The neurophysiology of human touch and eye gaze and its effects on therapeutic relationships and healing: a scoping review protocol

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Review question/objective: The objective of this scoping review is to examine and map the range of neurophysiological impacts of human touch and eye gaze, and better understand their possible links to the therapeutic relationship and the process of healing. The specific question is “what neurophysiological impacts of human touch and eye gaze have been reported in relation to therapeutic relationships and healing?”

Keywords Gaze; healing; neurophysiological; therapeutic relationship; touch

Background

This review will attempt to connect and show the relationship between the body of work on the importance of human interaction, positive nurse–patient relationships and the therapeutic relationship for healing and the fundamentals of care, and the body of work on the neurophysiological impact of touch and eye gaze on human interaction with trusted others. Both bodies of work include the variables of trust and positivity as relevant mediators of the impact of human interaction.

The fundamentals of care refer to the essential elements of care that every patient requires regardless of their clinical condition or the setting in which they are receiving care. They can be physical, such as nutrition, hydration, elimination and hygiene, and psychosocial, such as respect, dignity, privacy, empathy and cultural safety, in nature. Given the growing evidence that these fundamentals are being poorly executed globally, there is increasing emphasis on how these fundamentals can best be delivered in practice.2–10 Research is beginning to acknowledge that a positive, trusting nurse-patient relationship is integral to the delivery of high-quality, person-centered fundamental care.1,11 However, the specific neurophysiological mechanisms by which this positive relationship impacts patient care, safety and positive patient experiences are unknown.

In addition to work on the fundamentals of care, there is a large body of work on the importance of an empathic, therapeutic relationship for patient health, healing, resilience and hope.12–14 This therapeutic relationship may involve multiple “actors” as patients can interact with multiple health professionals in any healthcare episode. Specific studies include grounded theory work on connectedness,15 social influences on healing and stress,16,17 meta-analyses of noncontact healing studies18 and reviews of the effect of interpersonal touch on patients19,20 and specific cells.21

There are also studies and literature reviews on the role of trust in nurse-patient relationships22,23 and the impact of increasing technological interaction on this therapeutic relationship.24,25 These studies demonstrate the increased capacity for hope displayed by the patient when there is a high trust relationship and personal interaction between the patient and nurse/medical practitioner, and even the observed difference such hope makes to the quality and potential for survival in critically ill patients.26,27 The observed interactions and interconnections that are considered to be relevant to improving the healing capacity of patients in these
circumstances include the display of genuine empathy, direct eye contact and physical touch motivated by even a slight level of compassion.

Although clinicians and many patients are in no doubt as to the efficacy of a positive therapeutic relationship (sometimes referred to as good bedside manner), much evidence is based on self-reporting by the patient or observation by the practitioner.\textsuperscript{13,24}

There has been little formal exploration on establishing what happens in the body to elicit such efficacious reactions in patients. There is however a growing body of work on the neurophysiological impact of human interaction. Physical touch and face-to-face interaction entailing eye gaze and retinal eye lock are two types of contact that produce neurophysiological effects on the body.\textsuperscript{20,28,29}

**Physical touch**

There is a growing number of studies investigating the neurophysiological impact (both effect of and reaction to) of physical touch. Studies discriminate between and examine the cortical dynamics of both discriminative (discrimination of stimuli) and affective (pleasant, gentle stroking) touch,\textsuperscript{30–34} and include the way in which the brain registers (codes) affective touch.\textsuperscript{35–38} The neurophysiological response to interpersonal touch includes the release of specific chemicals and neurotransmitters that, in turn, lead to neuroendocrine effects; vagal stimulation; reduction of stress, pain and depression; and enhancement of immunity.\textsuperscript{20,39–42} Affective touch also appears to lessen allostatic load in critically ill patients\textsuperscript{20} because of the positive effects on pathophysiological processes aggravated by stress such as immune and neuroendocrine derangements and inflammation.\textsuperscript{28,39} There is early evidence of an interoceptive effect of affective touch that will aid rehabilitation through alterations to the insular cortex and limbic system.\textsuperscript{43}

Affective touch is transmitted primarily through stimulation of the nerves unmyelinated C-fibers, which are shown to be beneficial to the process of healing.\textsuperscript{29} Affective touch is represented in areas of the brain that are closely related to the perception of emotion and empathy, and this affective-emotional pathway runs in part through the spinomesencephalic tract, engaging the amygdala, insula and anterior cingulate cortex.\textsuperscript{29} Resultant neurophysiological reactions can mediate the perception of touch, and are shown to be beneficial to the healing process as well as having a positive effect on a patient’s capacity for pain management\textsuperscript{25,44} and a number of physiological outcomes, including changes to autonomic innervation through repetition of affective stimulation.\textsuperscript{20}

**Face-to-face interaction, eye gaze and retinal lock**

One of the most powerful human interactions is face-to-face contact involving eye gaze; the interaction between trusted individuals creates a neural duet between brains as people interact, with a powerful effect on the level of trust, empathy and positive attitudinal shift.\textsuperscript{45} Face-to-face contact involves the activation of mirror and spindle neurons.\textsuperscript{33,46,47} When interacting with trusted others, a number of chemicals are released including oxytocin and vasopressin,\textsuperscript{48,49} both of which are associated with lowering physiological stress response and aiding both growth and wound healing.\textsuperscript{50} Social interaction becomes an interactive process of positive feedback whereby increased levels of oxytocin in turn encourage even greater levels of gaze to the eye region of human faces.\textsuperscript{49} This dynamic further increases the level of trust and empathy between the interacting parties.

