy and fearful facial expressions in 7-month-old infants, focusing on the ERP components Nc, N290, and P400 while manipulating touch type and context. Thirty 7-month-old infants (± 2 weeks) will be tested at two independent EEG appointments within four weeks. At one appointment, infants will experience their mother's touch; at the other, a female experimenter's touch (stranger's touch). Furthermore, the infants will be exposed to two types of touch conditions - affective touch (CT-optimal) and non-affective touch (CT-suboptimal). During both appointments, infants are presented with pictures of emotional facial expressions while we record the EEG signal and measure the infants' heart rate.
This will allow us to differentiate between cognitive effects reflected in EEG responses and broader, system-wide effects on the arousal system. Our results will yield important insights into the influence of affective touch on emotional face processing in early development.

15

Touch in Action - Haptotherapy for people with cancer: Qualitative research outcomes

MSc Agnes van Swaay[1], Prof. Dr. Kris Vissers[1], Prof. Dr. Yvonne Engels[1], Dr. Marieke Groot[2]

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Objective: By combining haptotherapeutic affective touch and therapeutic conversation, haptotherapy has the potential to bridge the gap in mainstream oncological care, where the psychological impact of physical consequences of cancer seems to be largely overlooked. The aim of the present study was to gain profound understanding of haptotherapy for people with cancer.
Methods: In-depth interviews with patients with cancer and haptotherapists about their experiences, perceptions and opinions regarding haptotherapy. Inductive coding and thematic content analysis were used.
Results: Interviews with fourteen patients and nine haptotherapists were performed. Five themes were identified: (1) perceived problems of patients with cancer who consult a haptotherapist such as a severely disturbed relationship with the body, together with emotional and identity problems; (2) content of a session and therapy process, based on affective touch and therapeutic conversation; (3) what haptotherapy brings about in patients with cancer, notably a felt awareness of the loss of contact with - parts of - their bodies and of suppressed feelings and emotions; (4) the essence of haptotherapy, in particular touch as the connection between physical and emotional feeling; and (5) the role of the haptotherapist, especially their sensitivity, subtle observations and focus on the patient as a person.
Discussion: Haptotherapy can make an important contribution to the overall recovery of patients with cancer by restoration of both contact with and trust in the body, thus supporting the associated psychological processing. Further research should focus on outcome measures such as body perception and the degree of psychological processing.

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Part of the LIVE-POSTER Project: Experiencing being touched as a body- object or body-subject as applied in haptotherapy for people with cancer

MSc Agnes van Swaay

Radboud University Medical Center, Nijmegen, Netherlands

This live poster is related to the poster Affective touch in haptotherapy. Indeed, one of the applications of haptotherapy is in the counseling or (non-medical) treatment of people with cancer. Qualitative research outcomes show that haptotherapy can make an important contribution to the overall recovery of patients with cancer by restoration of both contact with and trust in the body, thus supporting the associated psychological processing. One of the prominent complaints of people with cancer concerns the objectifying way in which they are touched during medical examination and treatment. They feel treated as an object, which reinforces the disruption of their relationship to their

bodies. Haptotherapists therefore speak of 'body-object' as opposed to 'body-subject', which can be experienced through haptotherapeutic, affective touch. Patients report that this latter touch helps them tremendously to reconnect with and regain trust in their bodies and - so they say, for example - to find themselves again. In the live poster session, there are several touch options. One is to have participants feel the difference between these two described touches and explore what it does to them.

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Part of the LIVE-POSTER project - Touch in Action: Subtle Touch developmental play for preschool children

Psychologist Maria Irene Gonçalves

Instituto Sedes Sapientiae, São Paulo, Brazil

Since 1983, Dr. Pethö Sándor's Subtle Touch method (1969) has been effectively combined with movement-based techniques in educational projects at Casa Redonda (Brazil), a preschool for children aged two to six, founded by Maria Amelia Pereira. It is offered as prophylactic care to prevent developmental problems and enhance emotional regulation.
In subtle touch play, with the children's and their parents' permission, children receive a series of touches, in a passive state, usually in a prone or supine position. The touches are mostly very light on specific points of contact. Parents were also taught these techniques to apply to their children for improved emotional communication, mindful playtime, and bonding.
These playful touches are natural facilitators of child development. The sensory fibers activated during these sessions inform the central nervous system about the children's internal states and external environment. This process brings the children's attention to their inner sensations (interoceptive awareness), feelings, emotions, and thoughts associated with those experiences. Interoceptive awareness is the basis of sound emotional development and prevention of early anxiety related to bodily states (Price & Hooven, 2018).

Proposal to the vivo-poster: Demonstrate to participants a non-invasive sequence of touches to the spine, arms, and head: Vibratory touches are made to each spine vertebrae in an upward direction; 2) Sliding strokes over the arms; 3) gentle twist of each finger; 4) Finally, the therapist gently brushes the receiver's scalp with fingertips.

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Affective touch in Haptotherapy. (Part of the LIVE-POSTER project by Touch in Action)

Mrs. Eleonore ten Thij[1], Mrs. Francoise Wibbels-Pancras[2]

[1]Zin-tact Haptonomie, Enschede, Netherlands.
[2]Haptonomie Hengelo, Hengelo, Netherlands

In the Netherlands, a new therapeutic concept emerged in the fifties of the previous century: haptonomy. Theoretically, based on the work of Merleau-Ponty, and Terruwe, among others, Frans Veldman researched principles of touch and feeling phenomenologically, as a means to appeal to our bodies-as-subjects.
A specific form of person-, body- and

contact-oriented therapy developed, called 'Haptotherapy'. Its tools are therapeutic conversation, haptotherapeutic affective touch, and experiential exercises. Haptotherapeutic touch is a way of touching that is connective, committed, and respectful, in which the therapist makes the intention felt that the client is acknowledged, accepted, and appreciated. In general, the treatment contains some hapto-education, aawhere clients experience how they can access their own capacity to feel and how this impacts their basic muscular tone, arousal, breathing but also their feelings of inner security, sense of self-determination, and interaction with the other. Important tools in hapto-education are extended touch, and basic presence. Extended touch can help inviting clients to reciprocate the touch. Reciprocity is necessary in order to communicate affectively, and allow the positive effects of touch to develop fully. Research suggests that basic presence co-determines vitality and positive existential feelings.We will offer experience in both extended touch and basic presence.

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Part of the LIVE-POSTER project by Touch in Action - Subtle Touch modality Fractional Decompression Touch technique: Lifting the heaviness to find the lightness of being

Ph.D. Clinical Psychologist Anita Ribeiro

Calatonia International Training, Palm Coast, USA

Petho Sandor's Subtle Touch method is based on Jungian psychology, which views the psyche (mind) and soma (body) as a continuum, mutually influenced by internal and external events (Blanchard, 2019). The body's symptoms, sensations, and energy levels bring awareness of inner states. The mind produces verbal, metaphorical, imagetic, and expressive language to make meaning of inner and outer events. The mind has an embodied element (Johnson, 2017) informed by sensory systems. This embodiment becomes clear in metaphors. While literal language describes an explicit fact *("John disciplines his children"*), figurative language (*John is heavy-handed with his children*") adds implicit emotional and sensory undertones that resonate with listeners, they can physically and emotionally "feel" a heavy hand. Metaphorical speech activates the SSII cortex (Bretas et al., 2020), illustrating how discriminative and affective pathways (insula-encoded) become inseparable as child development unfolds. Many metaphors relate exclusively to touch/skin receptor functions (hot, cold, rough, vibrant, etc.). Touch therapies awaken emotional and cognitive processes associated with stimuli delivered, e.g., a light touch may be perceived as caring, rhythmic patting as enlivening, etc. We offer Fractional Decompression, a touch technique that starts with a relaxed hand weight that lightens up pressure during the receiver's nine full breaths. The touch is delivered to specific contact points: knees, shoulders, and chest. Synchronizing touch with the receiver's breath builds a non-invasive and reassuring contact. Lightening up the weight of hands may evoke physical, emotional, and mental integration related to experiences related to the "heavy-light" axis.

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Decoding social touch: a multi-modal exploration of tactile perception, gender and culture

Dr. Helen Powell[1], Dr. Jason He[1], Miss Khushika Magnani[3], Miss Ke Hu[1], Miss Lauren Barnes[1], Miss Ria Bessler[2], Dr. Vikram Chib[3], Dr. Nicolaas Puts[1]

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Social touch plays a vital role in human development and social bonding, yet the mechanisms underlying how social touch elicits pleasant or aversive responses remain unclear. Furthermore, the role of lower-level tactile sensitivity (i.e. the ability to detect or discriminate stimuli) in shaping these responses, as well as the impact of contextual factors, such as gender and cultural differences, are not fully understood.
Here, we investigated social touch pleasantness in 48 adults (26 from the UK; 18-38 years; 15 Female, 11 Male, and 22 from Singapore; 21-37 years; 13 Female, 9 Male) as well as 163 Singaporean children (14 years; 72 Female; 91 Male). Social touch preference was assessed using a novel, quantitative Social Touch Task, which presented images of dyadic social touch interactions involving different touch partners. Tactile perception was measured using vibrotactile psychophysics. Questionnaires on social touch were also assessed.
Across all cohorts, strong gender effects were observed, such that female participants rated touch from a friend or stranger of a different gender as less pleasant than males. Interestingly, adults with worse discrimination thresholds, and children with worse detection thresholds, had lower pleasantness ratings for social vs. non-social touch on the Social Touch Task.
These findings suggest a link between poorer tactile perceptual function and the emotional appraisal of social touch. Furthermore, while some cultural differences were observed between cohorts at the contextual level, perceptual contributions to social touch preference appeared to be conserved. These findings could have implications for neurodevelopmental conditions involving atypical social and sensory processing.

