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ABSTRACT

English

This paper presents the paradigm of Embodied Cognitive Science as a theoretical framework for rethinking healthcare education and the care relationship. By challenging classical cognitivism, it emphasises the active role of the body in cognition, communication, and therapy. The article explores how narration, gesture, and bodily presence co-construct meaning, proposing a reflection on possible training models that enhance the body as a source of knowledge and a medium of transformative learning.

Italiano

Il presente contributo presenta il paradigma delle Embodied Cognitive Science come quadro teorico per ripensare la formazione sanitaria e la relazione di cura. Mettendo in discussione il cognitivismo classico, si evidenzia il ruolo attivo del corpo nella cognizione, nella comunicazione, nella terapia. Il lavoro esplora le modalità attraverso cui la narrazione, il gesto e la presenza corporea co-costruiscono in significato, proponendo una riflessione sui possibili modelli formativi che valorizzano il corpo come fonte di conoscenza e mediatore dell'apprendimento trasformativo

KEYWORDS

Inglese: *Embodied cognition; healthcare training; care relationship; narrative medicine; pedagogy of care*

Italiano: *Cognizione Incarnata; Formazione Sanitaria; Relazione di Cura; Medicina Narrativa; Pedagogia della Cura*

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Introduction

Today, training needs a radical rethinking of its founding paradigms, with a view to the integral education of the person (Maritain, 1985, 1995, 2001, 2002). It cannot be reduced to a sequence of standardised procedures or mere mechanical processes: training is, rather, a complex experience in which the biological, psychological and social dimensions of the human being merge and harmonise. In this direction, the *Embodied Cognition* (EC) approach (Varela, Thompson & Rosch, 1991; Lakoff & Johnson, 1999) recognises the body as having an epistemic and generative role, understood as an active constructor of meanings and signifiers. The body thus becomes the living and concrete place from which the mind springs and, with it, situated learning (Gomez Paloma & Damiani, 2015; Gomez Paloma, 2017). When translated into the therapeutic field, this perspective translates into an encounter between embodied horizons of meaning: *bodies-that-heal* and *bodies-that-are-healed* can be configured as relational spaces in which healing becomes a mutual experience of recognition. As Marano (2006) points out, «the observation that interpersonal contact between doctor and patient is not limited to the technical aspect of treating illness but is enriched by the human relationship between the two subjects dates back to the dawn of time» (p. 15). From this perspective, the care relationship opens to the acceptance of the fragility that is constitutive of the human experience, understood as an existential and ontological dimension of being (Muscarà et al., 2025).

In the medical-healthcare field, however, the very concept of care is exposed to a structural vulnerability, often linked to the marginalisation of the emotional-empathic aspects that make the relationship authentic and formative (Cara et al., 2020, p. 65). Healthcare personnel frequently find themselves having to manage narrative and intimate dimensions of the self — their own and others' — which they must take on in a conscious and reflective manner. As Zurru (2020) states, «when there is a lack of interpretative attention to the complex existential phenomenon of being ill and entrusting an intimate part of oneself to another, the act of care is reduced to objective investigation alone, which also becomes limiting in terms of the professional and human experience of the doctor» (p. 44). The practice of corporeality, embodied simulation and reflection on one's own contextualised

actions therefore emerge as essential elements in training processes. They represent not only pedagogical tools, but also genuine devices for ethical and relational awareness. Every patient, like every doctor, is *unique* (Zurru, 2020, p. 47): inhabiting the care relationship therefore means cultivating one's physical, emotional and empathetic presence in a continuous exercise of listening, interpretation and resonance.

1. The Thinking Body: Theoretical and Empirical Foundations of Embodied Cognition

1.1 Theoretical evolution: from classical cognitivism to embodiment

In line with what has been discussed so far, the theoretical elaboration that leads to the current perspective of E.C. arose as a critical reaction to the assumptions of classical cognitivism. The latter, in its original formulation (Fodor, 1975; Newell & Simon, 1976), conceived of the mind as a symbolic processing system, regulated by formal processes independent of corporeality. From this viewpoint, cognition is understood as a set of computational operations based on amodal representations. Such a view reduces the complexity of human experience to a purely abstract and incorporeal dimension. For years, this thesis dominated cognitive science, establishing a strongly dualistic epistemological model in which the mind is represented as a separate entity superordinate to the body. However, since the 1980s, there has been a gradual process of revising and overcoming this paradigm. Thanks to the *autopoietic theory* of Maturana and Varela (1980), a new perspective has taken shape: living systems are described as autonomous units that construct their own cognitive domain through continuous interaction and renegotiation with their surrounding environment. The so-called *enactive* perspective, later developed by Varela, Thompson and Rosch (1991), suggests a paradigm shift that focuses on the dynamic and relational component of experience.

