Improving Empathy in the Care of Pain Patients

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Abstract

Empathy is associated with countless benefits in clinical interactions, yet it is not always optimal in health care providers. Social neuroscience offers a window onto the cerebral processes underlying the complex relationships between the multiple components of empathy, patient care, and the caregiver's well-being. Neuroimaging studies have revealed patterns of empathy-related neural responses that shed some light on the mechanisms that could partially explain the phenomena of empathy decline and pain underestimation in health care providers. Such information, complementary to behavioral research findings, may help develop new means of improving empathy in health care, as long as interpretation of neuroimaging data remains grounded. Additionally, research on empathy in this context has largely focused on how clinicians' empathy may affect patient outcomes, but the relationship between empathy and well-being in health care providers is often neglected. The quest to optimize empathy in patient–clinician interactions must take into account the welfare of both members of this dyad.

Keywords: cognition, emotion, empathy, neuroscience, neuroimaging, pain

Health care providers, who share the noble calling of helping others in need, are frequently exposed to pain and emotional suffering, and often on a daily basis. How they respond to this suffering can have a significant impact on their patients, as well as their own well-being. One very important aspect of patient–caregiver interactions that has received substantial attention over the last decades is clinicians' empathy. Empathy in this context, typically assessed through self-reported measures, has been associated with more accurate diagnoses, as well as reduced distress and increased satisfaction and compliance with treatment in patients (Neumann et al. 2011). While self-reported measures offer valuable information on dispositional empathic abilities (i.e., a person's traits or general tendencies, rather than actual behavior), most do not allow the examination of how empathic responses may vary depending on the patient or the context, which is important given the multiple factors that can affect clinicians' empathy.

By measuring the neural correlates of empathy in different experimental contexts, social neuroscience research has provided a complementary and perhaps more objective (albeit not absolute, as discussed later) perspective on clinical empathy. In this review, we wish to provide a comprehensive summary of what we have learned from social neuroscience research about empathy in the context of patient care. Our article also highlights the potential benefits of promoting empathy from both the patient's and the clinician's perspective, and examines the ethical implications of using state-of-the-art neuroscience methods to shed some light on this multifaceted, and mostly covert, mental process.

UNIFYING EMPATHY

One of the challenges in empathy research is the variability in how this concept is defined and measured across studies. Empathy is generally defined as an ability to perceive, understand, and, to varied extent, share the emotional state of other individuals. Neurocognitive and multicomponent definitions (e.g., Decety and Jackson 2004), which imply that empathy deficits can stem from changes in distinct yet interacting components, are well suited for empirical testing of this complex construct. Two components are found in most definitions of empathy: A first component, called resonance, refers to the automatic sharing of other people's affective and sensorimotor experiences; a second component, often referred to as perspective taking (and akin to mentalizing and theory of mind), implies a more controlled and deliberate understanding of what others are feeling and thinking. Three other components are often, but not always, included in the definition of empathy: self-regulation, prosocial stance, and empathic behavior. The self-regulation component of empathy prevents individuals from completely sharing others' distress and thus from becoming overwhelmed by vicarious emotions, through a distinction between self and other. Self-regulation oversees the interaction of different levels of resonance and perspective taking. The prosocial stance may be seen as the motivational force of empathy, but it is not always considered a component of empathy per se. A key distinction should be made, however, between prosocial stance and actual helping behaviors. Here, we include the intention and the motivation to help or care for others as part of an empathic response, whether it leads to specific behaviors or not. Some researchers place a strong emphasis on the behavioral manifestation of empathy, and we agree that without it, all the good intentions in the world will not help anyone. Still, one must remain careful so as to avoid automatically ascribing an underlying prosocial stance to all "good" behaviors. The same action can be performed out of empathy or based on other forms of mental states or social conventions (or even ill intentions). For instance, a health care provider could give painkillers to reduce a patient's suffering or simply to decrease behaviors that may be stressful to the provider herself, like moaning, crying, and beeping the alarm. The prosocial stance in the first situation is what makes this behavior empathic, while the same behavior in the latter situation is self-oriented.

