



The Subjective Need for Social Interaction

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ABSTRACT

Introduction: With regard to emotional phenomena, the aim of this thematic review is to provide a synthesis of the most recent and highest-quality psychological and psychobiopathological information, endorsed by the scientific community. **Material and Method:** A relevant electronic and manual search of several major national and international repositories, directories and bibliographic databases has been carried out until the end of March 2023. **Results and Discussion:** Well-known strategies of predictive regulation or allostasis are discussed in relation to human emotions, feelings and interactions. Emotions will be able to induce feelings, which will influence personal actions mutually. Psychobiologically, the default or default-operating neural network is important in any interactions. Distinct networks of the so-called social brain display volumetric changes in the presence or absence of social support groups. Social connection and interaction are a strong preventive factor for psychopathologies such as anxiety, depressive and personality disorders. On the other hand, interoceptive awareness, linked to empathy, is key to social interaction. Understanding of personal interrelationships is shaped in the brain regions that are considered social cognitive. Dysfunctional social behaviours may be strongly conditioned by genetic as well as environmental factors. Furthermore, one should consider both individual cognitive reserve and cognitive performance. **Conclusions:** The known relationships between emotions, feelings and personality with respect to human interactions have been made succinctly explicit. Also, where relevant, the psychobiopathological influence on personal relationships and communication skills.

Keywords: Cognitive function, Cognitive reserve, Connectivity, Population neuroscience, social behavior, Subjective age

INTRODUCTION

Humans and other animal species need to interact and communicate with the living beings around them, so it can be said that communication is an inherent condition of any organism. Expressing one's emotional, sensory and sentimental life is also an intraspecific social requirement, which is natural from the second year of life for children. In this period, language, awareness of otherness and of being oneself – that is, self-consciousness or the subjective experience of existing as a separate person – attain fresh properties or attributes.

Emotions are transient, involuntary, neurochemical and hormonal responses that predispose and prepare us to react in a certain way to external or internal stimuli. Emotional phenomena

are closely related to subjective experiences, which in turn are linked to cognition and affectivity. For emotions, the two essential premises of human interaction are awareness and knowledge, which are also prerequisites for learning and the performance of future behaviour. Below, we will succinctly discuss subjective knowledge on the need to interact with other people, other living beings and things. Subjective knowledge refers to the cognitive process of internal, immediate perception that one is aware of something. The subject is very diffuse and varied, involving numerous popular, philosophical explanatory studies and conjectures, as well as more opportune scientific approaches. This article aims to provide a synthesis of the most recent and highest-quality general psychological and, in particular, psychobiopathological information endorsed by the scientific community.

MATERIAL AND METHOD

An online manual search of several major national and international, medical and psychological, bibliographic databases, repositories and directories was undertaken until the end of March 2023. The main but by no means exclusive sources consulted were: 1) PUBMED, US National Library of Medicine, National Institute of Health; 2) Scientific Literature – SCILIT Indexing; 3) ÍNDICES CSIC, for the Spanish Ministry of Science, Innovation and Universities; 4) American Psychological Association – PSYCINFO JOURNAL; and 5) Excerpta Medica Data Base EMBAS – University of Kansas Medical Center.

In order to make the result operational, the most important contributions have been selected (mainly considering the journals by their impact factor or index), relating to quality scientific information on the subject and most recent publication. A total of four contributions in the form of a book or book chapter were also highlighted, giving a total of 64 references. This selection represents non-probabilistic convenience sampling, which aims to be objective. Primarily, qualified scientific publications of varied approaches have been included, which converge regarding the presumed common subjective need for adequate social interaction. The main methodological limitation on this study is that the process for assessing the scientific quality of the selected papers included in the bibliography, is not specified due to their extreme diversity.

RESULTS AND DISCUSSION

Emotions, Feelings and Human Interactions

Feelings are the usually fairly stable sum of emotions and associated thoughts, thoughts that are often conditioned by previous emotions. Feelings are not under volitional or conscious anticipatory control. Emotions are neurobiological processes that are subjectively transformed into feelings when the individual becomes aware of them, when they are interpreted and decisions are made, i.e., when they are managed and regulated. Emotional regulation refers to the set of skills and manoeuvres necessary to influence or modify emotional experiences in order to improve psychological functioning and well-being (usually prospectively).