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Characterization of human tickling behavior and associated bodily maps of ticklishness

Ziliang Xiong[1], Konstantina Kilteni[1,2]

[1]Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, Netherlands. [2]Department of Neuroscience, Karolinska Institute, Stockholm, Sweden

Social touch is essential for navigating interpersonal interactions, integrating cognitive, motor, and somatosensory afferent processes. Among its various forms, tickling uniquely triggers laughter and bodily convulsions, typically seen in playful dyadic activities, such as between parents and their children. However, despite its seemingly trivial nature, tickle remains a widely underexplored human behavior. We do not know how tickle relates to tactile experiences, whether it is influenced by cultural or personality differences, and how ticklish sensations are represented on the human body's

topography. To address these questions, we performed an online study with 448 participants, aiming for a culturally diverse (149 Chinese, 150 Dutch, and 149 Greek) sample. Participants completed a survey about their experiences as a 'ticklee' and/or 'tickler' during their childhood and adulthood, as well as their opinions on tickling. Additionally, they completed a topographical body-coloring task to indicate body areas related to experiencing ticklish sensations. Our preliminary results revealed that being a 'ticklee' was more common in childhood than adulthood and associated with both pleasant and unpleasant sensations. In contrast, 'tickler' experiences were overall pleasant, indicating a change in perception depending on the behavioral role. Importantly, ticklish sensations were linked to a specific topography, with the neck, armpits, belly, and foot soles identified as the most ticklish areas. Crucially, no cultural differences were found in participants' experiences, opinions, or bodily topography, suggesting a consistent similarity across cultures. These findings provide the first comprehensive characterization of tickle behavior in humans, and indicate that tickling experiences are culturally universal.

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Characterization of human tickling behavior and associated bodily maps of ticklishness

Ziliang Xiong[1], Konstantina Kilteni[1,2]

[1]Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, Netherlands. [2]Department of Neuroscience, Karolinska Institute, Stockholm, Sweden

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behavior in humans, and indicate that tickling experiences are culturally universal.

28

Affective Empathy and CT-touch (AffECT): Does C-fiber activity modulate pain empathy? - A pilot study

Franziska Buchmann, Vivian Mohr, Prof. Dr. phil. Sarah Jessen, Prof. Dr. rer. nat. Ulrike M. Krämer

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Objective. C-tactile (CT) mechanoreceptors in hairy skin respond optimally to light, slow caresses. Previous research suggested CT-targeting touch may soothe pain. Here, we investigated whether CT-activating touch biases perception of others' pain.
Methods. In an empathy-for-pain task, a robotic device applied CT-optimal touch (3 cm/s, ~0.2 N) to the back of the left hand of 30 participants (26 female, mean age = 22.3 years) while they watched videos of target persons receiving electrotactile pain stimulation. Participants rated the targets' pain. As a control, CT-neutral touch was applied to the palm during the same task. We hypothesized lower accuracy in pain ratings for CT-optimal touch compared to CT-neutral touch.
Results. Half of the participants (n = 16) preferred CT-optimal over CT-neutral touch. Pain ratings between participants and targets were highly correlated (r > .60), but participants generally underestimated targets' pain. Robust mixed ANOVA revealed no interaction effect of CT-responsivity and touch on empathic accuracy (F(1, 17.8) = .73, p =.404, η^2_p = .039). A linear mixed effects model confirmed that CT-responsivity and touch did not explain variance in empathic accuracy in single trials. Greater liking of CT-optimal touch was associated with lower susceptibility to others' negative emotions (τ_b = -.33, p = .01).
Discussion. CT-optimal touch did not bias empathy behaviorally: participants maintained self-other distinction equally well in both conditions. However, the subjective pleasantness of CT-optimal touch may relate to emotion regulation and self- awareness. Further research is needed to validate the touch stimulation's psychological and physiological effects.

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Bridging the Distance: Exploring the Neurophysiological and Behavioural Markers of Social Connection in Pseudo-haptic VR

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Social touch is fundamental to fostering human connection, intimacy and well-being. Yet, with increasing social interactions occurring at a distance, new

approaches are needed to bridge the physical gap. Embodied Telepresent Connection (ETC) is a VR experience where participants embody light particle avatars and interact through pseudo-haptics: visual and auditory cues to proximity and touch designed to create an illusionary feeling of co-presence and bodily contact (Desnoyers-Stewart et al., 2023). For instance, particles get warmer in color as users get closer and, when they touch, fireworks are emitted from the location of touch.
Exploring whether pseudo-haptics facilitate social connection, the present study investigates the subjective, behavioural and neurophysiological correlates of the ETC experience. Forty pairs of friends were immersed in the ETC with or without pseudo-haptics. Each pair was instructed to freely move or to touch the partner. We measured interpersonal synchrony across the neural (fNIRS), physiological (ECG), and behavioral (motion energy) scales, as well as self-reported levels of embodiment, engagement and co-presence, and observed tactile behaviours.
Preliminary results suggest that the experience with pseudo-haptics is rated higher in terms of body ownership, sense of agency, engagement and co-presence. We hypothesise pseudo-haptics also increase touch frequency, approaching behaviours, and interpersonal synchrony. This would support the potential use of pseudohaptics to create illusions of social touch, overcoming the technical hurdles of bringing touch into extended reality and remote social exchanges. Rather than simply replicating the haptic sensation of physical contact, this approach creates new forms of digital tactile communication.

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Touch in Action - Qigong Sensory Treatment: Evidence and future directions for affective touch in autism

BA, EFA, LMT Sabine Baeyens
Make Children Better®, Antwerp, Belgium

Qigong Sensory Treatment (QST) is a parent-delivered massage protocol that has demonstrated effectiveness in reducing tactile abnormalities and enhancing developmental outcomes in children with autism. Over 17 years of research, including randomised controlled trials and observational studies, have shown significant improvements in sensory integration, self-regulation, and child-to-parent interactions. Notable outcomes include a 72% normalisation of tactile responses, a 49% improvement in self-regulation, and a 44% reduction in autism severity, with some children transitioning off the autism spectrum. Parents also report enhanced bonding and reduced stress, underscoring the holistic benefits of this intervention. While the efficacy of QST is well-established, the mechanisms underlying its success remain an area of active investigation. A study by Dr. Louisa Silva and colleagues reported a 50% reduction in C-tactile fibres in children with autism, suggesting a potential link between tactile impairment and developmental delays. CT fibres are known to respond optimally to slow, rhythmic touch, which may play a role in emotional and sensory integration. However, it is not yet confirmed whether QST directly stimulates CT fibres or operates through alternative pathways. This presentation will review the evidence supporting QST's effectiveness, explore its

implications for sensory processing and emotional regulation, and discuss avenues for future research into the mechanisms driving its success. By connecting practical outcomes with ongoing scientific inquiry, this talk aligns with the symposium's theme of integrating affective touch to deepen our understanding of the human experience.
RESEARCH: https://www.qsti.org/published-studies/
Video: https://www.youtube.com/watch?v=lXlBVBtWKlY

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LIVE-POSTER project - Touch in Action - Healing tactile sensitivities: Qigong Sensory Treatment and integration in autism

BA, EFA, LMT Sabine Baeyens
Make Children Better®, Antwerp, Belgium

Tactile challenges, including touch aversion, touch-seeking and defensiveness are common sensory processing differences among autistic individuals. While some find touch distressing or uncomfortable, others may actively seek it, often preferring deep pressure over light brushing. These sensitivities impact social interactions, daily routines, therapeutic engagement and developmental milestones, necessitating tailored interventions.
Rooted in Traditional Chinese Medicine (TCM), Qigong Sensory Treatment (QST) offers a holistic, individualised approach to addressing these challenges. QST combines rhythmic tapping, stroking and deep pressure techniques applied systematically across the body to engage sensory fibres, reconnect with the central nervous system and activate body meridians. This process reduces tactile defensiveness, restores sensory balance, promotes emotional regulation and overall well-being (improving sleep and appetite).
Research supports QST's effectiveness in addressing autistics' tactile differences. Dr. Silva(1) demonstrated that QST improves tactile processing and self-regulation, suggesting that tactile differences contribute to developmental delays and are treatable through QST. Preliminary studies(2) also indicate the involvement of C-tactile fibre loss in autism, underscoring the need for further research to explore these mechanisms and replicate findings.
Participants in this live poster presentation will have the opportunity to experience a 5- minute QST touch session, to evaluate their own touch sensitivity and explore the therapeutic potential of the method. By integrating Eastern principles with Western neuroscience, QST provides a promising, evidence-based pathway for addressing sensory differences in autism.

L.M.T.Silva et Al. (2015) Early Intervention with a ParentDelivered... AutismResearch&Treatment
Silva and Schalock, (2016), First Skin Biopsy Reports in Children... Journal of NeurologicalDisorders

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LIVE-POSTER project - Touch in Action - Healing tactile sensitivities: Qigong Sensory Treatment and integration in autism

MA Susan Frazer
UKCP Registered Body Psychotherapist

Body psychotherapists are in a position to translate what is being discovered about the activation of the C Tactile system in the laboratory to clinical practice. Body psychotherapy is a long term depth psychotherapy. Clients are seen weekly for many years. The use of touch is an inherent part of body psychotherapy. Within body psychotherapy there is a wealth of expertise related to touch, with well established practices and comprehensive ethical guidelines. Touch skills are cquired predominately through learning a psychophysiological form of massage, Biodynamic Massage. Biodynamic Massage, developed by Gerda Boyesen, a clinical psychologist working within the psychiatric system in Norway include a range of different methods, two of which are, slow gentle stroking and static holding. Adaptation of these methods to activate the C Tactile afferents are taught to students of body psychotherapy to be applied in clinical practice when appropriate. Affective touch can be beneficial for clients who have a history of touch deprivation, those who have difficulties with emotional regulation and interoception. It can also be used on areas of localised pain. The lightness of the strokes means it is suitable for the frail and elderly and those receiving palliative care. For the purpose of demonstration a routine has been developed adapting different methods of biodynamic massage. An electronic stethoscope will be used to monitor autonomic nervous system responses by listening to the sounds from the gut.

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LIVE-POSTER project - Touch in Action: RECLAIMING TOUCH: A Mindful Education Approach to Social-Emotional Growth

Rita Griesche

Mindful-Touch Education MTEd, Murcia, Spain

In our increasingly digitized world, touch seems to be fading from our daily lives. Yet, touch is not just a pleasant experience or a luxury. It's a necessity and plays a crucial role in how we grow, learn, form emotional bonds, and behave. Especially today's children often miss the vital impact of human touch. Mindful Touch Education (MTEd) addresses this gap by reframing touch as a necessary educational tool and tangible "language" with its vocabulary, grammar, and storytelling potential, fostering social-emotional learning, interpersonal connections, and a sense of belonging.