As a multicomponent construct, empathy suffers from confusion around the terminology used. Without embarking on a semantic debate, it seems relevant here to point out that the use of terms such as cognitive empathy and affective empathy can be misleading, as they convey the idea that there are two distinct types of empathy, which we argue is not the case. We propose that empathy cannot be solely affective or cognitive, but in fact needs to be both. Feeling distressed when someone else is in pain is not in itself empathy; one also needs to cognitively distinguish between his or her own pain and the other person's suffering. Similarly, simply knowing that someone is in pain when their hand is struck by a knife is not empathy, unless we also have an emotional response to this observed situation, which triggers an intention to help or comfort the other. The relative importance of each component may vary across individuals and situations, but it would be erroneous to consider that someone is empathic when only one of these components is present.

Empathy plays a very important role in pain management, and optimal care depends on health care providers being able to accurately evaluate their patients' pain, based on their facial expressions, postural cues, and self-report when available. It should be noted, however, that recognizing and understanding patients' emotional suffering (e.g., sadness, anxiety) is also an important part of empathy in clinical contexts. While some of the findings from pain empathy research may be applied to emotional suffering (Morelli et al. 2014), it remains important to characterize the context in which empathy and its cerebral bases are studied, and to point out that a large part of the social neuroscience research on empathy, up to very recently, was related to physical pain.

THE NEURAL SUBSTRATES OF EMPATHY FOR PAIN AND SUFFERING

Research on the neural bases of empathy has largely focused on a series of cerebral systems and regions involved in the actual experience of pain, often referred to as the pain matrix or pain matrices. The primary and secondary somatosensory cortices (S1; S2) located on the postcentral gyrus and that receive information from the afferent spinocortical pathway through the thalamus, are generally thought to play a role in perceiving the sensorydiscriminative dimension of pain (pain location and intensity). An affective role (i.e., unpleasantness) is usually ascribed to the insula, which receives input from both S2 and the thalamus and has efferent connections to limbic structures and the anterior cingulate cortex (ACC), a structure that is also thought to be involved in the affective dimension of pain. The ACC also has bidirectional connections with regions of the prefrontal cortex (PFC) such as the medial PFC (mPFC), regions that contribute to the cognitive dimension of pain (Apkarian et al. 2012). The pain matrix has served as the basis for investigating the level at which neural structures involved in nociception are also activated during different forms of vicarious pain (the representation of someone else's pain).

By identifying regions activated by both felt and observed pain, researchers have robustly identified areas such as the anterior insula (AI) and adjacent inferior frontal gyrus (IFG), the somatosensory cortex, and a region including the anterior midcingulate cortex and dorsal anterior cingulate cortex (aMCC/dACC),1 as part of the neural circuitry underlying empathy for pain (for a meta-analysis see Lamm, Decety, and Singer. 2011). This approach was initially based on the shared representations view that performed and observed or imagined actions share part of the same neural circuitry. While it has been useful in identifying the neural regions involved in the sharing of pain experiences (affective and sensorimotor resonance), it does not provide a complete portrait of the neural substrates of empathy for pain, let alone empathy for other emotional states. Indeed, although some regions have been shown to be activated during both felt and observed pain, differences have been found in the exact areas involved in each type of pain processing (Jackson, Rainville, and Decety 2006), and more complex analyses show different brain signatures for physiological pain and for vicarious pain (Krishnan et al. under review). Additionally, vicarious pain processing has been found to recruit neural regions such as the temporoparietal junction (TPJ) and the posterior part of the superior temporal sulcus (pSTS), which are not typically associated with the experience of self-pain but are most likely related to processes such as perspective taking (Zaki and Ochsner 2012). Thus, witnessing pain in another individual can lead to partially sharing the experience felt by the other but also triggers other cognitive processes that are part of empathy.

Most research on the neural bases of empathy has been conducted using the visual presentation of pain stimuli (limbs receiving a painful stimulation, actors or patients expressing pain), but recent research shows significant differences between the neural circuits underlying empathy for pain and empathy for other emotional states like anxiety and happiness (Morelli et al. 2014). These results demonstrate that empathy-related activation in regions such as the aMCC/dACC and the AI varies across emotions, which supports the formulation that these regions are involved in affective resonance, while other regions may be related to empathic processes that are not emotion specific. For instance, Morelli and her colleagues (2014) showed that the septal area was the only area recruited by vicarious pain, anxiety and happiness, and that activation in this region predicted subsequent helping behavior, suggesting a general role for this region in prosocial stance.

Despite variability across studies, some consistent findings emerge from the literature on the neural bases of empathy for pain and can serve as a guide to interpret the emerging social neuroscience literature on empathy in health care. Activation in the aMCC/dACC and the insula seems to reflect affective resonance, while activation in the somatosensory cortex has been associated with sensorimotor resonance. More cognitive processes such as perspective taking and self-regulation tend to be associated with activation in the TPJ, the pSTS, and the mPFC.