When there is sufficient trust and positivity, a contagion effect can occur, which stimulates the parasympathetic nervous system and releases immune system chemicals that enable neuroplasticity and neurogenesis to occur.\textsuperscript{51,52} These same chemicals are involved in changes to such things as hormonal responses triggered by stress, pain signaling and integration, and immune system strength, all of which are directly related to healing and resilience through mechanisms such as modulating the interplay of lymphocytes that produce antibodies\textsuperscript{73} and triggering hormone and neuropeptide changes that mediate emotions.\textsuperscript{13,34}

Eye gaze and retinal eye lock between an anxious person and a trusted “other” has a direct effect on the synchronization of the right brain hemispheres\textsuperscript{55,56} and the quietening of the sympathetic nervous system and amygdala,\textsuperscript{57} changing the “fearful effect” and increasing the ability to deal with trauma. Thus, it enables the caregiver or trusted “other” to “soothe”.\textsuperscript{48,57} The “eye contact effect” modulates activity in structures in the social brain network,\textsuperscript{58} aiding communicative intention and affective arousal. There is growing evidence of the link between these neurophysiological reactions and
a decreased level of morbidity and mortality through changes such as an increased capacity for hope,\textsuperscript{13,59} the capacity to reframe vulnerability and deal with trauma\textsuperscript{60,61} and neurophysiological reactions related to the placebo effect.\textsuperscript{62}

In summary, touch and face-to-face interaction with trusted others have a number of neurophysiological effects that are relevant to both healing and the building of a therapeutic relationship. These neurophysiological effects are heightened, created, moderated or mediated by the quality of the relationship shared by the individuals. Trust and empathy, in particular, appear to be mediators as they have a profound effect on the body’s generation and/or secretion of beneficial chemicals such as serotonin.

This scoping review will attempt to connect the evidence outlined earlier and establish that the beneficial effects of a therapeutic relationship are due in part to the neurophysiological effect of touch and eye gaze on healing. It will also gauge the impact and role of the major variables of trust and empathy on this neurophysiological effect.

A preliminary search for existing published or underway scoping reviews on the topic has been conducted, and no relevant reviews were found. The databases searched were Joanna Briggs Institute (JBI) Database of Systematic Reviews and Implementation Reports, Cochrane Database of Systematic Reviews, CINAHL, PubMed, EPPI, Scopus, Psychology Information, Web of Science and Epistemonikos.

Methods
This scoping review will adopt the methodology for JBI scoping reviews as described in the 2015 JBI Reviewers’ manual.\textsuperscript{63,64}

Inclusion criteria
Types of participants
This scoping review will consider studies that include cognitively intact human participants of any age in laboratory and clinical settings. Patients who are heavily sedated or unconscious will be excluded.

Concept
This scoping review will investigate a number of areas related to the neurophysiology of human interaction including touch and eye gaze, and their relationship to healing and building a useful therapeutic relationship with trusted others. The concepts examined include:

- Neurophysiology of care
- Neurophysiology of touch
- Neurophysiology of eye gaze
- Neurophysiological impacts on healing
- Therapeutic relationships

Context
This scoping review will consider studies that have examined, in either clinical or laboratory settings, the neurophysiological impacts of touch and eye gaze, and that draw links to the therapeutic relationship and the process of healing.

Types of studies
This scoping review will consider both experimental and quasi-experimental study designs including randomized controlled trials, non-randomized controlled trials, before and after studies and interrupted time-series studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies will be considered for inclusion. This review will also consider observational cross-sectional studies for inclusion. Only quantitative studies will be included as the aim is to examine objective measures of neurophysiological changes as a result of human touch and gaze.

Search strategy
The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilized in this review. An initial limited search of Scopus, MEDLINE and CINAHL will be undertaken followed by an analysis of the text words contained in the title and abstract, and the index terms used to describe articles. A second search using all identified keywords and index terms will then be undertaken across all included databases. Third, the reference list of all identified reports and articles will be searched for additional studies. Studies published in English will be considered for inclusion in this review. All studies published will be considered for inclusion in this review.

The databases to be searched include CINAHL, PubMed, Cochrane Central Register of Controlled Trials (CENTRAL) Scopus, PsycINFO and Web of Science.
Initial keywords to be used will be gaze, healing, neurophysiological, therapeutic relationship and touch.

**Data extraction**

Data will be extracted from articles included in the scoping review using the draft data extraction tool (Appendix I) by two independent reviewers. The data extracted will include specific details about the populations, concept, context and study methods of significance to the scoping review question and specific objectives. Any disagreements that arise between the reviewers will be resolved through discussion or with a third reviewer. Authors of articles will be contacted to request for missing or additional data wherever required. The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included study. Modifications will be detailed in the full scoping review report.

**Data mapping**

The extracted data will be presented in diagrammatic or tabular form in a manner that aligns with the objective and scope of the scoping review, including a mind map of the various aspects of the study and how they interrelate. A narrative summary will accompany the tabulated and/or charted results and will describe how the results relate to the review’s objective and question.

**Acknowledgements**

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**References**

Appendix I: Data extraction form for scoping systematic review

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