Our curriculum, rooted in the science of affective touch, mindfulness, and Shiatsu, emphasizes touch's reciprocity, distinguishing it as a uniquely powerful communication tool. Through experiential learning, MTEd explores how intentional touch modulates physiological responses in both giver and receiver, positioning touch as integral to peer interaction and personal growth.

Preliminary implementations in select schools have shown that embedding the language of touch into education positively affects students' emotional regulation, social engagement, and overall well-being. Qualitative feedback and initial quantitative measures indicate that incorporating mindful touch practices fosters compassionate classroom environments and contributes to a positive attitude to learning.
This presentation highlights MTEd's crucial role in bridging technological advancement and human connection. As

touch has often been avoided in education due to fears of abuse, MTEd reclaims its positive potential by teaching children the "language of touch" as a preventative toolbox. Further research is needed to ensure children remain safe and connected to what makes us human.

mindfultouch-education.com

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Does self-touch change how we perceive emotions?

Anne Felsenheimer[1,2], Prof. Sarah Garfinkel[2], Prof. Arno Villringer[1], Prof. Patrick Haggard[2]

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Objective. People often engage in self-touch (ST) when they are anxious, but it is unclear why. Consistent with theories of embodied simulation - which argue that we reactivate sensory experiences associated with an observed emotion in order to recognise it - being touched by others boosts fear recognition. However, similar effects of ST have not been tested empiricially. Therefore, the current study investigates whether ST can modulate the perception of fearful facial expressions in anxiety-inducing contexts.
Methods. Using a within-subjects design, we examined the effects of touch type (ST vs. unimanual control), anxiety induction (threat vs. safe), and emotion (fearful vs. happy faces) on emotion detection. Participants discriminated varying intensities of happy or fearful faces compared to their neutral counterparts. Applying a 'threat of scream' paradigm, blocks containing unpredictable screams were alternated with 'safe' blocks free from screams. During ST, participants stroked the left dorsal forearm with their right hand at a C-tactile targeted velocity. In a unimanual control condition, they stroked a wooden surface with the same motion. ECG was recorded as a marker of affective state, and stroking movements were tracked using electrogoniometry.
Results. Based on pilot data, we expect enhanced perception of fearful faces during threat blocks, indicated by a lower discrimination threshold. Importantly, we expect this effect to be modulated by ST, but not by the unimanual control condition.
Discussion. This study may provide initial evidence for the function of ST during anxiety. Follow-up studies will investigate whether this effect differs between active ST and passive touch.

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"Touch in Action - Calatonia® gentle touch modality in psychotherapy: The complexity of therapeutic touch

Ph.D. Anita Ribeiro Blanchard

Calatonia International Training, Palm Coast, USA

Developed by Dr. Petho Sandor (1969) during WWII, Calatonia involves a sequence of seven low-threshold and three supporting touches, each sustained for three minutes on the lower or upper limbs and the head. Initially used in Red Cross refugee camps, it promoted physical, emotional, and mental regulation, well-being, and relaxation for various physical and psychological complaints. After the war, Dr. Sandor applied Calatonia in patients in the

psychiatric wards of German hospitals for two years, leading to reduced depression, anxiety, pain, PTSD, phantom limb symptoms, and improved sleep, motivation, and concentration.

In Brazil, he developed additional techniques under the "Subtle Touch" label, integrating them with verbal therapy in clinical psychology. Over the past fifty years, numerous qualitative and some quantitative studies on Calatonia have been published, covering depression, anxiety, PTSD, psychosis, and developmental/attachment issues

This presentation explores (Blanchard, 2021): The interplay between the receiver's explicit and implicit histories of touch experiences. This briefly address insula-encoded nerve fibers as a proto-affective system during the preverbal phase and their subsequent integration into a broader cognitive-affective system when declarative memory develops.

The neural/attentional environment created, e.g., the receiver is lying down, in a passive resting state/default mode connectivity, eyes closed, in biobehavioral synchrony with the therapist.

The areas being touched [feet and hands are "organ-like" (Hayward, 2018) areas] and touch features (low-threshold, stationary, long-duration, bilateral).

The attunement and trust between therapist-receiver.

The impact of integrated affective processes on psychophysical regulation and mental health.

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"Is Angelina Jolie a 'warm' or a 'hot' girl? Your thoughts and feelings about it." A developmental perspective on slow and fast conducting nerve fibers as an integrated system

Ph.D. Anita Ribeiro Blanchard

Calatonia International Training, Palm Coast, USA

Two core principles of physiology, homeostasis, and evolution (mirrored in human development), can explain the role of CT fibers as part of a self-regulating, developing organism. CT fibers may serve as primers (implicit memory) for positive relational touch, alongside insula-encoded AD and C polymodal fibers in early childhood (0-2.5 years).
This priming occurs through classical and operant conditioning (association and reward/punishment) and statistical regularity. Early affective implicit conditioning relies on biologically valenced insula-dependent neural pathways, producing strong emotional reactions for touch-related lessons crucial for survival and bonding before conscious learning readiness. Concurrently, SI-SII fibers produce implicit procedural learning and memory, based on valences they generate, such as a sense of agency and autonomy.
CT fibers create implicit memories associated with pleasant touch, fostering openness to experience later in life. This system exclusively primes for passive pleasant touch in body areas most exposed to early physical contact. This early imprint potentially buffers sensory overload from AB (and AD) fibers (autism research) and enhances mother-infant attachment through the slow caress required for CT optimal stimulation, attuned to the baby's pace.
As autobiographical/declarative memory emerges (around 2.5 years), implicit affective and procedural touch memories are transferred to a broader cognitive

system, building on a baseline of "positive and negative" touch experiences (seeking comfort, avoiding pain, regulating temperature, manipulating objects, exploring the environment). Metaphors are an example of such integration. This talk explores how this integration occurs and how a lost developmental window can disrupt the enhancement and integration of both systems.

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Part of the LIVE-POSTER project - Touch in Action: Dynamic Hapto-Relaxation: an affective-touch-based application as a tactile relaxation therapeutic method

Karl Devreese

VIVES, Kortrijk, Belgium

Dynamic Hapto-Relaxation (DHR) is a standardized and evidence-informed tactile relaxation intervention widely employed by relaxation therapists in Belgium for clinical and therapeutic applications. The method comprises a structured sequence of ten successive techniques, integrating affective-touch-based (ATB) strokings, more intense strokes (IS), and subtle mobilizations (SM), predominantly targeting the facial, cervical, and shoulder regions. DHR operationalizes recent insights on affective touch (AT) and CT-optimal stimulation, which activate C-tactile afferents, fostering pleasurable sensations, hedonic experiences, and stress modulation. The intervention's design adheres to principles of the relaxation response (Benson, 1975), emphasizing environmental stimulus reduction, the facilitation of a tranquil atmosphere, and the promotion of passive participant engagement. Specifically, DHR alternates gentle, slow CT-optimal facial strokes with deeper petrissages and mobilizing maneuvers, aiming to trigger vagal activity and induce a parasympathetic shift. These dual-stimulus modalities address both emotional regulation and musculoskeletal tension, contributing to immediate relaxation outcomes and long-term therapeutic benefits, including enhanced sleep quality and sustained relaxation state development. Empirical and practice-based evidence underpins DHR's efficacy. Non-published qualitative findings from 252 individuals treated in 2023-2024 reveal significant reductions in perceived stress and heightened subjective experiences of calmness, contentment, and relaxation. A comparative study scheduled for 2025 will provide further empirical validation. During a typical 20-minute session, participants assume a supine position, facilitating optimal therapist access for the structured delivery of ATB, IS, and SM techniques. By integrating scientific rigor with clinical application, DHR emerges as a robust, patient-centered intervention for stress mitigation and somatic relaxation.

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The physiological correlates of the social softness illusion

Dr. Olga Dal Monte, Dr. Greta Bonino, Dr. Francesca Capiotto, Dr. Ilaria Mirlisenna

Department of Psychology, University of Turin, Turin, Italy

According to the social softness illusion, individuals perceive another person's skin as softer compared to their own skin. This illusion may represent a useful mechanism

to foster social connections by boosting individuals' motivation to engage in intimate relationships. To date, investigations on this topic are limited to two behavioral studies involving unfamiliar individuals. Here, we aimed to enlarge the comprehension of this phenomenon by testing differences in the occurrence of the illusion when interacting with unfamiliar and familiar individuals at behavioral and physiological levels. The experimental subject was invited to promote an affective touch to a familiar or unfamiliar individual, in an experimentally controlled setting. After each touch, the subjects were asked to rate which skin they felt softer and smoother between their own skin and the others' skin.
Additionally, skin conductance was recorded to investigate the physiological correlates of the social softness illusion when interacting with familiar and unfamiliar others. Coherently with previous findings, we found participants to rate others' skins softer than their own, providing evidence of the social softness illusion at the behavioral level. Crucially, the physiological responses encoded the occurrence of the illusion and differentiated the identity of the interacting individual.
Collectively, our results provide the first evidence of the physiological correlates of the social softness illusion. In conclusion, the present study provides a more comprehensive and multilevel understanding of this phenomenon and its pivotal role in shaping and maintaining interpersonal relationships.

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The main factors influencing the effect of mindfulness-based massages on the well-being of seniors

Joerg Henkel
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Objectives: Massages are used as complementary methods in the geriatric area. But what are the biggest impacts of a massage on the well-being of seniors? Using the example of the TouchLife massage, this study examines the major influencing factors in order to discuss the effective use of massages to increase the well-being of seniors.
*Methods:*112 seniors aged 65-94 years (Ø 72.93 years) received in total four 60-minute TouchLife massages including interview once a week. The well-being of the elderly was measured by the Questionnaire on Current Physical Well-being (FAW) and the Multidimensional Sensitivity Questionnaire (MDBF24) before the first and after the fourth TouchLife massage.
Results: Two meaningful models for the greatest influence on well-being have been formulated. For the physical well-being of the elderly, the scales vitality/zest for life (b=0.441), rest/leisure (b=0.439) and subjective concentration and responsiveness (b=0.171) were identified as the most important predictors with an adjusted R2 of 0.867. The most important predictors of mental well-being, with an adjusted R2 of 0.845, were the scales rest (b=0.755), vitality/zest for life (b=0.281) and declining tension (b=-0.162).
Discussion: In order to increase physical well-being, massage treatments for seniors should be vitalizing and invigorating. At the same time they should create a space for rest and leisure and guide seniors to stay attentive during the

massage. In order to increase the mental state, the massage should promote inner peace, curiosity, vitality and zest of life They should ensure that the elderly do not relax too deep.