This refers to [1,2], who has proposed a new theoretical psychological model that stresses the importance of being able to pay attention to the joys, pleasures and other positive feelings and sensations experienced or to be experienced throughout life. This model implicitly assumes any possible interventionist approach (whether or not carried out by a specialist mental health practitioner), which is aimed at enhancing strategies to improve positive psychological adjustment. Bryant also proposes that people should be proactive in this regard, i.e., promote deliberate acts of seeking or creating positive stimuli.

Predictive regulation strategies or allostasis [3] mean aiming for stability through change. Whereas in homeostasis the continuity and suitability of the environment is achieved through stability, in allostasis it is achieved through instability and variation. Body mass index and C-reactive protein have been the most informative biomarkers for determining 'allostatic load' [4]. It hypothesises that recurrent exposure to stressful environmental demands leads to progressive dysregulation of multiple physiological systems. When allostasis is ineffective, inadequate or the causative agent is prolonged over time and adaptation is not achieved, disproportionate or futile activation occurs, giving rise to what is known as allostatic load, the management of which is essential for survival.

In the subjective need to interact with others, emotions and feelings are crucial. From a psychobiological perspective, the natural functioning of synaptic mechanisms involves a permanent remodelling of neural circuits. Prefrontal structures are located rostrally to the motor and premotor encephalic areas and are involved in emotional processing and the orchestration of complex behaviours. The main ones are the ventromedial and dorsolateral cortex, as well as the anterior cingulate cortex. The ventromedial connects to different cortical and subcortical areas. The latter include the lateral hypothalamus, hippocampus and amygdala; the cortices include the temporal cortex, dorsolateral cingulate and dorsolateral prefrontal cortex. That said, for the necessary neuronal plasticity, with or without relevant psychopathologies, physical activity is important, as it has been shown that it can protect against some mood disorders such as depressive disorders, as well as help with anxiety or fear-related disorders [5-7].

After the initial emotions and feelings, subsequent actions decided upon will necessarily influence the feelings of the actors and the feelings of the observers involved. Feeling is a form of knowledge [8], so that subjectivity complements or completes the condition of knowing, paradoxical as it may seem. The subjective impression of possessing any knowledge will therefore be basically emotional, not cognitive. It has even been proposed to use subjectification as a conceptual approach to study different values, practices and elements that constitute the culture of scientific research [9].

From a psychoneurological perspective, it appears that emotional and relational processes in the right brain operate non-consciously not only in early human development, but throughout life [10], which in individuals will be essential for synchrony and interactions of any kind. Cognitive, affective and social neuroscience that is integrative and multidisciplinary can help to understand the most intimate personal subjectivity. Consider, however, that biological systems, and specifically brain functions, are based on the principle of randomness [11]. Overall, the intrinsic stochastic or non-deterministic process (as in gene expression, as a biological example) helps keep the brain in a flexible state to explore various alternatives as a prerequisite for making decisions.

Precisely in relation to these interactions, traditionally, in contrast to reactive behaviour, activities or actions are understood as any human behaviour, provided that the actor attaches some subjective reason or meaning to it [12]. Action will be social when the subjective sense refers to past, present or future behaviour that is observed or assumed in others and to which the observer's behaviour will be oriented. Thus, social behaviour is actually an interaction, as it entails the necessary involvement of at least two people. The need to interact is expected to be

greater in older individuals and to some extent will depend on the corresponding 'social capital' of useful links in the community [13].

People's everyday lives seem to be, in general, deeply emotional. Emotions and feelings are often omnipresent and interrelated. Emotion is an involuntary response, often endowed with psychophysiological correlates. Feelings, on the other hand, can be trained, so that it is possible to influence their original irrationality, since some single emotions can arouse different and even contradictory feelings. When experiencing any sensation originating from internal or external stimuli, there will routinely be emotional responses that are primary (such as anger and others) and secondary (such as shame and others). Primary and secondary emotions are in turn be capable of inducing feelings (whether expected or more surprising), which will most likely influence the human interactions in question.

