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Personality and pain: Back to the four humours?

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Abstract

Associations of personality and physiologic characteristics have been of interest for centuries and remain a topic of scientific pursuit. This editorial reviews the association of personality, pain response and autonomic function in the context of the accompanying article “Exploring the relationships for visceral and somatic pain with autonomic control and personality” by Paine, et al.

Keywords

autonomic; personality; visceral pain; somatic pain

For centuries attempts have been made to classify humans into stereotypic categories - the ancient Greeks described traits based on the four humours; Traditional Chinese Medicine observed stereotypic patterns of energy excess and deficiency; Ayurveda proposed the three Doshas, or divine elements. As greater understanding of cellular processes arose, the focus in Western medicine turned to a more reductionist view of specific organ systems and cellular processes and clinical medicine has tended to practice as if the mind and the body are unrelated entities. Despite this, researchers have continued to pursue connections between personality, physiology, and illness. As we find interesting combinations of physiologic and psychological findings that cluster together, it is tempting to look far back to the patterns described in ancient times, and more recently to the work of Eysenck, who suggested in 1951 that neuroticism was an inherited “biological unit”[5], predicting the search for endophenotypes ongoing today.

Neuroticism has often been associated with subjective reports of pain and bodily symptoms [3;9;11], though debate has existed as to whether this is primarily an effect of over-reporting. A number of experimental findings in healthy subjects and those with medical disorders counter this argument and suggest a physiologic basis. Vossen et al show that neuroticism moderates cortical processing of pain, using EEG concurrently with electrical pain stimuli.[15] In functional dyspepsia patients, neuroticism was found to be associated with decreased cardovagal tone as well as reported symptoms.[8] While fascinating findings, the common, reproducible connections needed to establish clear personality phenotypes are lacking. Each set of findings is the product of very specific experimental protocols, measurement systems, and populations, failing to make the leap to a unifying “humour”.

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Paine et al., in this issue of *Pain*, enter into this difficult arena with a complex study of personality, somatic and visceral pain perception, and autonomic function. This study is novel in its combination of measures and as well as the results it describes. The authors find that both somatic and visceral pain result in an increase in both sympathetic and parasympathetic nervous system activity in healthy subjects and that a relationship exists between autonomic function (specifically the slope of cardiac vagal tone, or CVT, across the experimental paradigm) and neuroticism.

The autonomic nervous system (ANS) is an obvious candidate for linking psychological traits with physical symptoms. Centrally, the ANS is integrated with regions of the brain associated with pain, interoception, and behavior [2] [4]. Peripherally the ANS interfaces with all body systems. The difficulty in ANS research thus far has been a limitation in the ability to measure the ANS in action throughout the body. One of the major windows into ANS function that has been used is the cardiovascular system. A complex balance of sympathetic and parasympathetic forces modulates heart rate and blood pressure, making the individual components difficult to tease apart. Spectral analysis of heart rate variability (HRV) has been useful in isolating the cardiovagal contribution, though measures of sympathetic activity are more controversial[1]. Widely used experimentally, HRV has frustrated many with inconsistent results and limitations on experimental design required by using epochs of at least a minute. Paine, et al choose a selection of less frequently published measures, including CVT as measured by the NeuroScope™[10], and Toichi's Sympathetic Index.[14] This approach allowed the authors more flexibility to measure short intervals of time, with the drawback of less prior validation of the methodologies.

The study's findings are reminder that the sympathetic and parasympathetic branches of the ANS can interact in multiple ways to maintain selected homeostasis for a given situation. While the fight or flight response is often expected in the face of a painful stimulus, in this paradigm that response is fleeting. Once the immediate visceral threat of choking (placement of the esophageal balloon) has passed, the subjects adapt to the inescapable threat of the phasic balloon inflation with the hypervigilant "tonic-freeze" response. Coactivation of the sympathetic and parasympathetic branches has been described in animal models in which concomitant analgesia is observed [12] [13]. In humans the "tonic freeze" response has been described in sexual assault [7] and may be a poor prognostic factor in PTSD [6] but has not been described in experimental pain protocols. It was more surprising that the tonic freeze response was seen also in the somatic pain condition. While the authors postulate that this may have been due to the particularly unpleasant sensation of deep nail bed stimulation, the implied threat of the esophageal balloon, which remained throughout the protocol, cannot be discounted.

The analysis of intertwining characteristics of personality, autonomic function and pain perception is an enormous challenge and current literature does not yet show us a clear picture. Differences in these responses may vary depending on the subject (sex, age, and perhaps personality or coping style), on the environment (natural or experimental), or on the task at hand (controllable or uncontrollable, tonic or phasic stimuli). Careful evaluation of the various experimental methods is essential and movement towards greater standardization of measurements would aid in interpretation of data across studies. With so many pitfalls, what is the usefulness of this approach? In the identification of various components that contribute to the pain experience, perhaps we can find better insights into the causes of pain and distress, leading to more targeted, personalized therapies. Cautious interpretation of data, careful evaluation of methodology, and application to large subject samples are required to push this area of research forward. This work by Paine, et al., helps us proceed in that direction, stimulating, as provocative work should, as many questions as it answers.

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