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Quantitative evaluation of human brushing physics in affective touch

Zackary Landsman, Gregory Gerling
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In addition to affective touch studies involving direct touch with the human hand, research in the field often utilizes semi- controlled brushing, with a typically specified velocity range from 3-10 cm/s and force range from 0.2-0.4 N. Such ranges are derived from perceptual and physiological experiments with touch receivers, as opposed to toucher deliverers. We describe the characteristics of human brushers in delivering brush strokes. In particular, we observe the delivery strategies of untrained brushers through high-resolution force and position measurement using an instrumented brush. In the experiment, participants deliver consecutive brushstrokes within and between trials, from which are derived velocity, force, duration, and stroke length. We find that resultant force levels match prior studies, although the mean velocity is higher than range typically reported, which may be due to a focus of prior works upon the brushing receiver's response as opposed to the deliverer's tendencies. In describing individual brushing strategies, we also characterize individuals' strategies and demonstrate these personal brushing strategies often exhibit high repeatability, with unique magnitude and precision targets per individual. The aggregate of the brushing cohort occupies a compact feature range that can inform future pleasant brushing studies.

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Touch in Action. Touch dialogue with learning-disabled adults who are non-verbal

Lorraine Horton
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Many learning-disabled (LD) adults do not express verbally but have much to contribute. There is little research exploring the significance of touch in their lives, indeed they are often excluded from research due to differences in sensory integration. This population experiences a higher incidence of abuse than the general population, yet inevitably are unable to access talking therapies. Previous research concludes that the relationship between LD people and their care workers exits in the context of the "constant" touch required in that care. Touch provides meaningful communication, connection and emotional support. However, touch is complex and multi-dimensional. Many interconnecting complexities exist (psychological, emotional, cognitive, physical, somatosensory, past experiences) that impact our perception of touch (positive and negative) all of which reflects a broader understanding of CTs signalling and "affective touch". Combining multiple touch modalities (therapeutic massage, myofascial integration, somatic trauma therapy) enables 'touch conversations' with LD

people, contributing to the humanisation of care services. LD people sometimes use 'self-harming' touch through which to communicate, often on the same body area. Meaningful touch interaction with this often reduces its intensity and enables temporary cessation. Again, however, there is little research. *Conclusion:* Little recognition is given to the use of touch and its complex communicative function in care. Research is required to further understand the significance of touch in the lives of LD people, including their own use of 'self-harming' touch. Training enables care givers and care receivers to confidently use touch as a reciprocal communicating medium and sense of human connection.

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What makes the un-huggable huggable?

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What is the design space between purely mechanical and near-human appearances for hugging robots to create shared, reciprocal experiences of embracing in multi-agent scenarios, and what role do external stimuli (e.g., audio, visual, tactile) play in shaping human acceptance and perception within this space? This early-stage artist-led inquiry explores the design and perception of multi-agent robotic hugging interactions, focusing on the sensorimotor dynamics that influence the huggability of two distinct robotic morphologies: Boston Dynamics' Spot and HuggieBot. We aim to understand how these robots can facilitate meaningful social touch in a group context, taking into account the person(s) engaged in hugging, the robot(s), and the observer(s), all contributing to the holistic experience of the embrace. Through two body-storming workshops based on iterative performance art, soma-design, and creative and responsible A.I research, we prototyped and evaluated the interactive hug experiences. Participants engaged in scenarios with individual and multi-agent hugging to assess the functional feasibility of group hugging, the importance of active deep-pressure touch, and the perceptual effects of sensorimotor misalignment when interacting with mixed human-robot groups. When multiple humans were participating in the robot hugging activity, participants reported that the tactile sensations from robotic agents were often as indistinguishable from those provided by other human huggers, especially when sensory information (e.g., vision) was restricted. This finding highlights the role of sensorimotor integration in multi-agent hugging scenarios and suggests that social touch can transcend distinctions between human and robotic agents when designed appropriately.

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The Legacy of Children's Social Care: Exploring Variability in Touch Experiences and Attitudes.

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Objective. The most common reasons for a child to come under the care of social services are neglect and abuse. Early childhood adversity is a risk factor for social-isolation and poor mental health in adulthood. Our previous study highlighted links between experiences of UK foster care and more negative attitudes to and experiences of social touch (Devine et al. 2020). The aim of the present study was to explore the psychological and social factors underpinning these findings. *Methods.* Sixty-five participants aged 18-40 completed an online survey. N=34 were care experienced (CEP). Participants completed the Childhood Trauma Questionnaire, the Relationship Structures Questionnaire, the Touch Experiences and Attitudes Questionnaire and The Beck Depression Inventory. *Results.* CEP reported significantly higher levels of childhood trauma, greater attachment anxiety and avoidance, more negative attitudes and experiences of social touch, and higher levels of depression than controls. Being CEP accounted for 20% of the variance in current intimate touch, whereas greater attachment avoidance explained 23.9%. Whereas childhood trauma and attachment anxiety did not contribute significantly to this model. Collectively, the model explained 44.6% of the variance. While more years in foster care was associated with higher levels of depression, more current intimate touch was associated with lower levels of depression. *Discussion.* These findings highlight that it is the experience of the foster-care system rather than traumatic childhood experiences which best account for more negative attitudes to social touch and higher levels of depression in CEP. These findings have significant implications for foster care policy and practice.

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Effect of osteopathic manipulative treatment on interoceptive accuracy and sensibility in healthy subjects and patients with chronic low back pain: A randomised controlled trial

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Background: Osteopathic manipulative treatment (OMT) improves chronic low back pain (CLBP), but the underlying mechanisms of action are unclear. Interoception has been implicated as it is altered in patients with CLBP and may be improved by OMT, but further research is needed. Objective: To investigate the effect of OMT, compared to sham treatment imitating OMT (SHAM), on the interoceptive accuracy and sensibility of healthy subjects (HS) and patients with CLBP. Methods: A

single-blinded, parallel-group, multi-center, randomised controlled trial was conducted. Two (30-minute) sessions of OMT and SHAM were provided, while measuring the: (1) interoceptive accuracy and sensibility of HS and CLBP patients with the Heartbeat Counting Task (HCT) and the Multidimensional Assessment of Interoceptive Awareness (MAIA-2) questionnaire; (2) pain intensity and functional status of CLBP patients with the Numeric Rating Scale (NRS) and the Oswestry Disability Index (ODI); and (3) heart rate variability (HRV) of HS and CLBP patients with electrocardiography (ECG). Ancillary, adverse events and blinding concealment rates were assessed. Within-group and between-group differences will be analysed with descriptive (mean, standard deviation, and percentage) and inductive statistics (chi-squared test, two-sample t-test, and mixed ANOVA).
Results and Discussion: The trial has been completed, and the data analysis is currently ongoing. The results will be available for the conference to be presented to the audience.

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Sleeping arrangements and maternal-infant night-time touch

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Objective. We aimed to investigate whether different infant sleeping arrangements (being in a sidecar cot, separate cot, or in the mother's bed) beget different types of touch. Methods: We performed a secondary analysis on video data collected at the Durham Infancy and Sleep Centre (DISC) using three ceiling-mounted infrared cameras and Noldus Observer software. Fourteen mothers and infants each provided between one and three nights of data, for a total of 19 observations. Using ethological observation, the middle six hours of each video was coded continuously for mother-infant touch, including stroking/rubbing/caressing/massaging, patting/tapping, and static touch; and for the infant's location. Durations of different behaviours were analysed in RStudio using linear regression and Gaussian models.
Results: Infants who spent more time in the mother's bed received more static touch and more touch overall. Infants who spent more time in a cot received less static touch. There was a small but significant effect of the amount of time infants spent in a cot on the amount of soothing touch received from the mother (stroke/rub/caress/massage and patting/tapping).
Discussion: Possibly, the static touch received by infants who bed-shared signalled the mother's presence before the infants could become aroused by separation. In contrast, infants who spent time separated from the mother in a sidecar or separate cot received less static touch and the mother may have engaged in more "compensatory" touch (gentle, active touch) to soothe them.

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Part of the LIVE-POSTER project - TOUCH in ACTION Reclaiming Touch: Bridging Emotional and Social Gaps in Schools. Mindful-Touch Education ©

Ms Rita Griesche
Mindful-Touch Education ©, Murcia, Spain

Children today face growing challenges due to excessive reliance on technology, being "left to their devices," and restrictive no-touch policies in schools. These conditions contribute to emotional instability, including anxiety and difficulties with emotional regulation, reduced focus and learning capacity, and weakened interpersonal bonds, making it harder for children to develop empathy and meaningful connections.
Mindful-Touch Education (MTEd) offers a preventative toolbox designed to address these challenges and reduce the risk of future mental health issues in children. By integrating principles from Traditional Chinese Medicine (TCM), Shiatsu, and Western science, MTEd helps children learn touch as a language. Through a step-by-step methodology, they explore its "vocabulary" with 10 touch modalities and visually explore their effects. Five engaging heroes then personify emotions and character traits, helping children deepen their understanding through "grammar" and making learning meaningful and holistic.
Implemented in schools with transformative results, the program fosters empathetic, supportive classrooms that prepare students for healthier relationships, a more caring mindset, and holistic growth. Children enjoy experimenting with touch practice and collectively showcasing their work, encouraging open exploration and discussions about positive and negative touch.
In this live-poster session, participants will:
Experience a simple leaning-touch sequence for shoulders and back.
Select a "touch story" featuring one of our five heroes, documenting their experiences.
This innovative, research-ready framework invites researchers to collaborate with us in exploring new opportunities for integration and development, addressing the urgent need to reclaim touch and bridge emotional and social gaps at this critical stage in human evolution.