Social scientific studies have long established that subjective aspects play some role in the processes of producing knowledge [9]. In particular, emotions and feelings define the way we behave in social, affective and family interactions. Reference is sometimes made to hypothetical constructs of a specific 'emotional' or 'social intelligence' and a supposed 'social brain' that would be attuned to others. So-called emotional intelligence would help one feel, think, learn, solve problems and make decisions. It is clear that social learning can play an active role in the development of cooperative strategies, which is also the case in non-human animals [14].

Since Aristotle, we know that emotion influences and transforms in such a way that one's own judgement will be affected [15]. In any case, it is clear that emotions influence interpersonal relationships. So-called social intelligence emphasises the set of skills that enable successful interaction with other people. Intelligence refers to the accumulation of properties of the brain that are not found separately in its components. The brain's left superior parietal lobe is a region of high cytoarchitectonic variation and in the resting state, individual modifications have been demonstrated in association with large-scale networks. Network topology, which refers to the way in which a given neural system is arranged, is linked to emotional intelligence [16].

In a recent study, positive interpersonal emotion regulation played an effective mediating role between conscientiousness and emotional intelligence in teams of people [17]. The group's emotional intelligence was considered to be the ability to deal with the relationships between its members. It seems to be demonstrated that the level of social intelligence is associated with the degree of functional integration between the brain network characteristic of representation of the mental states of others and the caudate nuclei [18].

Such representation is an ability assumed by the 'theory of mind', based on the pioneering work of G. Bateson, D. Premack and G. Woodruff. According to theory of mind, one can try to know the thoughts, desires and intentions of others and use this knowledge to predict their behaviour. This theory plays a key role in successful social interactions and is associated with a network of functionally related brain regions, the supposedly most critical centres of which are located in the dorsolateral prefrontal cortex and the temporoparietal junction [19].

In each subject, emotions and to a certain extent personality and its character component are supported by interpersonal relationships, i.e., their social environment. The construct 'personality' is used to explain consistency and coherence in patterns of affect, cognition, desire

and behaviour [20]. The stress response of endogenous cortisol has been related to perceived social support, including that of romantic partners, if any [21,22]. However, implementing interventions aimed at increasing social contact or support that do not take into account the joint degree of positivity and negativity (characterised by aversions and ambivalences) implicit in these interactive relationships may lead to undesired detrimental consequences [23]. Ambivalent bonds with co-workers, in particular, are strongly related to helping or harming behaviours [24,25].

Under normal conditions, between harbouring the idea of promoting a certain behaviour that has group implications and actually doing it, there are furthermore concurrent emotions and desires to consider, intermediary factors that will generally always be present. Teams or groups are understood here as social entities capable of collective action, and include spatial, discursive, emotional, institutional, psychological, technical and other environments [26]. To a large extent, they shape one's own assessment and evaluation of what is done. The subject, circumstances, ideas and emotions form a single framework within which the perceptive and acting capacities of individuals are manifested and which, together, constitute the personal and social space of awareness and ensuing interactions.

Social Interactions and Psychobiopathology

Modern society consists of a multitude of social systems. A three-dimensional concept of health has been proposed that considers health as concurrently organic, psychological and social [27,28]. Human beings have biological structure, and self-awareness is a psychophysiological and social cognitive condition, although the neurobiological underpinnings of social cognition are not yet well understood.

Interaction with others is an essential part of personal experiences. The frustrated sense of belonging (which is a basic human need) will generate isolation and relative helplessness. In particular, thoughts of uselessness and undervaluing are at the root of the individual eventually perceiving him or herself as a social burden, which ties in fully with Thomas Joiner's model of suicide risk [29]. The effectiveness of interventions by mental health specialist practitioners will depend to a large extent on the quality of the relationship with the patient and the construction of a shared understanding of the mental disorder, the patients and practitioners themselves, and the type of therapeutic intervention [30].

