

# HOW SHOULD A DOCTOR REACT WHEN PERSONS EXPRESS A WISH TO SUFFER IN UNION WITH CHRIST? TRUE LOVE AND AN IMPORTANT ISSUE OF NEUROSCIENCE

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## SUMMARY

Here we discuss whether the type of love which is expressed as religious Catholics who want to offer their suffering in union with the suffering of Jesus Christ has the same neurological pathways as the usual pathways related to love, that is a neurological pathway linked with the the Reward System and based on Dopamine as the main neurotransmitter. We propose that this type of love is probably based on an input from the Mirror Neuron System, which is related to Empathy. and the Default Mode Network. We accept that there are different inputs for the different types of love but the main output in all cases is the release of Dopamine as a Neurotransmitter. We argue that, while all types of love have, as a final pathway, the release of Dopamine from the Reward system, the type of love which is associated with suffering in union with the suffering of Jesus Christ is related to inputs related to Empathy. and the identifying of the self. By highlighting this perspective, we underscore the importance of recognising and respecting the profound dignity of individuals who choose to engage with their suffering in this meaningful way.

**Key words:** love - Passion of Jesus Christ - Reward system - Mirror Neuron System – empathy - Default Mode Network

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## INTRODUCTION

One traditional view of suffering that Devout Catholics use is that they are accepting suffering in union with the Suffering of the Passion of Jesus Christ. Even today, many elderly persons take this view. It is true that this has been the case with many prominent Catholics have taken this view. We can present two Saints of the Catholic Church at the beginning of the Twentieth Century as taking this view; Saint Therese of the Child Jesus (von Balthasar 1992) and Saint Elizabeth of the Trinity (De Bono 2018) take this view. Hence this view is Orthodox, standard Catholic Teaching, and is motivated by the Love these persons have for the person of Jesus Christ. Therefore, since this is a known normal Human Behaviour, it should be taken seriously by medical and Nursing Staff, and be taken into account when treatment is planned and medication is delivered.

Essentially, this expression of Love depends, as all our decisions and actions do, on a function of the brain. We therefore wish to enquire in this paper, as to the Neuroscience by which the Love referred to by Christians who wish to unite their suffering to the suffering of Jesus Christ is mediated.

## FIRST PRINCIPLES -, EVERYTHING WE DO HAS AN ANIMAL SUBSTRATE

First of all, it needs to be understood that, as suggested by Augustine, that, since we are within the animal kingdom, everything we do, including expressing Love, has an animal substrate in order to do it (Agius 2014, Augustine 420AD). Applied to the brain, this means that

there is a part of the brain which is concerned with the expression of Love. We now have to identify this part of the brain which mediates the expression of love.

## IDENTIFYING THE PART OF THE BRAIN WHICH MEDIATES PRAYER

"Prayer is the lifting up of the Heart and Mind (Which implies the whole intellectual faculties of the Human Person) to God." Is a common definition of Prayer (St. John Damascene) (Catechism of the Catholic Church 2000). We are therefore attempting to Identify the Part of the Brain which Mediates Prayer, in order to answer the question which we have put to ourselves. We need also to clarify that the fact that a particular action of the brain is mediated by a particular part of the brain is normal procedure in discussing how the brain works. It does not, in any way, imply any interference with the relationship between the human person and the Being (For Christians God the Trinity) to whom we pray, it simply means that we are more closely defining the mechanism by which the human person who wishes to pray relates to the Other at the level of the human brain, and is not seeking to define the Other, but we do accept that prayer is a normal Human activity frequently carried out by Human Persons and is directed to Another, "Whoever we accept that Other to Be".

## DEFINING LOVE

The next question we need to address is how do we define Love ? And further, is there only one form of Love, and further, if there are more than one form of

love, what sort of love is implied when Christians who wish to unite their suffering to the suffering of Jesus Christ?