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Anxiolytic Effects of Social Touch: Moderating Influences of Trauma and Social Interaction Experiences

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Objective. Trauma-exposed individuals often display a pattern of touch aversion and avoidance. Surprisingly, however, it is still unclear whether trauma experiences are associated with altered anxiolytic effects of social touch and if these consequences differ depending on previous interaction experiences.
Methods. We are in the process of recruiting 200 healthy adults (100 women) with varying levels of trauma experiences assessed with the Childhood Trauma Questionnaire (CTQ) and the Trauma History Questionnaire (THQ). Participants are randomly assigned to a positive interaction paradigm (PIP) and a non-social control task. Subsequently, participants perform a threat of shock task and in half of the trials they receive

c-tactile optimal touch on their forearm by the experimenter of PIP or an unfamiliar person.
Results. We will analyze self-rated tension and the electrodermal activity during a countdown before shocks as the primary outcome to evaluate the anxiolytic effect of touch. Furthermore, we will investigate whether the anxiolytic effects differ between contexts (PIP vs. control) and if they are related to trauma experiences (CTQ and THQ scores). As a secondary readout, we will explore anti-nociceptive touch effects by investigating self-reported unpleasantness of and electrodermal responses to the shocks.
Discussion. With this study, we aim to contribute to a better understanding of the complex social sequelae of trauma experiences, specifically relating to the processing of social touch.

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The Soft Palm Robot – A Novel Approach to Deliver Gentle Stroking Touch

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There is a growing interest in exploring the neural underpinnings of tactile processing, particularly with respect to the encoding of gentle stroking touch. Yet, stimulation methods that can deliver controlled yet natural stroking touch remain limited. Here, we introduce the soft palm robot as a novel touch tool. The soft palm robot provides precise control of touch parameters such as velocity, force, and temperature. Critically, the robot's touch effector, a 3D-printed soft palm made of flexible TPU-95 material, mimics the human hand with its pre- bent surface. It adapts to the curvature of the forearm using a cable-driven motor-pulley system with cable tension sensors. By adjusting cable length, the soft palm morphs to ensure close adhesion to the touch surface. To facilitate online palm adjustment, the robot uses information from a pre-touch calibration. This calibration involves the 3D mapping of the forearm, at five different positions along the forearm's length, to compute optimal cable tension, followed by fine-tuning to ensure consistent force before stroking. Using the soft palm robot, we replicated a prior EEG study with a cable-driven robot holding a soft brush gently stroking a participant's (N = 1) left forearms at velocities of 0.5, 1, 3, 10, and 18 cm/s. We explored self-reported

touch pleasantness and brain responses by examining the sN400 component. Velocity-dependent modulation of both measures followed a negative quadratic trend, being maximal at ~3 cm/s. These findings highlight the soft palm robot as a reliable and precise tool for delivering gentle touch stimuli.

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Do touch giving and receiving feel differently?

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Objective. Research has highlighted the importance of interpersonal touch for affect and well-being and implied that touch receiving is more pleasant than touch giving. Here, we aimed to further investigate potential differences between touchers and touchees by surveying everyday touch experiences in the general population.
Methods. At the time of abstract submission, 25 healthy adults (8 male/ 17 female, mean age: 27.80±10.08 years, target sample size = 150) completed a two-part online survey. In each part, they were presented with 24 different touch actions (e.g., shoulder embrace) and were asked to rate action frequency and pleasantness and to provide descriptive feeling adjectives once from the perspective of the toucher and once from the perspective of the touchee.
Results. Touch frequency did not differ between roles (toucher = 3.33 ± 1.50, touchee = 3.16 ± 1.49). However, touchers found touch more pleasant (47.50±48.95) than touchees (38.26 ± 50.74). This effect was driven by a few actions including squeezing the cheek or upper arm, petting the head or shoulder, and holding the forearm. Participants provided similar adjectives for most actions but for actions that were rated differently between roles, touchees used more negative adjectives such as "intrusive", "annoying" and "unusual".
Conclusion: Our preliminary results indicate that touchers and touchees may experience touch interactions differently. However, the observed differences seem small and might be related to different affective or interactional goals. Notably, touch giving can be as if not more affectively positive than touch receiving.

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Keep it calm: Self-touch dampens arousal-related responses

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This study investigated the extent to which active self-touch might dampen negative affective responses, in particular reaction times to emotional stimuli and ongoing heart rate. At the time of submission, 35 participants completed a lexical decision task comprised of pseudowords and words, the latter of which varied in valence (negative/neutral/positive) and arousal (low/high). Before each written stimulus, participants were prompted to perform a stroking motion. In separate blocks they stroked either their own arm (positive prime) or an object (neutral prime). Reaction times showed an effect for valence. Participants responded significantly faster to positive compared to neutral and negative words. Additionally, there was a significant interaction between arousal and touch. In the object touch condition, arousing

words were responded to faster than neutral words. This effect was absent in the self-touch condition. Finally, the heart rate data differed marginally between object and self-touch blocks suggesting that self-touch tended to reduce cardiac activity. The results suggest that, similar to social touch, active self-touch may dampen arousal-related responses.

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A psychophysical investigation of touch perception on the torso

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Much research has been carried out into touch on the hands. However, the input from the skin over the whole body contributes to our sense of self and to interactions with the world, but especially during interactions with others. We aimed to investigate the fundamental somatosensory perception on the human torso, to apply the insights to reproduce realistic sensations in breast prosthetics, after mastectomy.
We investigated affective touch on the torso (above the breast, nipple-areola complex, under breast), forearm, and palm in 51 participants. We applied controlled brush strokes delivered by a robot over these skin sites, at 0.3, 1, 3, 10 and 30 cm/
s. The participants rated pleasantness and intensity using visual analog scales. We also measured thermal perception thresholds for cool and warm detection. We found inverted U-shaped curves between the pleasantness ratings and the stroking velocities for each skin site. In women, we also found that perception on the nipple-areola skin site was less pleasant compared to the forearm and the palm. Tactile intensity increased linearly with stroking speed for each skin site. For temperature detection thresholds, we found no difference between skin sites.
It appears that pleasantness in the nipple-areola complex is different from other zones and does not resemble glabrous or hairy skin perception, indicating a different type of skin innervation. We couple these findings to the underlying neurophysiology and underline how heterogenous somatosensation can be depending on the body area stimulated.

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Clinical Project of Psychophysical Integration SUBTLE TOUCH METHOD COMPLEMENTARY TO CALATONIA BURINI, Elaine R. V.,

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Objective. The present work introduces a method elaborated by the author called SUBTLE TOUCH METHOD (STM) that enables the catalyzing of psychophysical integration, well-being, relaxation, self-knowledge, expansion of consciousness. *Method*. Calatonia is a technique attributed to Dr. PETHÖ, Sándor, 1984, whose practice leads to results in sensitivity, self-perception and autonomous self-regulation of the body (CORTESE, 2008; BLANCHARD, 2021). STM was developed from Calatonia,

Body Meridians and Energy Pathways. It consists of circular movements applied with the fingertips, to each toe and finger, for a continuous period of eighteen breaths.
Result. STM is a variant of Calatonia, which proved to be of great value since the initial period of SARS-CoV-2, strengthening of the physical, emotional and mental support of patients positively. The reports collected from patients were feeling integrated, welcoming, safe, and sense of well-being.
Discussion. At the beginning of the COVID-19 pandemic, we did not have reliable information, medications, or vaccines. The use of Calatonia was a beneficial support to the patients. The combining knowledge about activating meridians energy (Chinese medicine) with Calatonia and observing patients' responses led to an improvement method, the so-called STM.

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Measuring differences in social touch: Development and validation of the short Touch Experiences and Attitudes Questionnaire (TEAQ-s)

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Interpersonal touch is an essential part of human social life, impacting emotional and physical well-being. Variations in touch behavior and perception can be assessed by the *Touch Experiences and Attitudes Questionnaire (TEAQ)*. Although comprehensive, the TEAQ appears lengthy with 57 items, limiting its usability for large surveys. Therefore, we developed a refined and shortened version of 16 items, tested in Germany and France. The poster presents three studies. In the first, we created the TEAQ-s (n = 313). In the second and third, we validated the TEAQ-s in German (n = 383) and French (n = 327), respectively. The resulting TEAQ-s showed strong reliability (Cronbach's alpha: 0.86 to 0.87; test-retest correlation: r= 0.85) and validity consistent with the original version. Analyses also revealed that better mental health, higher body appreciation, being in a relationship, and among those reporting higher relationship satisfaction, were positively associated with more frequent touch experiences and more favorable touch attitudes. A four-factor structure (4 items per scale) was confirmed through factor analysis. Final subscales are *attitude to friendly touch, current intimate touch, childhood touch,* and *attitude to intimate touch*. We hope that the TEAQ-s serves

as a valuable tool for researchers in the field of touch and beyond, offering well-founded items in an efficient format.

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Scratchy, sticky, and universally icky? Tactile unpleasantness judgements are similar across four countries

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Objective. While rough or sticky materials are widely recognised as unpleasant to touch, it remains unclear whether tactile unpleasantness is judged similarly across cultures. This study investigates cross-cultural perceptions of the imagined unpleasantness of touching everyday materials and objects with various properties, with samples from France, Germany, Türkiye, and the UK. *Methods.* Participants (620 in total, >100 per country) rated the perceived unpleasantness of touching 79 material and object names presented in their respective languages via online surveys. *Results.* Bland-Altman plots revealed that most stimuli were rated similarly in tactile unpleasantness across the four countries, though a few exhibited systematic differences. Furthermore, mean unpleasantness ratings for each stimulus were highly correlated ($r_s \geq 0.86$) between countries. Nevertheless, a linear discriminant classifier with ten-fold cross-validation, trained on the unpleasantness ratings, achieved a prediction accuracy of 65% for country identity - significantly above chance. Substituting the ratings of 12 materials showing systematic cross-country differences with random values reduced accuracy to chance level, while substituting ratings for materials judged similarly across countries with random values increased accuracy. *Discussion.* Our results demonstrate more cross-cultural similarities than differences in the perceived tactile unpleasantness of materials. Only a small subset of stimuli (~15%) showed cross-country differences, which the classifier capitalised on to achieve above-chance accuracy. We speculate that those differences likely reflect variations in the specific connotations of the translated words. Importantly, our findings support the validity and informativeness of cross-cultural comparisons in affective touch research, as most materials seem to evoke comparable tactile unpleasantness across diverse populations.