EMPATHY DECLINE AND UNDERESTIMATION OF PAIN

Examining the link between empathy and helping behavior is highly relevant in the clinical context. How much of the pain of patients do health care workers share? Is this sharing essential to display empathy? And more broadly, is empathy of health care workers always optimal? The answer to this last question is unfortunately no. For instance, a number of studies show that physicians' empathic dispositions tend to decrease during medical school and residency (for a review see Neumann et al. 2011). This decline in empathy could negatively impact patient care in several ways, notably by making providers less attuned to patients' suffering. Indeed, it has been demonstrated that health care providers, including physicians and nurses, tend to underestimate patients' pain, compared either to nonexperts' or to the patients' own evaluations, a phenomenon that has been observed both in experimental settings and in situ (for a review see Prkachin, Solomon, and Ross 2007). A few studies have, however, yielded contradictory findings. For instance, estimates of observed newborn pain provided by pediatric nurses were higher than those provided by control participants (e.g., Latimer et al. 2011), despite several reports documenting that newborn pain is generally undertreated. This apparent contradiction suggests that multiple factors (e.g., age of the patient) may contribute to the relationships between empathy, pain evaluation, and patient care (see next section). This further highlights the importance of examining potential variations in the underlying functional cerebral organization that could help understand the complex network of processes involved in patient care.

The underestimation of pain by health care providers has been linked to their neural response to observing pain. In a seminal study using functional magnetic resonance imaging (fMRI), Cheng et al. (2007) showed that when observing patients receiving painful acupuncture procedures, physicians showed less activation than non-expert participants in the AI and the aMCC/dACC, two regions at the core of shared representation models of empathy. The physicians' reduced response to observed pain in these two regions thus suggests that clinical expertise or experience is associated with a decrease in the affective resonance component of empathy for pain. Consistent with this idea, a more recent study using event-related potentials (ERP) has demonstrated that physicians' neural response to observed pain is characterized by a blunting of the early automatic frontal component typically associated with affective resonance (Decety, Yang, and Cheng 2010). This gap between the patient's and the clinician's emotional experiences may partly explain the underestimation of patients' pain by health care workers, as Cheng and colleagues reported that lower responses to vicarious pain in the aMCC/dACC and AI were associated with lower pain intensity ratings in all subjects. Although Decety, Yang, and Cheng (2010) also reported a reduced response in the ERP component associated with the cognitive processes involved in empathy, it is probable that physicians' familiarity with the stimuli used in the study partly explains this result.

Another interesting finding from the comparison of physicians and non-experts was that neural regions such as the TPJ and the mPFC were more activated in the former during pain observation (Cheng et al. 2007). These regions have been associated with the perspective taking and mentalizing components of empathy (Zaki and Ochsner 2012), but the finding that physicians show stronger activation in the mPFC during pain observation could also reflect a cognitive inhibition of their affective response to patients' pain, as this region has also been linked to emotional regulation (e.g., Etkin, Egner, and Kalisch 2011). This interpretation is consistent with a "detached concern" approach adopted and promoted by some clinicians to reduce potential emotional contagion from patients' suffering (for an interesting discussion on this topic see Newton 2013). The fact that pain intensity ratings were positively correlated with aMCC/dACC and AI activation and negatively correlated with activation in the mPFC, however, should not be interpreted as indicating that an empathic reaction based on affective resonance is more effective than detached concern in evaluating patients’ pain. As ratings were not obtained from patients themselves, empathic accuracy, that is, the congruence between the level of pain perceived by the health care provider (vicariously) and the patient’s self-reported pain, could not be assessed. Taken together, these results suggest that physicians may experience less distress than individuals without medical training in response to patients’ suffering, but may also use more cognitive strategies, or learn to regulate their affective response when assessing the suffering of others, which is another important component of empathy.

Through their association with the different components of empathy, neural activation patterns reported by Cheng et al. (2007) provide some insight into physicians’ empathic response to pain. Interestingly, however, no significant differences in self-reported dispositional empathy were found between physicians and control participants. Although this may be due, at least in part, to the small sample sizes typically used in fMRI research that may be insufficient to detect differences on questionnaire scores, it also highlights the limits of relying on self-reports to assess empathy and the importance of combining multiple approaches in tackling this complex construct.