Here we are faced with a poverty in the English Language. The Google Dictionary, provided by Oxford Languages provides the following definitions of Love; an intense feeling of deep affection (as between parents and babies), a feeling of deep romantic or sexual attachment to someone, a great interest and pleasure in something. (s in for a sport), among others Hence, as a verb, love has the following meanings; to feel deep affection for (someone including relatives, friends),, feel a deep romantic or sexual attachment to (someone), or to like or enjoy something, e.g. a sport, very much. Thus, a person Chooses to feel deep affection for someone, including God, he may develop a romantic or sexual attachment to another person- initially by choice but then developing an attraction, not entirely linked with choice, or he may simply enjoy a sensation caused by an action such as a sport. The issue is that, while such a broad term as "Love" may be used to cover so many meanings in the English Language, the question is whether they can all be seen as having the same neural mechanisms. We wish to argue that this is improbable.

In fact, these differences in meaning are represented in other languages by different words and phrases, thus in Italian, there are two terms, "ti voglio bene " and "ti amo" which represent two separate concepts and are very well explained in Google AI Overview thus: *Ti voglio bene" in Italian translates to "I want you well" or "I want good for you". It's a way of expressing affection and care, often used to express love in a non-romantic way, like with family, close friends, or even pets. Unlike "ti amo" which means "I love you" in a more romantic sense, "ti voglio bene" is used to express a general sense of care and affection. They both mean "I love you." If you want to say "I love you" in a romantic way to your special one, you'll say: "Ti amo." In every other context (family, friends), you'll say: "Ti voglio bene."*

Four Greek words for Love also distinguish two distinct meanings of the English term "Love" these are "Philia", "Storge", "Eros " and "Agape "

## EROS

The Google AI Overview for "Eros " is as follows: *Eros is a term with multiple meanings. In its most basic sense, it refers to the Greek god of love and desire, often associated with Cupid in Roman mythology. Beyond that, eros can also signify passionate or sensual love, as well as a more general concept of life force or drive. In psychoanalysis, it's used to describe the universal desire that motivates our innate needs.*

Hence, the Various meanings of Eros are as follows and further well described by Google AI Overview with some editing by one of us:

- *The Greek God of Love:* Eros is the Greek god of love and desire, depicted as a winged boy with a bow and arrow. His Roman counterpart is Cupid.

- *Sensual or Passionate Love:* The term also refers to sensual or passionate love, often described as the type of love between lovers.

This sense of Sensual or Passionate Love between lovers is the most relevant sense to our present discussion. however there are other meanings which are related.

- *Life Force/Drive:* Philosophically, eros can represent a more general life force or drive, similar to the concept of libido in psychoanalysis.

- *Psychoanalytic Concept:* In psychoanalysis, eros is used to describe the universal desire that drives all our innate needs, according to Freud.

- *Related Concepts:* The words "erotic" and "erogenous" are derived from eros and relate to sexual desire or arousal.

In essence, comments Google AI Overview, eros encompasses a broad range of meanings, from the divine realm of Greek mythology to the fundamental human experience of love, desire, and the life force.

The meaning of eros as the life force which covers all our innate needs becomes also relevant to our discussion.

## PHILIA

Philia is one of the four ancient Greek words for love, In Aristotle's Nicomachean Ethics, philia is defined in Wikipaedia as "friendship" or affection. The complete opposite is called a phobia. In Aristotle's Nicomachean Ethics Books VIII and IX Aristotle gives examples of philia including: young lovers, lifelong friends, cities with one another, political or business contacts, parents and children, fellow-voyagers and fellow-soldiers, members of the same religious society, or of the same tribe, a cobbler and the person who buys from him. All of these different relationships involve getting on well with someone, though Aristotle at times implies that something more like actual liking is required. Philautia is defined in Wikipaedia as self-love.

## STORGE

Storge is defined in Wikipaedia as 'love, affection' or familial love, and refers to natural or instinctual affection, such as the love of a parent towards offspring and vice versa.

## AGAPE

Finally, Agape is defined in Wikipaedia as "the highest form of love, charity" and "the love of God for human persons and of human persons for God". This is

in contrast to philia, brotherly love since it embraces a profound sacrificial love that transcends and persists regardless of circumstance.

It is clear that these four Greek words describe four different forms of functioning of the brain, which are all important to human persons but have entirely different consequences. It is therefore highly possible that they have different neural mechanisms in the brain or are even mediated by different parts of the brain.

We will now show that the form of Love indicated by those Christians who wish to unite their suffering to the suffering of Jesus Christ is Agape.