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Feeling connected: Both dog touch and gaze boost owner positive affect

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A previous online survey identified a positive relationship between touch in human-pet interactions and the affect owners experience after touch as well as their overall well-being. In this lab-based observational study, we sought to further explore these touch effects and to compare them with the effects of mutual gaze—another important behavior by which humans connect with their pets. A

sample of 36 participants (target sample size 64) completed a short well-being survey and interacted with their dog for 5 minutes. Participants also rated their momentary affect before and after the interaction. Owner well-being was unrelated to affect. However, it negatively predicted the frequency with which dogs touched their owners, while showing no relationship with the frequency of owner-initiated touch. Similarly, only dog- but not owner-initiated touch predicted greater positive feelings and lower arousal following the interaction. Interestingly, mutual gaze was correlated with dog touch and showed the same relationships with well-being and affect. Together, these preliminary results point to a role of touch in affect regulation, emphasizing the importance of receiving over that of giving touch. Further, they suggest that a dog's touch is attuned to its owner's overall well-being, potentially enhancing it by improving the owner's current affect. Notably, however, these dog touch effects may be social rather than tactile as they also emerge from other modes of connecting with the pet.

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Tracking touch with ecological momentary assessment: Age-related variations in partner touch frequency

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In adulthood, relationship partners are the most frequent and desired touch givers. Research has highlighted the importance of partner touch in stress reduction, personal well-being and relationship satisfaction. In the past, studies have been limited by survey character or short observation periods. Therefore, we assessed first reference data with an ecological momentary assessment method for seven consecutive days. In study 1, $n = 114$ young subjects between 18 and 35 years of age documented the number of touches received from their partner with a mechanical counter. In study 2, $n = 45$ middle-aged and old subjects (40-84 years) did the same. Beforehand, subjects were asked about relationship and individual characteristics. Preliminary results showed that young adults received an average of about 56 touches ($SD = 56.40$) per day from their partner whereas middle-aged and old adults received about 14 touches ($SD = 13.01$) per day.This difference reached statistical significance ($t(139) = 7.42$, $p < .001$). Overall, partner touch frequency was correlated with age ($r = -.38$, $p < .001$) and relationship satisfaction ($r = .26$, $p < .001$) across samples. Final results will be presented at the conference.

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The Role of Affective Touch in Modulating Attention and Perceived Pleasantness During Temporal Summation of Second Pain

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Objective. Research has demonstrated that affective touch (mediated by C-fiber tactile (CT) afferents) effectively reduces acute pain, caused by cutaneous heating, leading to analgesia in healthy subjects. Temporal summation of second pain (TSSP) is described as an increase in pain perception caused by repeated noxious stimuli of constant intensity at a specific frequency. TSSP is related with central sensitization mechanisms, contributing to the development and persistence of chronic pain conditions.
Methods. This study aimed to explore the effects of CT-stimulation and interpersonal affective touch on pain perception and attention during a TSSP paradigm. Thirty-two couples underwent a TSSP paradigm with four experimental conditions across two distinct sessions: an alone session involving vibration and stroking with a brush attached to a robotic arm, and an accompanied session involving partner- mediated hand stroking or static touch. Participants evaluated pain levels, attention to the heat, and the pleasantness of the stimulations during the conditions.
Results. Results showed no significant differences between conditions in the increase of pain perception during TSSP. However, participants reported paying more attention to the heat stimulus during the vibration condition and less attention when stroked by their romantic partner. Attention levels during stroking with the brush or static touch were similar. Additionally, vibration was rated as the least pleasant stimulation, while no significant differences in pleasantness were observed among the other three conditions.
Discussion. These findings suggest that affective touch from a romantic partner may influence sensory attention and emotional responses within pain summation mechanisms.

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From Foerster and Zotterman to the question of the 'social': Revisiting histories of the neurobiology of affective touch

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Papers in the affective touch literature cite the early nineteenth century pioneers Otfrid Foerster in Germany and Yngwe Zotterman in Sweden. Zotterman in particular, through his microneurography technique, has a significant place in revealing the role of C-fibres in frogs and then cats, in Cambridge and then Stockholm. But there remains the question of why it took so long for researchers like Johansson (1988) and Nordin (1990) to look for these fibres in the human face, ahead of the celebrated work in Gothenburg by Vallbo, Olausson, Wessberg and Norsell in 1993. The latter's explanation at the time was underdeveloped: "it has been suggested that an older and slowly conducting system for innocuous mechanoreception has faded away during evolutionary processes antedating man" (Vallbo et al. 1993: 301). Some recent research inspired by that work has speculated on the social implications that arise from the pleasurable bonding sensations and associated neurochemical release. However, few social scientists are investigating the social mechanisms behind these distinct pathways at work in

the so-called "affective touch hypothesis" (e.g. Olausson et al. 2010), or "social touch hypothesis" (e.g. India Morrison 2016, 2023). This paper offers an exploration of these issues. First, through a brief contextual history of the early twentieth century experiments with nonhumans, based on archival research for my forthcoming book. Second, by considering more wide-ranging explanations for collective human behaviours which put the 'social' back into 'social touch'.

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Unraveling the Multilevel Modulation of C-Tactile Fibers on Somatosensory Input: A Study of Spinal Neural Activity

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Objective. Activation of C-tactile (CT) fibers has been shown to reduce pain, yet the mechanisms underlying CT-mediated analgesia remain unclear. A possible hypothesis involves nociceptive inhibition effects at the spinal cord. This study investigates whether CT-optimal stimulation reduces somatosensory input by assessing neural activity at the spinal level.
Methods. The experiment combines EEG and ESG (electrospinography) recordings using 17 electrodes centered on the 6th cervical vertebra. Somatosensory evoked potentials (SEPs) will be elicited via electrical stimulation of the left median nerve under four conditions: (1) CT-optimal stimulation applied on the left forearm using a robotic brush; (2) vibrotactile stimulation on the left arm; (3) CT-optimal stimulation manually performed by the experimenter; and (4) no concomitant stimulation. The stimulus intensity ratings (electrical stimulation) and touch pleasantness will be assessed on a numeric rating scale.
Results. While the definitive analysis is pending, we hypothesize that CT-optimal stimulation will modulate early stages of somatosensory processing, as indicated by a reduction in the N13 component of the SEPs, when compared to discriminative or no concomitant touch conditions. This modulation could reflect mechanisms for CT fiber-mediated somatosensory modulation
Discussion. If our hypotheses are confirmed, the results will provide evidence that affective touch influences spinal-level somatosensory processing. This would offer a mechanistic explanation for the analgesic effects of CT fiber activation, expanding our understanding of how affective touch interacts with other somatosensory modalities.

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Fast and glabrous: fast palm stroking trumps cortical selectivity for velocity and hairy-skin stimulation during pleasant touch

Dr Giovanni Novembre, Dr India Morrison

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Cortical brain regions have been observed to segregate functionally during pleasant touch stimulation, depending on

the speed of skin stroking (slower or faster) and the site of stimulation (hairy or glabrous skin). Stroking on both hairy (arm) and glabrous (palm) skin is experienced as pleasant, but their neural coding is dissociable at peripheral and central levels of the human nervous system. In the brain, velocity-dependent responses for arm stimulation tend to fall in posterior insula (PI) and nearby parietal regions, while palm stroking preferentially activates primary somatosensory cortex (S1). However, these aspects of the cortical processing of pleasant touch have not been directly compared in the same study. We therefore aimed to disentangle the contributions of two factors, stimulation site (arm vs. palm) and stroking speed (slow=3 cm/s vs. fast=30 cm/s) in an fMRI study. As expected, slower stroking was rated as more pleasant than faster, while arm stroking was rated more as pleasant than palm. However, hemodynamic responses in both S1 and PI were greatest when the palm was stroked at the faster speed, with least activation when the arm was stroked at the slower speed. These preliminary findings suggest that neural dissociations based on stroking velocity and skin type reflect fluid network dynamics among somatosensory regions. These may be modulable for affective touch, depending on the co-presence of other factors, behavioral demand, or other variables.

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How social and emotional experience shapes touch processing in the brain: insights from brain-hormone co-modulation

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From the cell receptor to the brain, somatosensory pathways relevant to affective touch are increasingly well-mapped, both structurally and functionally. However, we still understand very little about the neural mechanisms through which social and emotional experience can shape touch perception in humans. This talk will present evidence for experience-dependent processing of touch in social contexts, focusing on cortical and subcortical pathways by which an individual's past experience may contribute to how the brain processes affective touch. Our lab's investigations of co-modulation between the brain and the neuropeptide oxytocin have suggested that changes in endogenous oxytocin during touch-mediated social interactions are sensitive to temporal and contextual variables. Covariance with these oxytocin changes in parietal and temporal cortices indicates a selective role for parietotemporal pathways in the integration of touch information with context information. This evidence provides hints that the role of social touch unfurls over time, not just during a single social interaction, but over the course of whole relationships. These findings also implicate a region of medial prefrontal cortex (mPFC) in co-modulatory dynamics between oxytocin and cortisol levels in the blood, suggesting that contextually-dependent physiological and neural changes interact with stress responses. During social interactions, such brain-hormone co-modulation could allow for adaptive, dynamic changes in individuals' behavior and physiological states, providing a basis for both flexibility and

stability in a changing social environment.

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Modulation of Spinal Nociceptive Processing by C-Tactile Afferents: Evidence from the Nociceptive Flexion Reflex

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Objective. Affective touch, mediated by C-tactile (CT) afferents, promotes social bonding and emotional well-being while also having the capacity to modulate pain perception, making it a key area of interest in understanding touch-pain relation. This study aimed to investigate whether CT-optimal stimulation modulates nociceptive processing at the spinal level, using the Nociceptive Flexion Reflex (NFR).
Methods. Participants performed an experimental task that included the recording of NFR, elicited via electrocutaneous stimulation of the sural nerve. The NFR activity, recorded via electromyography, was used to assess nociceptive modulation at the spinal level under four conditions: CT-optimal stimulation by robot brush, CT-optimal stimulation by human touch, vibrotactile stimulation, and no concomitant stimulation. CT stimulation was applied to the left forearm, and participants rated pain intensity and tactile pleasantness using numeric scales.
Results. Since the analyses are still in progress, we hypothesise that the NFR activity will be significantly reduced during CT- optimal stimulation conditions compared to discriminative or no stimulation conditions. Furthermore, we expect the reductions to be more pronounced during human-applied CT stimulation due to the additional interpersonal component.
Discussion. If our hypotheses are confirmed, these findings will suggest that CT-optimal stimulation modulates nociceptive processing at the spinal level, likely by altering reflexive nociceptive circuits involved in the NFR. This finding highlights the potential of affective touch as an innovative and non-invasive therapeutic approach for pain management.