WHY SOME PATIENTS MAY RECEIVE SUBOPTIMAL CARE

Adding to health care providers’ general tendency to underestimate their patients’ pain, some patients may be at even higher risk of seeing their pain underestimated and receiving suboptimal pain care. For instance, gender disparities have been reported in the treatment of pain, with women being more likely to be undertreated than men (Hoffmann and Tarzian 2001). This could be explained partly by an implicit gender bias, as both women and men tend to detect pain more rapidly and more accurately in facial expressions of male than female targets (Riva et al. 2011), and male facial expressions of pain have been found to trigger stronger neural activation than female facial expressions of pain in the amygdala and in regions that have been associated with empathy for pain, such as the pSTS and somatosensory cortex (Simon et al. 2006). Recent findings further suggest that this gender bias could be exacerbated by other factors, such as the caregiver's physical condition. Indeed, it has been demonstrated that being in pain tends to increase our evaluation of men's pain and to decrease our evaluation of women's pain (Coll et al. 2012). Considering that health care providers such as nurses, physicians, and physical therapists are at high risk for chronic pain conditions (Jakobsen et al. 2014), this could have important ethical implications for the clinical evaluation and treatment of pain in male and female patients.

Racial disparities have also been reported in the treatment of pain, with minorities receiving less treatment for their pain (Drwecki et al. 2011). Brain imaging methods are particularly helpful in studying different biases, as they may reveal implicit processes that would not be expressed explicitly, either because they are not conscious (i.e., neither willfully generated nor monitored by the individual) or because they are masked by social desirability. Indeed, neuroimaging investigation of in-group empathy bias has shown that neural activation in regions associated with affective resonance (aMCC/dACC, AI) tends to be higher when observing the pain of a person from the same ethnic group (Xu et al. 2009). A similar in-group bias has also been observed with electroencephalography (EEG) in the form of reduced sensorimotor resonance for racial out-group members (Riecansyky et al. 2014). Interestingly, despite showing an ethnic in-group bias in empathy-related neural activation, Xu and colleagues (2009) reported no significant difference between the overt ratings of pain for in-group and out-group targets. This discrepancy, which underlines the interest of combining behavioral and brain imaging methods, is intriguing and should be explored further.

Individuals perceived by health care providers to be responsible for their condition also seem at risk for receiving less empathic patient care. In an fMRI study comparing neural activation to observed facial expressions of pain, targets who were presented as being responsible for their condition (HIV due to drug injection) generated significantly reduced responses in AI and aMCC/dACC and lower pain estimates from participants, compared to targets who were presented as not being responsible for their condition (HIV following blood transfusion; Decety, Echols, and Correll 2010). Similarly to drug addicts, obese patients and noncompliant patients may be perceived by some clinicians as being responsible for their conditions and they could thus be more likely to receive inadequate care. Understanding how certain factors may decrease their empathic responses and thus affect the quality of care provided to some patients could help clinicians safeguard against these implicit and most likely unconscious biases.

POTENTIAL EXPLANATIONS FOR EMPATHY DECLINE AND PAIN UNDERESTIMATION

As previously suggested, self-preservation factors could partly explain the decline of empathy in health care providers and their underestimation of patients' pain. However, other mechanisms are likely to be involved as well. For instance, it seems probable that high exposure to patients' pain could modify the clinicians' perception of others' pain. Prkachin and colleagues (2010) have indeed provided an empirical demonstration of how overexposure to others' pain can lead to a reduced tendency to perceive pain in others, apparently by changing the threshold at which one perceives pain. Using signal detection theory, they showed that after exposure to a series of stimuli showing high pain facial expressions, participants were less likely to attribute pain (bias) to a rapidly presented facial expression. Following up on these findings, we have recently conducted an EEG study to examine potential changes in event-related responses following a similar acute overexposure (Coll et al. 2014). The findings confirmed that overexposure led to a reduced likelihood of attributing pain to subsequently presented facial expressions, and to reduced amplitudes in a specific component of the brain signal (LPP) that has been shown to play an important role in affective processing of pain in others (Reicherts et al. 2012). Also consistent with the overexposure hypothesis, it has been shown that underestimation of patients' pain is more pronounced in clinicians with more experience, who are likely to have been more exposed to patients' suffering, than in those with less experience (Gleichgerrcht and Decety 2014; Prkachin, Solomon, and Ross 2007). The link between years of clinical experience and changes in empathy-related neural responses has yet to be demonstrated.