### **THE FORM OF LOVE INDICATED BY THOSE CHRISTIANS WHO WISH TO UNITE THEIR SUFFERING TO THE SUFFERING OF JESUS CHRIST IS AGAPE**

That the need, of those Christians who wish to unite their suffering to the suffering of Jesus Christ is a complete union with their Beloved Christ is a prayer of complete and permanent union with Him is clear from many famous prayers. Thus we can mention the famous prayer of Elizabeth of the Trinity, suffering severely from Addison's Disease " O my Three, my All, my Beatitude, infinite Solitude, Immensity in which I lose myself, I surrender myself to You as your prey" (Elizabeth of the Trinity 1904). Also we can quote Threse of Lisieux, dying of Tuberculosis, saying in her " Offering to Merciful Love" In order to live in one single act of perfect Love,I offer myself as a victim of holocaust to your merciful love" (Teresa of the Child Jesus and the Holy Face 1895).

However, ever more precise are two prayers of Saint Ignatius of Loyola, the Anima Christi and the Suscipe. The Anima Christi, a prayer beloved by many Christians (Ignatius of Loyola 1523), links each function of the human body ( as he understood them) with the passion of Christ in order, in a climax, to reach complete union:

*Soul of Christ, sanctify me.*

*Body of Christ, save me.*

*Blood of Christ, inebriate me.*

*Water from the side of Christ, wash me.*

*Passion of Christ, strengthen me.*

*O Good Jesus, hear me.*

*Within your wounds hide me.*

*Permit me not to be separated from you.*

*From the wicked foe, defend me.*

*At the hour of my death, call me  
and bid me come to you*

*That with your saints I may praise you*

*For ever and ever. Amen."*

Even more impressive is the Suscipe (Ignatius of Loyola), which links each faculty of the brain or mind in union with Christ; "Take Lord, and receive all my liberty, my memory, my understanding, and my entire

will, all that I have and possess. Thou hast given all to me. To Thee, O lord, I return it. All is Thine, dispose of it wholly according to Thy will. Give me Thy love and thy grace, for this is sufficient for me."

And, to give another example from recent times, this complete union with God and complete sense of self giving to God is echoed by Sandra Sabattini, a young medical student from Bologna University who died in 1984, and wrote, a few days before her death in a car accident "This life is not mine. It is evolving rythmically through a regular breath that is not mine, cheered by a peaceful day that is not mine. There is nothing in this world that is yours. Sandra, realise it! It is all a gift in which the 'Giver' can intervene when and how he wishes Take care of the gift given to you, make it more beautiful and full for when the time comes." (Sabattini 2025).

Thus, the type of love which Christians who wish to unite their suffering to the suffering of Jesus Christ is Agape. Is it likely that this form of love can have the same neural mechanisms as other forms of Love?

### **THE STANDARD NEUROLOGICAL DESCRIPTION OF LOVE**

In 2005 MRI pictures of the brain, when stimulated by romantic love were studied, the subjects were shown photographs of persons they were romantically associated with (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). The parts of the brain which were associated with romantic love were shown to be the caudate nucleus, a region associated with reward detection and expectation and the integration of sensory experiences into social behaviour, and the ventral tegmental area, which is associated with pleasure, focused attention, and the motivation to pursue and acquire rewards (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). These sites are also known to be rich in dopamine, a neurotransmitter associated with "feeling good" (Esch 2005, Aron 2005, Debiec 2007). The ventral tegmental area is part of the brain's reward circuit. This circuit is considered to be a primitive neural network, meaning it is evolutionarily old; it is linked with the nucleus accumbens (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025, Wright 2025). Some of the other structures that are included in the reward circuit - the amygdala, the hippocampus, and the prefrontal cortex (Wright 2025) - are exceptionally sensitive to (and reinforce) behaviour that induces pleasure, such as sex, food consumption, and drug use (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). Primitive areas of the brain are involved in romantic love and these areas light up on brain scans when talking about a loved one. These areas can remain lit up for a long time for some couples (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025).

Being in love releases high levels of dopamine, a chemical which activates the reward system, helping to make love a pleasurable experience similar to the euphoria associated with use of cocaine or alcohol (Esch 2005, Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025, Castro 2014).