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Touch in Action - Dynamic Hapto-Relaxation; an affective-touch-based application as a tactile relaxation therapeutic method

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Dynamic hapto-relaxation (DHR) is a standardized, tactile relaxation method used by many relaxation therapists in Belgium for various health care applications. DHR consists of ten successive strokes in which face, neck and shoulder areas are affectively touched and brought into motion.
The gentle, slow strokings, especially of the face, take into account the latest insights on affective touch (AT). These strokings are performed CT-optimal (Schirmer & McGlone, 2022) taking into account the therapeutic intention that the affective intentions of the DHR are also effectively perceived by the patient (Sailer & Lekness, 2022). These affective-touched-based strokings are alternately

offered with more intense frictions of the neck and shoulder muscles and subtle mobilizing movements of shoulders and head.
The mostly insular awareness of CT-optimal stimulation leads to pleasurable sensations (Ackerley et al., 2014; Löken et al., 2009; Olausson et al., 2010). AT leads to hedonic experiences (Haggarty et al., 2021; Meijer et al., 2022b; Morrison et al., 2011; Walker et al., 2017b) and to a stress-buffering effect (Eckstein et al., 2020; Kidd et al., 2022). As advised (Ackerley, 2012), the CT-optimal strokings are not offered for too long. The more intense petrissages especially in neck and shoulder regions trigger vagal activity (Field, 2000). The DHR is often repeated to obtain health effects (Schleip, 2012).
Practical non-published research of the short-term effects of the DHR indicates that subjects experience a significant decrease in their stress modus. When qualitatively questioned after undergoing the DHR, subjects reported increased calmness, less tension, happiness and satisfaction.

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Differences in discriminative and affective touch perception between self- and other-touch and in modifying the skin

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Our hands are the main way we actively communicate through touch, whereas the rest of the body is tuned to receive touch passively; however, all skin is important in self-care and social touch. We investigated three factors between hand-arm skin interactions: (i) substance applied to the arm (no substance or one of 6 cosmetic formulations); (ii) surface touched (bare arm or one of two different skin-like material films on the arm); (iii) mode of touch (self-touch to the arm, then in pairs, one person touched the arm of the other). We carried out two studies: one used an expert sensory panel (19 women) that gave ratings of 5 sensory aspects of touch and the other was with naïve participants (40 women) who rated 8 sensory and 8 emotional tactile descriptors, over these touch conditions. The panel excelled in determining differences between the substances, whereas the addition of a skin-like material only changed the perception of slip, thickness, and penetration. In the naïve participants, we found differences in touch perception depending on the substance applied, as per the expert panel, although to a lesser extent. Discomfort was associated with stickiness.
Machine learning revealed that soft was the most predictive word of positive affect, underscoring its pivotal role in shaping emotional responses. Overall, the results show stability in sensory judgment perceptions and that the emotional component is highly relevant, especially for its predictive power in touch liking. These findings have implications for well-being, enhancing user experience to increase pleasure in self-care.

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C-afferent density and perception of affective touch: a corneal confocal microscopy (CCM) study

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Perceptual experiences arising from skin stimulation are facilitated by different nerve fibers. Among these are C fibers, which are unmyelinated and slow-conducting, and play a role in signaling temperature change, slow touch, and pain. However, the relationship between peripheral C fiber physiology and the perceptual experience of touch and pain remains incompletely mapped. Investigation of a group of mutation carriers with reduced C-afferent density revealed a relationship between C nerve fiber density and self-reported pain perception in this population. Yet little is known regarding the question of whether variations in C-afferent physiology may be related to such interindividual perceptual variation in the healthy population. To address this, we measured C fiber density alongside self-reported perceptual experience of dynamic touch (brushing), temperature change, and thermal pain stimulation to assess any relationship these may have with C fiber density on a between-subject level. To measure C fiber density we used corneal confocal microscopy (CCM) in 38 healthy individuals. Dynamic touch on arm and palm, temperature change, and thermal pain stimuli were administered alongside self-report measures. The analysis aims to identify any correlative relationship between corneal C fiber density and self-reported perception of touch, temperature, and pain. Preliminary results for touch pleasantness have not indicated a direct relationship between C-afferent density and affective touch perception.

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Active inference and touch-based therapeutic modalities: A Free Energy approach to trauma and persistent physical symptoms

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Active inference offers a theoretical framework explaining how organisms minimise prediction errors by continuously updating internal models of their environment. This presentation explores how active inference principles illuminate touch-based therapeutic modalities for addressing both trauma and persistent physical symptoms, focusing on the critical role of free energy management in these processes. Individuals grappling with trauma or chronic pain often rely on rigid, entrenched internal models that perpetuate maladaptive responses to perceived threats, sustaining cycles of distress and dysfunction. Therapists can disrupt these patterns by introducing novel or surprising sensory experiences that transiently increase free energy, destabilising entrenched models and creating opportunities for adaptive change. When such disruptions occur within a context of epistemic trust, they foster self-organisation into more adaptive states, enabling individuals to transition from maladaptive to functional

trajectories. Affective touch plays a pivotal role by promoting bio-behavioural synchrony and strengthening the therapeutic alliance, thereby creating a secure foundation for patients to tolerate and integrate previously avoided or overwhelming sensations, emotions, and thoughts. This therapeutic dynamic functions as a self-organising ecological niche, where the patient and therapist collaboratively explore new possibilities. Touch-based interventions, viewed through the lens of active inference, facilitate perceptual updating, emotional regulation, and cognitive flexibility. By addressing outdated predictions and maladaptive patterns, these interventions enable the adoption of healthier responses. This integrative approach highlights the transformative potential of touch as a catalyst for adaptation, empowering individuals to navigate their environments with greater resilience and effectiveness.

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Exploring the Role of Self-Applied Touch in Dance Movement Therapy: Insights from Motion Capture and Subjective Experiences

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Introduction: Self-applied touch, a common intervention in Dance Movement Therapy (DMT), can facilitate "listening" and "reawakening sensation," fostering a deeper connection between body and mind. It is also believed to support attunement, which aids in achieving optimal self-regulation. However, little is known about the sensorimotor mechanisms and body kinematics underlying self-applied touch exercises during DMT sessions. *Methods:* Three ~15-minute DMT sessions were conducted, involving a certified DMT therapist and two clients in dyadic and triadic interactions. Motion capture technology recorded movement dynamics during self-applied touch exercises. Quantitative measures included velocity, acceleration, and Euclidean distance, revealing dynamic shifts in movement. Semi-structured interviews were conducted post-session, and significant moments of self-applied touch were used for thematic analysis. *Results:* Quantitative findings revealed alignment with therapeutic goals of grounding and relaxation through controlled, individualised movement patterns. For both clients, peak velocity reached 124.3 cm/s, and acceleration peaked at 26,580 cm/s^2, reflecting deliberate and regulated motion. Interpersonal distance remained stable (1332.4 cm, SD = 117.1cm), supporting grounding and autonomy, while weak synchrony (r = 0.017) highlighted independent rhythms. Qualitative analysis highlighted participants' experiences of enhanced bodily awareness and attunement, with themes emerging around "listening and reawakening" sensation.

Conclusions: Self-applied touch serves as a valuable intervention in DMT, promoting self-regulation, body awareness, and therapeutic engagement. By reconnecting clients with their sensory experiences, it fosters emotional processing, embodiment, and self-attunement. The integration of motion-capture technology provides a novel approach to characterising such movements, enhancing our understanding of their therapeutic impact.

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Predictive insights through statistical and machine learning approaches to explore higher-level perceptions in touch

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The field of affective touch has grown considerably and innovative research approaches have been developed to better measure the various types of interactions that give rise to emotional tactile perceptions. One method developed for touch, to mirror the lexicon in the McGill Pain Questionnaire, is the Touch Perception Task (TPT; Guest et al. 2011, Atten Percept Psychophys). This captures discriminative/sensory and affective/emotional aspects of tactile interactions, where participants rate the descriptiveness of 26 sensory (e.g. rough, soft, sticky) and 14 emotional (e.g. pleasant, exciting, irritating) words. The words, named descriptors, are systematically rated on a scale of 0 - not at all to 4 - very highly descriptive after each touch. The TPT has been used a number of times to investigate different aspects of tactile interactions, both between people and textures. We aimed to forward how these data are analyzed by using modern techniques to explore higher-level relationships in the perception of different tactile interactions. Statistical and machine learning analyses, including factor analysis, network analysis, Random Forest modeling, and Linear Discriminant Analysis (LDA) explored the sensory-emotional relationships and predictors of emotions. Through testing these models on existing data, LDA stands out as the most powerful and accurate tool to predict overarching perceptions. "Soft" is the most influential predictor of positive affect (feature importance score of 0.377) and the model uncovers "Prickly" and "Rough" as key drivers of negative affect. This result highlights how advanced machine learning techniques illuminate the intricate and deeply-rooted connections between tactile sensations and emotional outcomes.

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Perception threshold of younger and older adults of squeezing pressure by a soft actuator on the arm

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Older adults often experience a lack of touch due to circumstances, like living in a care home. They can benefit from

technology that mediates social touch reminiscent of touch in daily life like a hug or comforting squeeze shared with their (grand)children. When we design for inter-generational haptic interaction, we have to consider that tactile sensitivity changes with age. We applied soft pressure stimuli varying in surface area on the lower and upper arm to investigate the perception thresholds in older adults (65 - 79 years, n = 22) and compared this with (earlier reported) data for young adults (18 - 59 years, n = 29). We found that the thresholds for older adults are higher than for younger adults in terms of force (average of 116% higher for the lower arm and 120% for the upper arm), pressure (average of 111% higher for the lower arm and 131% for the upper arm) and ribbon reduction which is related to indentation (average of 15% higher for the lower arm and 8% for the upper arm). We also found that both groups show similar effects of spatial summation (i.e. lower force thresholds for larger surface areas). This suggests that the increased thresholds we found for older adults are caused by differences in the periphery, e.g. changes in number, morphology or receptive field size of mechanoreceptors, changes in skin morphology or any combination of the previous. These results help to design technology for intergenerational mediated social touch technology.