Another potential obstacle to optimal empathic response and pain management is the typically overflowing workload of health care providers, which can lead to reduced attentional and cognitive resources dedicated to pain evaluation. The conditions in which pain is often assessed, for instance, in a noisy hospital room where other patients require help and many other health care workers transit, may make it difficult to attribute optimal levels of attention to the patient's suffering. This could lead to reduced vicarious pain responses, a hypothesis that is supported by results obtained by Gu and Han (2007), who showed that when participants were distracted by a concurrent cognitive task (counting stimuli), observing hands in painful situations was associated with reduced activation in the aMCC/dACC and the insula, compared to when participants were strictly paying attention to the intensity of the pain perceived. Similar results were obtained with facial expressions of pain by Budell, Jackson, and Rainville (2010), who showed that activation was decreased in the IFG and the mPFC when participants were asked to pay attention to motor aspects of the expressions rather than to evaluate pain intensity. Further support for the attentional hypothesis comes from empathy for emotions other than pain. Morelli and Lieberman (2013) showed that both the level of empathy toward strangers experiencing happiness, sadness, and anxiety and the level of brain activation in neural regions associated with perspective taking and mentalizing (e.g., mPFC, TPJ, and pSTS) were reduced when they had to perform a concurrent cognitive task (memorizing a number sequence), compared to when they were instructed to simply watch the images or to empathize with the characters. Thus, a diversion of attention seems to lower empathy and the brain response in regions associated with affective resonance and with the cognitive component of empathy. The fact that health care providers must often divide their cognitive resources across multiple simultaneous tasks may thus further alter their empathic response to patients' suffering, adding to the already detrimental effect of overexposure.

Overall, many conditions are known to reduce the empathic behavior and the underlying brain response of health care providers when faced with the suffering of patients. Some of these conditions, for instance, heavy workloads, can also lead to heightened stress, exhaustion, and a higher risk of medical errors, and thus impact negatively on the quality of care. The health care providers' well-being is thus also important to consider in an effort to optimize empathy in the clinical setting for both patient and clinician.

HEALTH CARE PROVIDERS' PERSPECTIVE ON EMPATHY

The relationship between empathy and well-being in health care providers appears to be complex. While some authors have suggested that being more empathic may increase the risk of burnout, others have suggested the opposite, that is, that empathy may protect health care providers against burnout symptoms (for a review see Zenasni et al. 2012). The former view is based on the premise that more empathic providers may share their patients' suffering to a greater extent than less empathic ones, thereby exposing themselves to more stress and increasing their risk for compassion fatigue. This is supported by empirical data showing that health care providers with higher self-reported dispositional empathy also report experiencing more distress in response to stimuli depicting facial expressions of pain (in physicians: Gleichgerrcht and Decety 2014) and report more emotional exhaustion, a symptom of burnout (in nurses: Tei et al. 2014), than those with lower self-reported empathy. Interestingly, the relationship between burnout and empathy-related neural activation points to a more complex pattern, as researchers found that higher levels of emotional exhaustion in nurses were associated with lower activation in brain areas associated with both the affective resonance (AI/IFG) and perspective-taking (TPJ) components of empathy (Tei et al. 2014). While this may seem inconsistent with results obtained from questionnaire data, these findings may reflect the complex and often inconsistent relationship between individuals' objective neurophysiological response and their subjective experience.

The hypothesis of a protective role of empathy on health care providers' mental health is based partly on studies showing negative correlations between empathy and burnout symptoms (see Zenasni et al. 2012). This view is also supported by a recent fMRI study (Jensen et al. 2014) showing that physicians who report higher perspective-taking abilities derive higher satisfaction from perceived treatment success in an experimental setting. A correlation between self-reported perspective taking and response to successful treatment in the rostral part of the ACC, a region that has been associated with placebo analgesia, led the authors of the study to suggest that higher empathic dispositions may allow clinicians to better share the relief felt by their patients. More empathic caregivers could thus experience more work-related satisfaction. On the other hand, the negative correlation reported in the literature between empathy and burnout could also reflect a detrimental impact of burnout on empathy. Indeed, experiencing more personal distress may lead individuals to being more self-focused, and thus less responsive to the experience of others. Some evidence for this stems from research in individuals with major depression, who provide lower estimates of other people's pain and show somewhat reduced activity in the somatosensory cortex, known to be involved in sensorimotor resonance to others' pain (Fujino et al. 2014).