The default mode of brain function network [31] assumes that brain functions are primarily intrinsic and not necessarily task-evoked, so that there is usually considerable activity even in the resting state. It is, in effect, a neural network that is activated mainly in the absence of cognitive tasks. This is important in interpersonal interactions, particularly if certain psychopathologies coexist, as abnormalities in the functions of this network are a sensitive marker of attentional deficits. In particular, it would be of special interest to take the default neural network into account in education [32].

Stress, including multigenerational ancestral stress, is a primary risk factor for mental, behavioural and neurodevelopmental disorders, and social support will critically promote stress management and resilience [33]. Particularly in unmedicated patients with major depressive disorders, combined alterations in the amplitude of low-frequency fluctuations and regional cerebral blood flow in the left insula may represent clinically important central

neuropathological changes [34]. Such changes may, of course, affect their social relations and mutual influences.

Crucial to the processing of emotions, memories and learning related to interpersonal activities is the integrity of the Jakob limbic circuit – also known as the Papez circuit – [35], which conditions one's actions. With regard to emotionality in relation to others, the physiological response, so closely linked to genomics, and the experience of one's own feelings and thoughts and empathy with others, is fundamental [36]. From a population neuroscience perspective, it has been found that different networks of the so-called social brain show different patterns of volume variations linked to specific social indicators, such as the existence of friendship groups or, conversely, the lack of social support [37].

In particular, social anxiety disorder and major depressive disorder are highly comorbid with each other, and comorbidity exacerbates distress and impairment. The relationship between clinically significant anxiety for social interactions and comorbid depressive symptoms is likely to be different in men and women [38]. Thus, the self-perceived need to act or interact in social contexts is likely to differ with sex when formal anxiety and depressive disorders coexist. Based on extensive phenotypic and genomic data, it can be argued that social connectedness and interaction is the strongest preventive factor for experiencing depressive symptoms. This needs to be known in order to develop the right strategies to mitigate those depressive symptoms [39].

Personality disorders and related traits, on the other hand, involve deficits in patterns of cognition, experience, emotional expression and behaviour, which may have a genetic origin [40.41]. So-called 'secondary psychopathy' is determined by adverse experiences and trauma, and develops as a psychological coping mechanism [42]. 'Psychopathy' is often understood to mean certain constellations of personality traits.

In disorders considered primary or secondary personality disorders, social interactions will inevitably be altered, at least subjectively, as such disorders are associated with significant impact on the individuals themselves, their immediate environment and society. So-called secondary personality disorders are actually 'secondary personality changes' according to the current World Health Organisation's International Classification of Diseases for Mortality and Morbidity Statistics, eleventh revision, version 01/2023, code 6E68. These secondary changes may be due to a causal condition that can also be codified or associated with affective disorders (MB24.6x).

Interoceptive awareness seems to be related to the above-mentioned socio-emotional empathic capacity to feel and understand the emotional state of other people [43]. Empathy, which has emotional-affective and cognitive components, is key to any individual's healthy social functioning and interaction. Neocortical correlates have been found for more cognitive empathy (understanding others' problems and feelings), while only affective empathy (identifying with the feelings of another person whom they will eventually want to help) correlates with smaller volumes in subcortical structures. Functionally, affective empathy is linked to connectivity between the orbital and cingulate cortices [44].

Linked to social learning are motivation and metacognition. The latter is the ability to adequately consider the thoughts and emotions of all. There also appears to be a specific, widespread correlation between mental health, metacognition and mentalisation, the latter being understood as the ability to interpret one's own and others' behaviour [45]. In any case, people, like other organic beings, usually interact on the basis of past emotional episodes, which biases how they feel, think and make decisions in new situations [46].

The competencies of communicating and having interpersonal relationships fulfil at least a triple function: informative, value-affective and regulatory. It is worth recalling here the classic pyramid in *A Theory of Human Motivation* [47] with its five consecutive hierarchical levels of needs: physiological or basic, safety, love and belonging, esteem, and self-actualisation. In *Self Determination Theory* [48], which includes intentions and actions, autonomy consists of feeling that one is the volitional protagonist of one's own actions.