Cognition is no longer conceived as mere internal processing, but is understood as an embodied, situated and co-constructed process, emerging from the interaction between the brain, body and environment (Fuchs, 2009; Foglia & Wilson, 2013; Newen, De Bruin & Gallagher, 2018; Shapiro, 2019). In this direction, the extended mind theory formulated by Clark and Chalmers (1998, 1999) constitutes a further step towards overcoming the Cartesian dichotomy between mind and world. The authors propose an *active externalism*, according to which the environment is not a mere passive context, but a constitutive and co-adjuvant element of cognitive processes. They state: «Where does the mind stop and the rest of the world begin?

[...] We advocate a very different sort of externalism: an active externalism, based on the active role of the environment in driving cognitive processes» (Clark & Chalmers, 1998, p. 7). The evolution from classical cognitivism to *embodiment* marks a far-reaching epistemological transition: the mind ceases to be understood as an isolated device and becomes an open system integrated into the body, in which knowledge takes shape through action, perception and relationship. This perspective, as we saw in the previous paragraph, not only redefines the meaning of learning and educational experience, but also establishes a new anthropology of care, in which the thinking body becomes a space for knowledge, relationship and transformation.

1.2 *The body as a cognitive agent*

In line with the enactive and relational perspective outlined above, the body emerges no longer as a simple biological support for the mind, but as a *cognitive agent*, constitutively involved in the processes of knowledge construction. Cognitive experience is rooted in a circular dynamic of *sensorimotor coupling*, through which the constitutive interdependence between perception and action manifests itself. As argued by O'Regan and Noë (2001), the organism perceives the world through its own possibilities for action and, at the same time, acts based on perceptual information that continuously reorganises and redefines behaviour. This interpretation is supported by neuroscientific evidence: motor cortical areas are activated not only during the execution of movements, but also in linguistic comprehension tasks related to action verbs (Hauk, Johnsrude & Pulvermüller, 2004; Pulvermüller, 2005). This evidence confirms the existence of a direct link between language and motor systems, suggesting that semantic comprehension is based on sensorimotor patterns rooted in bodily experience (Barsalou, 2008). Cognition, therefore, is not an abstract or disembodied process, but a situated and bodily phenomenon, in which language and action influence each other in a bidirectional interdependence (Fischer & Zwaan, 2008).

In support of this perspective, Lakoff and Johnson (1980, 1999) have shown how human thought is organised through sensorimotor schemas that generate conceptual metaphors, thanks to which concrete experiential domains (space, movement, force) are projected into abstract domains (time, emotions, social relations). In this sense, *metaphorisation* represents the cognitive translation of *sensorimotor coupling*: a device that reveals how bodily experience shapes the ways in which we interpret, represent and communicate the world. The application of this paradigm to the context of clinical practice opens horizons of particular

interest. The metaphors that populate the narrative of illness — such as “recovering from an illness” or “fighting cancer” — are not mere rhetorical figures, but actual cognitive tools that shape lived experience and therapeutic meaning (Semino et al., 2018). Language, gesture and posture are thus intertwined in the same semantic fabric, where care also becomes an interpretative act of one's experience in the world. In this perspective, the body is configured as a place of meaning, a symbolic and perceptive space through which the subject gives shape to reality and to himself. Words, as Giurisatti (2024, p. 63) states, not only *have a face and a body*, but *are face and body*, as they actively participate in the process of signification. We cannot fail to recognise a profound resonance in the phenomenology of Merleau-Ponty, for whom «[...] we are in the world by virtue of our body, because we perceive the world with our body. But by thus regaining contact with it and with the world, we will also rediscover ourselves, since, if we perceive with our own body, the body is a natural self and the subject of perception» (Merleau-Ponty, 2003, p. 281). The body, therefore, is not only an object of knowledge, but also *a knowing subject*: the point of origin from which every cognitive, emotional and relational experience unfolds. In this way, reflection *on embodiment* is linked to the educational and clinical dimensions, restoring the epistemic, ethical and educational status of corporeality.