Most likely, both interpretations are correct; complex and sometimes opposing influences may be at play in the relationship between empathy and well-being in health care providers. Overall, there is accumulating data showing a relation between empathy and a number of patient-related and caregiver-related variables, but causal data remain scarce. In order to fully understand how empathy actually affects patients and clinicians, one must experimentally modulate empathy and concurrently examine potential changes in pain evaluation, patient care, and providers' well-being. Developing means to change empathic responses thus seems a promising research avenue, but it does come with new ethical concerns.

IMPROVING EMPATHY IN HEALTH CARE PROVIDERS

The role of empathy in health care is central, and the fact that a number of neurological, developmental, and psychiatric disorders (e.g., traumatic brain injury, autism spectrum disorders, psychopathy) are marked by empathy deficits has fueled a number of research initiatives aimed at exploring potential avenues to improve empathic skills. While techniques such as transcranial direct-current stimulation (tDCS) and oxytocin administration have shown promising results in this regard (e.g., Bartz et al. 2010; Wang et al. 2014), neither method seems a practical solution for improving empathy in health care in a meaningful way. Perhaps the day will come when we will distribute individual oxytocin nasal sprays to all physicians and nurses, or have them undergo tDCS sessions every week, but such procedures would raise a number of ethical concerns that are discussed in the next section.

Behavioral means of optimizing empathy are less invasive and more accessible. Optimization implies the modulation of distinct components of empathy in a direction adapted to individual needs, which seems a more relevant target than simply seeking to increase empathy. For instance, Drwecki et al. (2011) showed that an intervention specifically targeting perspective taking could be used successfully to reduce the racial bias in pain treatment found in nurses. Riess et al. (2012) also developed and tested a short training program in which physicians were taught to detect subtle emotional facial cues, to understand the neurophysiology of empathy, and to recognize their own emotional response in their interactions with patients. In a randomized controlled trial, they found that patients perceived significantly more empathy from physicians who had followed the program than from those who had not. Interestingly, physicians who had gone through the empathy training program also reported being better at recognizing their own emotional responses in clinical interactions. This suggests that such a program may be beneficial to both patients and clinicians. This would, however, need to be examined more directly, by assessing physicians' wellbeing to ensure that increased patient-perceived empathy does not come at a cost to the physicians' mental health. Long-term effects, as well as objective patient care data, would also need to be examined. Overall, while these efforts at improving empathic skills are promising and will no doubt lead to improving patient care, regular monitoring of the caregiver's wellbeing is warranted, as augmenting certain skills could gradually increase the probability of the caregiver being afflicted by compassion fatigue and other more chronic work and stress related conditions, such as burnout and major depression. An ongoing study in our laboratory aims at evaluating the impact of a 6-week empathy training program based on improving perspective taking skills in nurses. In addition to evaluating the impact of training on nurses' evaluation of their patients' pain, its impact on empathy-related neural response and on actual pain care behavior in situ (i.e., patient charts) is also evaluated, as well as its long-term consequences on nurses' well-being and burnout symptoms.

Optimizing empathy to improve patient care is a noble goal, but it should also serve to improve the experience of health care providers. One of the key components of such training should be the information provided to caregivers, which should include the most recent findings from behavioral and brain imaging research. Knowing that the brain is affected by the pain and suffering of others, and that the brain can change with behavioral training, is important. Knowing that empathy is multifaceted and that optimal empathy requires a balance between all of its components is also crucial to avoid negative consequences of changing some components without paying attention to others.

ETHICAL CONSIDERATIONS AND FUTURE DIRECTIONS

Reductionist Approaches and Problematic Inferences

Social neuroscience and more specifically the field of functional brain imaging have suffered from bad press stemming from reductionist approaches, which tend to ascribe a one-to-one relationship between a specific brain region and a mental process. For instance, a popular television series portrayed a serial killer who symbolically suppresses the "empathy center" of his victims' brains by removing the insula. Although part of the insula does play a role in empathy, as shown by several brain imaging and some lesion studies (e.g., Leigh et al. 2013), such a complex process could not depend solely on the integrity of a single brain region. It is unlikely, for instance, that more empathic health care workers simply have larger insulae.