When a person is in love, the neurotransmitters associated with the reward circuit flood the brain, producing a variety of physical and emotional responses - racing hearts, sweaty palms, flushed cheeks, feelings of passion and anxiety. The levels of the hormone cortisol increase during the initial phase of romantic love, preparing the body to deal with the present challenge. As cortisol levels rise, conversely the levels of the neurotransmitter serotonin become depleted. Low levels of serotonin precipitate the "intrusive, maddeningly preoccupying thoughts, hopes, and anxiety of early love (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025).

Two other chemicals involved in romantic love are oxytocin and vasopressin (de Boer et al. 2012), which are hormones that have roles in pregnancy, nursing, and mother-infant attachment. These two hormones are released during sex and heightened by skin-to-skin contact (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). Oxytocin deepens feelings of attachment and makes couples feel closer to one another after having sex. Oxytocin also provokes feelings of contentment, calmness, and security, and these are often associated with mate bonding (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). Vasopressin is linked to behaviour that produces long-term, monogamous relationships (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). It has been postulated that the behaviours associated with the actions of the two hormones may explain why passionate love fades as attachment grows (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025).

As well as the positive feelings which are caused by a romance, romantic love also deactivates the neural pathway responsible for negative emotions, such as fear and social judgment. These positive and negative feelings involve two neurological pathways. The pathway which is linked with positive emotions connects the prefrontal cortex to the nucleus accumbens, while the other, which is linked to negative emotions, connects the nucleus accumbens to the amygdala. So, when persons are involved in romantic love, the neural pathway responsible for making critical assessments of other persons, including assessments of the person with whom we are involved in romantic love is shut down (Zeki 2007), which might lead to incorrect judgements (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025).

It has been found that love of parents for their children produces the strongest activation of the reward system (Hudson 2024, Jethani 2025).

If romantic love lasts, Cortisol and serotonin levels return to normal. Love, which began as a stressor (to our

brains and bodies, at least), becomes a buffer against stress. Brain areas associated with reward and pleasure are still activated as the loving relationship proceeds, but the constant craving and desire that are inherent in romantic love often lessen (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). Thus MRI scans on couples who had been married for an average of 21 years show that the same intensity of activity in dopamine-rich areas of the brains as found in the brains of couples who were newly in love (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025). It is suggested therefore that while the excitement of romance can remain while the apprehension is lost. This is referred to as a more compassionate, routine type of love, however it has been shown that even after many years, more passionate love can be reignited (Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025).

It is important to note that, based on neuroimaging findings, passionate love not only activates the subcortical brain areas which mediate basic emotions, reward and motivation, but also stimulates higher-order cortical brain areas which are involved in social cognition, attention, memory, mental associations, and self-representation (Cacioppo 2012).

In fact, all types of interpersonal love engage social cognition areas, but with varying intensity, indeed fMRI studies show that the activation pattern of love is generated in social situations in the basal ganglia, the midline of the forehead, the precuneus and the temporoparietal junction (Hudson 2024, Rinne 2024).

Neural activity when feeling love depends on the object loved (Hudson 2024, Rinne 2024).

Love between persons stimulated social cognition brain areas in the temporoparietal junction and midline structures more than love for pets or nature, but all these objects stimulated these areas (Hudson 2024, Rinne 2024).

Love for persons who were close to the subject caused stronger and more wide activation in the reward system of the brain than love for strangers, pets and nature in that order, but the reward system was stimulated in the case of all these objects (Hudson 2024, Rinne 2024).

Love for a parent's children generated the most intense brain activity, closely followed by romantic love (Hudson 2024, Rinne 2024). 'In parental love, there was activation deep in the brain's reward system in the striatum area while imagining love, and this was not seen for any other kind of love' (Hudson 2024, Rinne 2024).

The above account of the neuroscience of romantic love does indeed explain romantic love, but it is an explanation which implies that the whole relationship between two human persons depends entirely of the reward mechanism, and this, in the end, depends on the pleasurable effect of dopamine.

Love of other types, such as the type of love represented by agape, which implies self giving, and union with the beloved, rather than pleasure, cannot be explained by this mechanism alone.

## THE IMPLICATIONS OF AGAPE

As has been stated, the type of love described as Agape implies that the two subjects wish to give themselves to each other and live in union with each other. This is the type of love that Christians who wish to unite their suffering to the suffering of Jesus Christ wish to experience with Him. Such love cannot be explained by the mechanism described above.