2.3 Towards a pedagogy of care: reflecting on fragility

Considering the above, *fragility* can be seen as a constitutive dimension of humanity, not as a sign of deficiency, but as a place where meaning and responsibility are generated (Canevaro, 2015). It becomes a space of openness to others, an opportunity to recognise one's own vulnerability and to build paths of ethical, cognitive and emotional growth. In this way, fragility is transformed into a dynamic condition of learning, capable of fostering awareness of one's own limits and the enhancement of one's own resources, promoting attitudes of receptivity, flexibility and adaptation. Education therefore takes on the function of enabling the subject to *inhabit* their own limits. A limit understood not as a barrier but as a horizon of possibilities. Limits as a threshold of transformation, a meeting point between vulnerability and potential: a place of meaning where individuals can come to terms with their own finitude without giving up their drive for growth. Accompanying others in this process means supporting their search for meaning even in pain and difficulty, guiding their experience towards the realistic construction of their own Life Project (Lo Piccolo, 2021). Care is not only a therapeutic act but is also an ontological and educational category, implying responsibility, proximity and mutual recognition. In Heidegger's reflection

(Heidegger, 1976, 1995, 2003), the term *Sorge* encompasses this constitutive dimension of existence, distinguishing between 'taking care of things' (*Besorgen*) and 'taking care of others' (*Fürsorgen*). In the pedagogical field, this translates into a shift from *defective* care, which replaces and limits, to *supportive* care, which accompanies and liberates (Brencio, 2022). The latter represents the authentic form of the helping relationship: an action that promotes autonomy, responsibility and awareness, favouring self-realisation while respecting the freedom of others (Muscarà et al., 2025). From this perspective, educational care emerges strongly as a dialogical and transformative practice. It is built on the recognition of the dignity of the person and the support of their potential, focusing on the construction of an autonomous and relational identity (Lo Piccolo, 2019, 2021). *Dialogue*, understood as a form of participatory mutuality, becomes the essential tool for generating genuine relationships and shared paths of meaning. Canevaro (2022) proposes two very effective metaphors to describe this logic: that of the *border*, which delimits but can also exclude, and that of the *path*, which opens the possibility of encounter and coexistence.

The educational task consists in maintaining a dynamic balance between the two logics, so that the helping relationship does not close itself off in welfare but opens up to supportive reciprocity. In conclusion, the pedagogy of fragility is rooted in the embodied awareness of the human being as a thinking, vulnerable and relational body. Caring for oneself and others means recognising the common condition of finitude and, at the same time, the possibility of a shared rebirth. Care thus becomes *a humanising act*, an experience through which the individual shapes their own existence, constructing meaning, belonging and hope in the shared world.

2. The Healing Relationship: Narrative, Communication, and Relational Meaning

2.1 Narrative and healing: from theory to clinical practice

The logic of *boundaries* and *paths* is well suited to narrative as a process deeply related to the body: life stories are, in fact, inseparable from the physical experiences that underpin them. In recent years, the literature on healthcare training has begun to integrate the *embodied* paradigm with promising results, although there is still a noticeable lack of awareness of the bodily dimension in healthcare professional training. In *narrative medicine*, the patient's story is conceived as a source of clinical information, an ethical resource and a therapeutic tool. Rita Charon (2001) developed the concept of *narrative competence*, i.e. the

ability of the clinician to read, interpret and access first-hand accounts of illness, allowing the relationship to extend beyond biomedical data: «Patients' bodies speak to us, and our bodies speak back. This I have come to understand not by virtue of my internal medicine training but by virtue of a life lived among patients and clinicians who respect the body enough to listen to it. With some sense of disloyalty to my own profession, I have to admit that internal medicine has yet to understand this, except along the edges in palliative care or what is now called integrative medicine. And so, many of us in conventional medicine seek wisdom from those healers who have the skill and insight to enter, with presence, into the presence of the ill person» (Charon, 2015, p.1).