Moreover, if we should soon find a means to stimulate efficiently this region that is deeply embedded in the cerebrum, through tDCS or novel transcranial magnetic stimulation techniques, this might not be sufficient to solve the problem of empathy in health care. Additionally, brain imaging methods, which rely on constantly evolving mathematical and physics data and thus appear objective, are nonetheless dependent on human arbitrary inputs (e.g., statistical thresholds). Though brain imaging is overall well suited to group inferences, it is still limited at predicting a specific person's response, as there is considerable inter-individual variability in neural activation.

Another potential danger of the reductionist approach is that it often leads to reverse inferences, by which a specific mental process is inferred based solely on neural activation. Given the large number of cognitive and emotional processes that have been found to involve the insula for instance, activation in this area cannot be interpreted as necessarily indicating that the person is feeling empathic. Neuroimaging data should always be interpreted in light of relevant behavioral measures that can inform us on associations between cognitive, emotional and neural processes. Self-report remains the most direct access to individuals' inner subjective experience. Behavioral tasks in which participants are asked to evaluate patients' pain intensity or to detect pain in visual stimuli presented very rapidly also offer important pieces of the puzzle that can give an indication of how empathic dispositions and neural activation translate into behavior.

Assessing Empathic Behaviors in the Clinical Context

Importantly, however, behavior assessed in experimental settings may differ from behavior in clinical contexts, as experimental control often works against ecological validity. Studies conducted in situ are thus essential to understand how empathy measured through self-report and experimental procedures relates to clinicians' typical behavior toward their patients. This highlights again the importance of approaching such a complex construct as empathy with multiple complementary techniques and measures in both naturalistic and controlled laboratory settings. One should be careful, however, when trying to compare or integrate behavioral and neuroimaging data, as the components of empathy that can be distinguished through neuroimaging (e.g., resonance) may not directly map onto the components measured by questionnaires (e.g., empathic concern, personal distress), which are typically derived from clinical, cognitive, or social psychology work without regard to the underlying neurophysiological processes.

Expanding the Empathy Knowledge Base

Social neuroscience relies on cognitive models of the mind, and testing those models implies that we try to isolate their different components through ingenious and well-controlled tasks. Investigating empathy through the use of painful scenarios and facial expressions of pain has allowed researchers to probe sensory and affective dimensions of a stimulus at once, leading to a decade of prolific research on empathy. However, the time has come to expand and integrate the findings from research on pain empathy to empathy for other emotional states such as anxiety, which might be as relevant for health care providers to detect and respond to, but may not recruit the same processes to the same extent (Morelli et al. 2014).

Replication of studies and meta-analyses are also an important part of social neuroscience research in any area, as individual differences and methodological specifications are likely to influence results in any single study. Indeed, while Cheng and colleagues (2007) did not report any significant activation in regions associated with affective resonance in their group of physicians, significant activation in response to observed pain was found in the AI (as well as in the TPJ) in a different group of physicians (Jensen et al. 2014) and in nurses (Tei et al. 2014). However, as no control groups were used in these last two studies, it is impossible to determine whether this activation was reduced compared to that of non-experts. As the number of studies investigating the neural bases of empathy in health care increases, the knowledge base for the underlying processes in different contexts might become clearer.

SHOULD WE ALWAYS SEEK TO IMPROVE EMPATHY?

Even though empathy is now understood as a sometimes fragile equilibrium between distinct components, the quest towars the optimization of empathy through methods such as brain stimulation has begun. Such methods may prove to be key at improving empathy deficits in a number of disorders, but the empathy fluctuations found in health care workers do not necessarily reflect a deficit per se. It is likely that empathic processes vary across contexts and with experience, and also from one profession to the other. For instance, different studies have examined empathy and its neural substrates in nurses and in physicians, but to our knowledge, no study has directly compared empathic processes between these two groups. Efforts to improve empathic dispositions in health care providers thus pose the ethical question of whether we are aiming for “suprahuman empathy,” by labeling as a deficit what should instead be seen as a healthy empathic response given the situation. Such an approach, similar to cognitive enhancement, calls for ethical considerations regarding potential benefits and costs for society and, more importantly, for health care workers (e.g., Faulm€uller, Maslen, and Santoni de Sio 2013).

In conclusion, efforts to improve clinicians’ empathy should target a balance between the patients’ and the providers’ health. Optimal levels of empathy should result in both improved patient care and improved well-being for health care providers. Perhaps investigating means to increase patients’ empathy toward health care providers is also part of the solution, as empathy is not a fixed isolated mental process but rather an interactive and evolving one. Social neuroscience will continue for years to come to play an essential role in the understanding of this signature of humanness.

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