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How to Analyse Physiological Data for Affective Touch

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The effects of affective touch can be subtle and dynamic. Traditional methods to process and analyse physiological data may not be best suited for affective touch and can fail to capture the nuanced effects. In this project, we compare different methods to analyse a range of physiological data for affective touch, and explore whether newer methods help reveal physiological responses unseen in traditional metrics. We first summarise the traditional methods to analyse heart rate (HR), electrodermal activity (EDA), and pupil data for affective touch. We then apply a novel statistical model for handling physiological data - generalised additive mixed-effects models (GAMM), to the data, where we can specify linear and nonlinear change over time. We discuss the model output, comparison, and their scientific implications.

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The Sensitouch Study: A Prospective Exploration of the Development of Affective Touch Sensitivity in Early Life

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Objective. Adverse early experiences, often associated with a lack of nurturing parental touch, can leave lasting effects on psychosocial development. Affective touch, mediated by C- Tactile afferents,

plays a vital role in healthy development. However, prior research is largely retrospective, cross-sectional, and focused on either the infant, mother, or mother-infant dyad, leaving gaps in understanding infant affective touch sensitivity (CT-sensitivity) and the broader parental context involving both parents. The Sensitouch project takes a novel, prospective approach to study CT-sensitivity development in infants during their first six months, considering both parents' roles.

Methods. This ongoing prospective study involves 74 non-clinical parent-infant dyads. Infant CT-sensitivity is assessed at 1, 3, 8, 12, and 24 weeks of age, and parental CT- sensitivity is assessed before birth and at 12 and 24 weeks using an experiential stroking touch paradigm. ECG and respiration data are collected to calculate RR-interval (RRI), respiration rate (*f*R), and respiratory sinus arrhythmia (RSA). Parental CT-sensitivity is also assessed vicariously, through ratings of perceived pleasantness of touch interaction videos. Broader parental context is examined through pre-birth trait questionnaires covering personality, attachment, emotion regulation, touch attitudes, and loneliness, alongside state questionnaires administered pre- and post-birth assessments measuring couple satisfaction, caregiving touch, postnatal depression, sleep quality, bonding, and touch longing.

Results and Discussion. Preliminary findings will be presented, offering a first contextual understanding of CT-sensitivity development in early life. The goal of this study is to identify risk and protective factors associated with early parental touch deprivation, to ultimately enhance prevention and intervention efforts.

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Touch in and as medicine

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In this talk, I will argue that a better distinction between social touch in clinical contexts and practices of so-called touch medicine is required. Specifically, I will first outline how touch in medicine can create a social bridge between clinician and patient, forming a bond of trust that is a critical component of person-centered care, discussing the concept of a therapeutic alliance.

Showing results from a recent study, I will detail the difference in how touch is perceived and the resulting physiological responses to touch in either a clinical or familial setting. Switching gears, I will then talk about how touch based therapies can tune arousal, mood and body awareness.

Showing two examples of digital technologies that make use of haptic feedback in physiotherapy and rehabilitation, I will highlight that these touch therapies will only be effective if tailored to individual preferences. By distinguishing between social touch and healing touch therapies, we are more likely to better understand the mechanisms that underlie their respective effects but also to provide credibility to clinically effective touch therapies.

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Refining the Categorization of Interpersonal Touch Behaviors: Insights from a Cross-Cultural Qualitative Study

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Interpersonal touch behaviors are a fundamental aspect of daily human interactions, and numerous cross-cultural studies have explored how such behaviors vary across relationships. Research indicates that cultural and ecological factors significantly influence patterns of physical contact. In our previous studies (Sorokowska et al., 2021, 2022, 2023), interpersonal touch behaviors were documented using a simple graphic task. However, before undertaking a broader cross-cultural survey, we recognized the need to validate the categories of touch used as response options in our studies. To ensure that the selected touch types accurately reflect behaviors across diverse cultures, we conducted a qualitative pilot study. This study examined the most commonly practiced forms of touch in culturally and geographically distinct regions. A total of 144 adult participants from 12 countries—including India, Kenya, Sweden, the USA, the Cook Islands, the UK, and Australia—participated in an anonymous online survey. Participants described various scenarios in which they engaged in touch behaviors or observed others engaging in such behaviors within their culture.

Based on this pilot study, we recommend modifying some of the touch categories used in the original surveys. Specifically, the category "stroke" should be updated to "stroke or caress," and "hug" should be revised to "hug or cuddle." Consequently, the final six touch types to be included in the survey are:

Non-affective touch behaviors: "casual, random touch behaviors" and "handshake"

Affective touch behaviors: "embrace," "stroke or caress," "kiss," and "hug or cuddle"

This revised approach provides greater detail and variability compared to our earlier cross-cultural surveys.

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Trauma and Affective Touch: Clinical Insights from Massage Therapy Practice

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Trauma affects sensory-emotional integration, resulting in distress and a lost sense of self. This session will explore, through clinical case examples, how Massage can help regulate the system by influencing perception and processing of somatosensory inputs. The cases will offer a clinical insight into how people with chronic pain and trauma seem to respond differently to variations in touch and how we can ensure safe and meaningful outcomes by modifying the approach.

Practical examples will be shown of how adjusting different elements of the massage session (such as depth of touch, room setup, and auditory cues) can leverage, at a somatosensory level, a safer perception and integration of stimuli. Focus will be given to addressing interoception as a core strategy for re-establishing body ownership and a healthier sense of self. We will explain

how the sessions have been clinically reasoned under the Active Inference model, which frames novel and positive experiences from touch as a way to facilitate emotional regulation by disrupting and updating internal models. The presented cases hope to demonstrate how evidence emerging from the fields of neuroscience and psychology can be translated into clinical applications. They showcase how Massage is uniquely placed to facilitate the integration of all somatosensory, emotional, and cognitive dimensions central to restoring equilibrium to a system profoundly affected by pain and trauma.

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Communication through social touch in Autism Spectrum Condition

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Objective. Autism Spectrum Condition (ASC) often involves atypical tactile sensory responses, including hyper- and hypo-sensitivities and reduced pleasantness compared to neurotypicals (NT). It is not well known how ASC individuals evaluate interpersonal touch, impacting social communication. This study aimed to investigate perceptual differences in social interpersonal touch between control (NT) and ASC groups, focusing on their ability to recognize and evaluate touch expressions.
Methods. Both groups completed a touch communication task and a touch pleasantness task with both felt and viewed touch. The touch communication task involved interpreting the social meaning of standardized touch expressions representative of the general population. Autism-Spectrum Quotient (AQ) was administered to evaluate autism traits in both groups.
Results. Higher AQ scores were significantly correlated with lower message agreement in the felt touch condition. However, no significant correlation was observed between AQ and message agreement in the viewed touch condition. ASC individuals showed particularly lower identification rates of the felt touch expressions intended to communicate "attention," "love," and "happiness" messages.
Discussion. Our results provide evidence that differences in touch perceptions in ASC are rooted in the sensory information ascending from the periphery and its processing in the somatosensory cortex. That is, the differences in sensory information processing in ASC are specifically related to tactile stimuli – and not higher order interpretation of the communication process, as the viewed touch condition was unaffected. In addition, the missing social context could contribute, as autistic individuals might rely more closely on cognitively analyzing the social context of a situation

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Affectionate touch during transition to parenthood. The role of discrepancy between what we want and what we receive.

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The transition to parenthood is a life

stage characterized by profound emotional, relational, and physical adjustments. While research on affective touch has predominantly centered on parent-infant bonding, far less attention has been given to the role of affectionate touch within the romantic couple relationship during this period. We explore non-sexual, affectionate touch between partners – including holding hands, hugging, stroking, and kissing. We also examine how affectionate touch predicts relationship related variables e.g. relationship security, relationship quality or marital satisfaction, and perceived stress in new parents. Moreover, we examine the discrepancy between preferred and received touch from a romantic partner, including its frequency and types, and it's consequences on the couples well being in the context of transition to parenthood. Hyper

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Affective touching behaviors among couples

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As intimate touch is more prevalent and natural, many efforts have been investigated social touch in close relationships, especially within romantic couples. As such, affectionate touch has been associated with greater relationship satisfaction and individual well-being. In romantic partnerships, affective touch serves as a crucial medium for expressing love, affection, and emotional support. Behaviors such as hugging, caressing, and gentle stroking are common manifestations of this touch, reinforcing emotional bonds and enhancing relationship satisfaction.
To explore touch dynamics in couples, we analyzed data from 7,115 dyads in the German Family Demography Panel Study (FReDA), where participants reported on the frequency and desire for three forms of touch using illustrated questionnaires (kiss, embracing, and intimate hugging), from which we calculated touch frequency, touch desire, and touch deprivation (defined as the discrepancy between desire and frequency).
Touch-related responses were collected alongside five broader data categories: sociodemographic, personality and attitudes, well-being, formal relationship characteristics, and relationship quality.
Our findings reveal a positive correlation between both received and desired touch frequency and relationship satisfaction. Touch frequency was also associated with higher relationship communication quality for both Anchor and Partner. Notably, a negative correlation can be observed between touch frequency and relationship duration, which appears to be influenced by participant age.
These results emphasize the critical role of affectionate touch in maintaining relationship health and underscore the importance of considering both partners' touch experiences in relationship research.

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Early holding experience is related to DNA methylation level of the serotonin transporter promoter

region in adolescence

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Serotonin plays a key role both during brain development and later functioning. The serotonin transporter has been implicated in regulating mood, anxiety and depression, and in the pathophysiology of several stress-related conditions.
Increased DNA methylation in the promoter region results in lower transcription efficiency in the same region and has been linked to histories of early life stress.
In the present longitudinal study, we analysed maternal diaries at 6 weeks of age in the Budapest Family Study. Mothers kept track of the baby's state (asleep, alert, fussy, crying, feeding) and the time of infant holding by a caregiver. Forty seven mother and child dyads provided saliva samples when the child was 17.7 years old. DNA methylation of selected gene regions and marker sites to control for epithelial cell ratio was measured in the adolescent samples. Serotonin transporter promoter region DNA methylation levels were consistently associated with the amount of infant holding at 6 weeks. Holding the infant when it was alert, or fussy was also negatively related to methylation. Methylation of the COMT promoter coding for the membrane-bound COMT isoform was related to infant holding. Adverse early-life events can have long-term effects by changing the methylation level of various regulatory regions. Our study demonstrates that normal variation in the amount of holding in a highly educated middle-class sample may have a long-lasting effect on the methylation of the serotonin transporter promoter region.

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