Narrative offers doctors the opportunity to *read between the lines of pain*, improving their understanding of the patient's identity and existential context (Kitta & Masel, 2024). An interesting study on the value of the patient's story in the palliative care pathway reveals that biographical narratives help to bring to light psychological concerns, spiritual needs and family relationships that would otherwise remain invisible in the clinical file: «Sitting at the heart of physician-patient relationships are patients' stories that supplement physicians with rich context-sensitive, culturally-pertinent, personalised, spiritual, sociocultural, relational, and psycho-emotional information about patients and their needs, goals, preferences, and interests. Patients' stories contain their narratives that concern the 'formalised, academic version of narrative medicine' and focus on the patient's illness, as well as their identities, values, beliefs, and goals before their illness. Stories also encompass personal, demographic, historical, and psychosociocultural anecdotes and accounts» (Quah et al., 2023, p.1).

In oncology, Gärtner et al. (2024) studied the ways in which narrative methodologies in cancer patients promote meaning-making, hope, and greater coherence in life stories in the presence of illness. Also, in the field of healthcare education, Kilbertus et al. (2022) conducted a *narrative inquiry* with palliative care practitioners, indicating how narrative experiences help to integrate the human dimension of the patient into therapeutic models.

2.2 Communication that heals: body, gesture and presence

In palliative care, verbal communication is often not enough: patients send body signals that convey pain, rejection, resignation or hope. A qualitative study conducted in two Danish *hospices* by Voetmann, Hvidt & Viftrup (2022) highlights that patients express spiritual needs mainly through bodily presence, gestures, pauses, postural changes and silences — elements that healthcare professionals

decode as essential components of the relationship. According to the authors: «The patients in our study expressed the value of the *Health Care Professionals* (HCPs) sitting with them and being present both physically and relationally. We believe that the patients' descriptions of bodily presence and their experience of a connectedness with the HCPs can be interpreted as representations of this presence or way of being. We found no clear answer as to how the patients and HCPs relationally can transcend the dilemma surrounding the direction of the initiative, in terms of initiating conversations about spiritual matters. However, we found that the patients' interpretation of the relationship and sensing is of great importance in terms of how patients experience the accessibility of HCPs, and that a kind of connectedness is important in determining whether patients open to conversations of a spiritual nature» (Voetmann, Hvidt & Viftrup, 2022, p.5).

In a case of therapy with a non-verbal patient with severe autism, Delafield-Butt et al. (2020) describe how the therapist and patient co-construct narrative and meaning through legible movements, shared glances and synchronised gestural rhythm: «This case study has shown that autism does not entirely rupture an individual's capacity for primary intersubjectivity. This young woman, regarded by carers as aggressive and psychologically distant, was able to co-create meaningful communicative exchanges in partnership with another human being whom she had just met. Such an outcome raises important theoretical questions, for it conflicts with the prediction made by the predominant cognitive accounts, which hold that a theory of mind deficit prevents autistic people from sharing mental and emotional states. [...] Further, we emphasise the fact that in our data narrative structures, a cornerstone of human meaning-making, were generated within the dyad's interactions and followed a normal, characteristic pattern. These data show primary intersubjective capacities readily emerge in the right social environment, with feeling expressed in reciprocal movement of body and voice attuned to the individual» (Delafield-Butt et al., 2020, p.71).

In a 2024 study, Öhrling et al. report that patients involved in palliative care unconsciously communicate through changes in body shape, physical appearance and actions, which act as *body talk* detectable by caregivers: «When patients were asked about experiences of telling others about their illness, they clearly expressed nonverbal dimensions of this communication, in the form of different cues. The significant others were also asked about their experiences with communication and reported that they noticed nonverbal cues. Three themes, characterising these cues, common to patients and significant others, were identified: Body talk, Extension talk and Action talk. The first two themes describe the nonverbal communication of objects—how the patient's body changes and how its extensions

'talk'. The third theme focuses on how cues in certain kinds of actions entail nonverbal communication. A fourth theme, To say, or not to say?, centres around if and how the nonverbal is verbally communicated by the patient, and a fifth theme, Significant others' understanding, focuses specifically on the experiences of significant others» (Öhring et al., 2024, p.5).

In this situation, the doctor can't just sit back and watch: they need to be an active listener, aware of themselves and the *Other-than-Self*, able to pick up on and interpret physical tension, adjust their own presence, and respond in a way that's consistent and communicatively effective. Hence the importance, in healthcare training, of cultivating awareness of one's own body on the one hand, and sensitivity in grasping implicit relationships, tones and communicative nuances beyond simple technical data on the other.