Other theories exist that we mention only as examples, such as 'attribution' [49] or classic 'social cognitive' theory [50], amongst others. In any case, the neural substrates linked to social cognition seem particularly susceptible when people endure prolonged periods of isolation [51]. What is certain is that in human interactions the personal needs for relationship and self-management must be satisfied while preserving the conviction that one is continuously oneself [52]. If this were not subjectively obvious, there are likely to be significant problems of many different kinds, including mental health problems, for all those involved.

The felt and assumed personal need to interact will necessarily relate to corresponding experience of the present, past or future time, and may be linked to people, other beings or things, whether or not they are perceived as real. Social interactions foster the convergence of subjects' perceptual responses and will generate shared collective models that enable agreements on entirely new objectives [53]. More particularly, understanding interactions is fundamental to extracting meaning from many everyday situations.

From a neural perspective, the understanding of personal interactions is shaped in the brain regions considered social cognitive, not in the motor regions [54,55]. These more social regions are mainly the prefrontal cortex, supplementary motor cortex, temporal lobe, cingulate cortex, limbic system, hippocampal system and visual associative cortex. So-called interpersonal neurobiology [56] emphasises that the mind is relational and biologically based and that its correct integration is essential for mental health.

From a relational approach to other people, dysfunctional behaviours may be caused or conditioned by various genetic factors, as well as environmental ones. The latter may be as diverse as the subjective needs to interact socially. The potential importance of the prefrontal GABAergic interneuron subtype of the neuropeptide somatostatin as therapeutic targets for the social impairments commonly observed in major mental, behavioural and neurodevelopmental disorders has been highlighted [57].

New technologies, which we could call relationship, information and communication technologies, bring about important changes in personal interactions [58], which maintain the challenge of aiming to be healthy, respectful and of good quality. Naturally, risk and trust are adapted to different cultures. In our functionally differentiated modern society, health

represents an essential system, which brings us back to Niklas Luhmann's sociological view of modern society as a system [28,59]. The subjective need to interact in a variety of community settings is closely related to health in general and mental health in particular. Furthermore, since social interactions affect the functionality of the brain, it is logical that they should be neither insufficient nor particularly conflictive.

In relation to person-to-person interactions, the total volumes of brain white matter and grey matter hyperintensities appear to be significant mediators in the association between the construct of 'cognitive reserve', cognitive performance [60,61] and social performance. This reserve is understood as the brain's capacity for lifelong thinking skills to tolerate and withstand neuropathologies before they manifest clinically. High cognitive reserve will prevent impairment, particularly social impairment, in people with white matter hyperintensities and help regulate brain function [62]. Specifically, cerebral small vessel disease is characterised by progressive white matter hyperintensities and associated cognitive social impairment.

Cognitive performance refers to the brain's abilities and capacities to function and operate with information received through the senses. Both cognitive reserve and cognitive performance are very important for adequate personal interactions, especially in older people, who are often particularly sensitive and vulnerable. Therefore, cognitive rehabilitation aims at recovering this performance and functional capacity through certain neuropsychological interventions. Furthermore, we have other promising therapeutic tools at our disposal, such as transcranial magnetic stimulation and transcranial direct current stimulation [63,64].

CONCLUSIONS

The current state of psychological and psychoneural knowledge of the personal need to interact with other beings and things has been briefly outlined. Socially shared realities about what is 'normal' in a given situation affect what people pay attention to and what they perceive. This is especially true for social interactions. Sufficient evidence exists to show a strong association between social relationships and physical and mental health. Psychological and social factors play an important role in the emergence of ambivalence in these relationships.

This article has dealt more specifically with the relationship between emotions and feelings, along with addressing the link between personality and character with regard to human interactions. It also, when applicable, looked at the inexorable psychobiopathological influence on such interactions and personal communication skills, fully accepting that many dysfunctional behaviours may be caused or encouraged by various genetic as well as socio-environmental factors. To make a comprehensive, synthetic summary, it can be stated that the subjective need to interact in various environments is closely related to health in general and mental health in particular.

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