We therefore need to seek another neural mechanism which may explain and enable Agape love.

We wish to propose an entirely different neural system which can fulfil the criteria for the experiencing of Agape Love and for the experiencing of Union with the suffering of Jesus Christ.

These criteria include a strong feeling of self, and therefore an ability to give oneself to others, as well as a strong feeling of union with another person, including not simply another person but also an abstract concept.

Such a system exists in the combination of the "Mirror Neuron System" and the "Default Mode Network" (Molnar-Szakacs 2013, Sandrone 2013). The "Mirror Neuron System" includes the affective empathy system located in the anterior insula (AI) and midcingulate cortex (MCC) as well as the cognitive empathy system of theory of mind which almost overlaps with the Default Mode Network network. The DMN includes several key brain areas, including the Dorsal medial prefrontal cortex; This area is involved in self-referential thought and social cognition, the Posterior cingulate cortex: This region is thought to be a central hub for the DMN and is involved in self-referential processing and memory, the Precuneus: This area is linked to autobiographical memory and mental imagery, and the Angular gyrus: This region is involved in language comprehension and spatial reasoning (taken from Google AI overview).

These are entirely different areas of the brain from those involved in the "Reward System", and therefore in "Romantic Love".

Regarding Empathy, we have described in other papers that the areas involving empathy "light up" on MRI scanning when two human persons are being empathic with each other (Northoff 2009, Agius 2014).

The Default Mode Network (DMN) is a collection of interconnected brain regions that become more active when the brain is not focused on external stimuli, such as during resting state or when engaging in internally oriented thoughts like daydreaming or rumination. It is also active during periods of quiet wakefulness, allowing for reflection on experiences and social interactions (taken from Google AI overview).

The Default Mode Network (DMN) shows increased activity during "resting state", so that The DMN is most active when the brain is not engaged in a task and is at a state of rest or quiet wakefulness. The Default Mode Network has an Internal focus, in that The DMN is involved in internally focused thought processes,

including self-reflection, daydreaming, mind-wandering, and recalling personal experiences. The Default Mode Network is involved in Social cognition (Li 2014), in that the DMN plays a role in understanding the perspectives of others, empathy, and social interactions. The Default Mode Network is involved in Memory, in that the DMN is implicated in episodic memory (that is, recall of personal experiences) and semantic memory (general knowledge). Other functions of the Default Mode Network include being linked to language processing, future planning, and emotion regulation. (taken from Google AI overview).

Now, It is known that, when an observer looks at an artwork, he is able to "think himself into", and so associates himself with the Artwork (Agius 2018, 2025, Ishizu 2011, Kawabata 2004, Maglione 2017, Trentini 2015, Vartanian 2004, Vessel 2010, Yue 2007). This process is known as Embodied cognition (Caramazza 2014, Ishizu 2011, Kawabata 2004, Mahon 2015, Trentini 2015). It has been shown that in fact, the two neural networks associated with Embodied cognition are the Mirror Neuron System (Caramazza 2014, Hoenen 2017) and the Default Mode Network (Vessel 2013).

Most of the work on Embodied Cognition has been done in relation to paintings, but elsewhere we have argued that these same concepts can be extended to other artworks such as statues, including those of the suffering of Christ, such as Christ carrying the Cross (Agius 2025) or Christ Crucified. Therefore it appears that a person, when using embodied Cognition to look at a statue, is able to experience the statue, and feel empathic to what it represents (Agius 2018, 2025). Thus, given that the only knowledge that a human person at present has of the suffering of Jesus Christ is the written accounts and the artworks associated with this, and that personal memories are also a function of the Default Mode Network, such a person can feel associated with, indeed in union with, through the function of empathy (Agius 2017, 2018), the suffering represented by artworks of the suffering of Jesus which the artworks that he sees and knows represent (Agius 2025).

Therefore it is our opinion that the Default Mode Network and the Mirror Neuron Networks which are involved in Empathy are good candidates for the generation of the feeling of union of the Human Person with the suffering of Jesus (Agius 2017).

The fact that new work shows that there is a differential in the strength of dopamine released from the reward system (Rinne 2024) does not negate the suggestion of different inputs into the system of perceiving and experiencing love.