2.3 The care relationship as care for narration

If narration and communication are deeply linked to the bodily, situated and contextual dimension, then the therapeutic relationship should be rethought as a co-negotiation of meaning. In this sense, doctor and patient dialogue not only through words, but through a complex interweaving of gestures, bodily rhythms, proxemics and interaction in contexts and environments with specific characteristics. A study in the field of psychiatry highlights how, in clinical practice, *body talk* is perceived as an integral part of therapeutic content, operating as *a bodily channel* that accompanies language and guides *assessment* and therapeutic approach: «An embodied approach appeared to be more integrated into goal-setting and treatment than into assessment. Participants commonly saw the assessment as being evaluated, rather than playing an active role. It seems that when the body is viewed from a third-person perspective as a biological and biomechanical system, rather than as an embodied self, an opportunity is missed for an interactive approach to assessment—one that could edify both patient and therapist and could clarify how underlying impairments influence movement problems.» (Sivertsen et al., 2022, p.8).

The therapeutic relationship thus becomes a place of continuous negotiation, in which language and embodied interaction mutually shape the identities involved. In *co-therapeutic* contexts, shared dialogic practices promote mutual bodily presence and allow therapists to co-regulate rhythm, breath and presence, contributing to an emerging understanding of the therapeutic journey: «Co-therapy contributes significantly to the development of therapists' professional self and experiencing self. Through various co-therapy processes, therapists support each

other to attend to, unfold and share different voices of their inner dialogue with the network. It is easy to get stuck in one position, inspired by learnings of the professional self or by memories of the experiencing self. Through co-therapists' invitation of one's different voices, therapists can make these voices less demanding, allow to move around different ideas and develop polyphony. This transformation of co-therapists in repositioning themselves as polyphonic individuals is reflected in the dialogical presence with each other that is not predetermined by their professional roles. Co-therapy can be a shared space for co-therapists to explore their differences and disagreements together, until something new emerges. This is how dialogue becomes healing» (Lagogianni, Georgaca & Christoforidou, 2023, p. 10).

The examples described above highlight the importance of exercising presence in the therapeutic relationship, a true *cure for healing* starting from the relationship with oneself and the ability to express one's presence in a conscious and authentic manner. This perspective can become a reality in healthcare training, if practitioners are enabled to acquire the bodily, kinesthetic and intersubjective awareness that allows the Other to *be authentic*. Only in this way can a caring relationship attempt to transcend technicality and become an open and human dialogue in a continuous negotiation of meaning that takes place and is situated in the physical, interactive and bodily relationship.

3. Directions of Meaning: Towards a Pedagogy of Care

Embodied Cognition paradigm invites us to overcome the traditional fragmentation between technical knowledge and relational knowledge, restoring the body's role as a device for thought and a mediator of educational and therapeutic relationships. In this perspective, knowledge is not an abstract or merely cognitive process, but a lived experience, rooted in the bodily dimension and its ability to give form and meaning to the world. The concept of *body pedagogics*, developed by Kelly et al. (2019) in the context of the health professions, fits fully into this vision, proposing to reintegrate multisensory experience as the core of learning: through experiential practices, sensorimotor exercises and embodied reflection, the student's body undergoes transformations that become a constitutive and automatic part of clinical competence. This perspective, which combines professional and personal training, is confirmed in the international literature *on curricular integration*: as Brauer and Ferguson (2015) point out in *AMEE Guide No. 96*, integration does not consist of the simple juxtaposition of disciplinary content, but of *the organic connection* between theoretical knowledge, clinical practices and