Further, we have noted a system whereby persons choose what they fall in love with, which is made less effective once they commit to love (Zeki 2007, Edwards 2015, Sherman 2024, Novotney 2023, Hudson 2024, Jethani 2025, Wright 2025).

The new work shows that the most potent dopamine response is parental love towards their children, followed by romantic love to another person, followed by love to a stranger, followed by love to a pet animal and followed by love of nature (Rinne 2024). We have elsewhere argued that our admiration of nature can lead to a perception of the ineffable (Agius 2018). We have also described that perception of an art work can generate a dopamine response from the reward system (Agius 2018), and that Embodied cognition can cause an artwork to cause stimulation of the mirror neuron / empathy network and the Default Mode Network (Agius 2018). We have also extended the concept of artwork to religious art (Agius 2025), which, we suggest, is the most important way in which we can visualise the suffering of Jesus Christ in His Passion.

Finally, it would be useful if prayer were shown to increase dopamine levels. This would corroborate the argument we have made above. Some recent studies do indeed show that Prayer does increase dopamine levels. The Google AI overview does suggest this, however it is difficult to identify the original papers. One study, from the University of Utah Studies Mormons Praying (Ferguson 2018). It was found that found that when the participants prayed, the brain's ventral striatum, which is associated with rewards, was activated. This led to an increase in dopamine levels, which led to feelings of pleasure and satisfaction (Soupstik 2023, Ferguson 2018). A study from Duke University Medical Centre showed that prayer can increase activity in the prefrontal cortex, which is responsible for decision-making, attention, and working memory (Soupstik 2023, Koenig 2009, Newberg 2014). Prayer also was linked with an increase in dopamine levels (Soupstik 2023). More such studies are needed, in particular on persons who want to unite their suffering to that of Jesus Christ. The most interesting study using functional magnetic resonance imaging (fMRI) on Catholics is a study on Carmelite Nuns (Members of the Same Order Of Teresa of The Child Jesus and Elizabeth of the Trinity mentioned above) who had a mystical experience of Union with God (Beauregard 2006). This mystical experiences caused stimulation of several brain regions and systems (Beauregard 2006). These included the right medial orbitofrontal cortex, the right middle temporal cortex, the right inferior and superior parietal lobules, the right caudate, the left medial prefrontal cortex, the left anterior cingulate cortex, the left inferior parietal lobule, the left insula, the left caudate, the left brainstem, and the extrastriate visual cortex. Unfortunately, dopamine levels were not measured in this study (Beauregard 2006).

## CONCLUSION

Given all the above, we can argue that:

- The Dopamine Reward system is a universal system for perceiving pleasure from any form of love;

- The inputs into the Reward System for romantic love (physical or mental contact with another Human being) or for love of nature (which would be by visual, auditory or olfactory) (Rinne 2024) are different from the input relating to artworks (Embodied cognition using mirror neuron network/ Default Mode Network) (Agius 2018) or the Ineffable (Empathy/ mirror neuron network/ Default Mode Network with emphasis on the perception of self and identification with another Self).
- The Output (in terms of Dopamine from the Reward System) is modulated by the different inputs, for the different types of Love, and that this is also likely to be true (that is, that there is a Dopamine Output) when a person unites herself with the suffering of Jesus as in Prayer (Beauregard 2006, Newberg 2014, Soupstik 2023, Koenig 2009).

In this paper, we have aimed to show that the desire of devout Catholics to unite their suffering with that of Christ is a reasoned and deeply rooted aspect of Christian tradition. We propose that the neurological basis for this spiritual commitment does not lie in the circuitry associated with romantic love, but is more plausibly linked to neural systems underlying empathy and self-awareness, specifically the mirror neuron system and the default mode network. Thus, we argue that, while a release of Dopamine is a final common pathway for all types of love, the form of "Agape" love for Christ by uniting oneself with His Suffering in His Passion is specifically mediated by those neural pathways which are specifically linked with the perception of the "Self" and with Empathy (Agius 2017, Northoff 2009), while other types of love are not so linked.

By highlighting this perspective, we underscore the importance of recognising and respecting the profound dignity of individuals who choose to engage with their suffering in this meaningful way.

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### Contribution of individual authors:

Both authors contributed to the literature search and the drafting of the text.

Both authors approved the final manuscript.

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