bodily experiences. This results in a pedagogical vision in which competence arises from the dynamic interaction between technical knowledge, sensory experiences and relational dimensions, overcoming any disembodied approach to training. In this way, Porter (2024) emphasises how traditional medical epistemologies, still tied to a mechanistic and reductionist paradigm, tend to marginalise *embodied* and *experiential* forms of knowledge, which are nevertheless essential components of clinical practice and educational action. A *pedagogy of care* based on epistemic integration therefore requires a profound rethinking of training culture: healthcare curricula must include experiences that engage the body, allowing it to act and be acted upon, and must train teachers capable of cultivating perceptive and empathetic sensitivity, providing learning spaces open to movement, presence and embodied reflection. In this perspective, the meaning of care arises from the living body and *intercorporeal encounter* (Faella et al., 2025): it is not enough to *do*, it is necessary *to be there* with one's whole body, to perceive the tension of the gesture, the silence that accompanies a narrative, the tremor that translates suffering. Thus, bodily knowledge does not remain implicit but becomes an explicit part of the training programme, orienting healthcare training towards an experiential, relational and deeply human dimension. The realisation of this paradigm implies that training becomes a true *embodied laboratory*, in which technical and relational skills are developed in an integrated way through reflective and bodily practices (Kontos et al., 2020). Research, for its part, is called upon to provide a solid empirical basis for measuring the impact of such approaches on non-verbal communication and professional well-being: *narrative medicine*, for example, has proven effective in strengthening therapeutic presence and relational awareness (Huang et al., 2021; Negri et al., 2022), while the construction of *communities of practice* (Wenger-Trayner et al., 2015) and the use of *immersive technologies* (Riches et al., 2022) offer innovative tools for training clinical sensitivity and empathic capacity. In summary, the *pedagogy of care* reinterpreted in the light of the E.C. paradigm restores the body's epistemic and relational status, configuring it as a place of knowledge and encounter, where knowledge, action and feeling intertwine in a process of integral formation, oriented not only towards competence but also towards the humanisation of care itself.

Conclusions

The adoption of the E.C. paradigm can therefore be a valid interpretative lens for reinterpreting the relationship between training and clinical practice: the body is not simply a vehicle for technique, but an epistemic and relational device that co-

generates meaning in care. From the theoretical foundation of the paradigm to the most recent neuroscientific evidence on language and action, from embodied narrative practices to non-verbal communication, to curricular and evaluative implications, an extremely clear thread emerges: professional knowledge is inseparable from situated bodily experience and its pedagogical translation. The result of this training is a pathway capable of integrating technical skills, interpersonal sensitivity, presence and clinical reflexivity, making the therapeutic relationship a place for co-constructing meaning rather than merely applying procedures. The prospects for development require careful consideration of at least three aspects. In terms of *research*, experimental and longitudinal studies that are pragmatic and multicentric are essential to measure the impact of EC-based methodologies on clinical and training outcomes: quality of the relationship, safety and appropriateness, the well-being of professionals, and transferability to real contexts. A mixed evaluation combining *quantitative indicators* (e.g., measures of interoceptive awareness, standardised coding of non-verbal communication, clinical performance) and *qualitative analyses* (narratives, debriefings, ethnographic observations), including multimodal data from simulations and immersive environments, should be favoured. In terms of *curriculum*, the *pedagogy of care* requires the targeted design of embodied experiences (body awareness workshops, performative practices, high-fidelity simulations, VR/AR oriented towards clinical presence), capable of making the physical dimensions of competence visible and assessable.

In terms of *teacher training itself*, it is essential to develop *faculty development* based on solid scientific training combined with strong human preparation: trainers capable of modelling professional postures, relational space management, interoceptive listening and reflection in action; trainers capable of guiding communities of practice that can support continuity, safety and effectiveness (ten Cate, 2017; ten Cate & Carraccio, 2019). Finally, important perspectives are opening regarding *ethical and institutional implications*. Integrating the body into healthcare training does not mean de-semantising or invalidating care protocols but rather recognising their materiality and fragility. This fragility does not belong only to the system or the patient, but also to *the healthcare professional*, immersed in *the community they care for*. A *pedagogy of care* must ultimately strive to build a training pact that can recompose mind and body, emotion and cognition, technical knowledge and human knowledge, *being in care* and *caring for being*: reshaping curricula to be more responsive to contexts, integrating assessments that include the quality of presence, implementing educational policies that support time and space for meaningful and situated learning. The direction is clear: to train

professionals who know *how to do* and know *how to be* in the body, capable of transforming the clinical encounter into an act of shared knowledge and profound therapeutic significance.

Author contributions

The paper is the result of constant collaboration and discussion between the authors. Nicolina Pastena wrote the introduction, outlining the theoretical context and objectives of the study. *Antonio Cuccaro* developed sections 2 and 3, focusing respectively on the epistemological foundations of “embodiment” and the narrative and communicative dimensions of care. *Chiara Gentilozzi* drafted the conclusions, summarising the main results and indicating future directions for research. Overall scientific supervision and coordination were provided by *Filippo Gomez Paloma*. All authors contributed to the critical discussion, revision and final approval of the manuscript.

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