***Fear, anxiety, and their disorders from the perspective of psychophysiology*: Summary of Findings and Analysis**

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Pathophysiology is rapidly emerging as an interesting and innovative way to understand mental health disorders, especially anxiety. A paper by Hamm (2019) provides an overview—through the use of a literature review—of defensive behaviors as they manifest in anxiety disorders and how these rely on threat proximity. The author explores neural networks involved in processing information related to threats and creating defensive responses. Hamm (2019) instrumentally addresses how his findings are translated to different clinical populations and how behavioral approaches can predict psychotherapeutic treatment outcomes. Hamm (2019) explores defensive mechanisms employed during anxiety, describes how psychopathology and psychophysiology may be a useful way to conceptualize and understand anxiety, and looks at how neurobiological processes differ depending on the proximity of fear-inducing stimuli.

To understand the article more clearly, we must recognize the central thesis that defense is an everyday function of the brain, and the parts of the brain that activate defense responses are necessary for survival. Defense circuits generate signals that reach our sensory systems, which increases the brain and body's ability to detect potential threats. The author qualifies the "pre-encounter defense" (Hamm, 2019, p. 7) stage, where participants exhibited hypervigilance to stimuli. He conceptualizes the human defense strategy as comprised of three major events: pre-encounter, post-encounter, and circa-strike. During the pre-encounter, the subject assesses his environment while adopting hypervigilance. The post-encounter defense is when the subject detects a threat cue and exhibits selective attention or homing in on the perceived threat. Circum-strike defense is when the threat is nearby, and the subject exhibits active defense behavior, such as flight or fight.

One of the main points the author tries to make in this study is that parallel physiological responses in the brain and body facilitate anxiety. Before this study, researchers found that during instances of Pavlovian conditioning, even before the actual threat event, the brain activated amygdala-based neurons, which propagated neural activity to the amygdala's central nucleus. The amygdala was found—through fMRI studies--to play a large role in fear-based responses, and it is often activated during earlier learning phases (Hamm, 2019). The implication is that anxiety affects more than just the amygdala and that neuronal and physiological brain activity can be highly dependent upon conditioned response to fear. The findings also indicate that heightened awareness and alertness (or widening focus of attention) during the initial defensive response involves increasing the sensitivity of the brain areas primarily responsible for basic sensory processing. The author refers to this phenomenon as “generalized hypervigilance" (Hamm, 2019, p. 5). In other words, even before exposure to the anxiety-provoking object, participants felt anxious and were already exhibiting neuronal behavior indicating this feeling. Hamm (2019) discusses a study in which participants who were afraid of spiders experienced increased activity in the thalamus and extrastriate visual cortex, indicating that pre-encounter defenses are activated. The findings from this part of the paper indicate that hypervigilance and activation in brain regions, like the amygdala and thalamus, occur during conditioned exposure to fear-inducing stimuli. The findings are instrumental in showing that physiological changes are present during defense anxious defense responses.

The author reviews fMRI studies to indicate that collectively, brain changes linked to anxiety and fear are arranged according to proximity and that certain processes along the defense continuum are congruent with different physiological markers. In addition, the participant considers “behavioral options” (Hamm, 2019, p. 13), which could mean a quick and sharp evaluation of available options upon exposure to a fear-inducing stimulus. Brain activity moves to the midbrain and away from the prefrontal areas when threats increase in proximity (Hamm, 2019). The author shows that physiological and neurobiological responses in the brain differ depending on where the threat is for the participant. For instance, during the post-encounter defense, when the participant registered a spider in the corner of the room, he would allocate increased selective attention to the stimulus, with heart rate deceleration and sympathetic nervous system arousal. The participant may undergo "defensive freezing," (Hamm, 2019, p. 5). Interestingly, participants with high fearfulness show higher skin conductance levels when viewing images of their feared objects. The key point is that the brain and body's defensive reaction is dynamically calibrated based on the interpreted nearness of danger, from vigilant monitoring to active avoidance or freezing responses. Different neural circuits, behaviors, and physiological signatures map onto varying perceived threat proximities. The midbrain tends to undergo higher activation during periods of high anxiety, moving away from the prefrontal cortex, which shows there is a high behavioral and physiological component to anxiety.

The author's study has interesting and pertinent implications. The "transdiagnostic model of defensive behaviors" (Hamm, 2019, p. 9), which is originally derived from animal research, can help scientists understand the physiological and pathopsychological processes involved in anxiety disorders, which are becoming increasingly prevalent in our society. The study concluded that human threat perception and responses are deeply tied not only to physiological cues but also to the proximity of the threat. There are different responses to immediate threats than to more distant ones. The author also identifies some interesting implications for research on anxiety, including behavioral options. When individuals in a study were given the option of avoiding the forced holding of their breath or an electrical shot through pressing a button, they exhibited accelerated heart rate, decreasing their blinking. The results suggested that similar circa-strike defenses are activated when there is an imminent threat, and options are presented for threat termination. Panic attacks tend to have the same circa-strike defenses (Hamm, 2019), an interesting implication and application for physio-psychology. In addition, the amount of blinking is found to be dependent upon imminent threat perception, generating the conclusion that a highly physiological response like blinking is connected to anxiety. The author cites additional studies in his conclusion section that indicate clear physiological markers connected to responses indicating anxiety.

In summary, Hamm provides evidence that anxiety involves both psychological and physiological mechanisms interacting dynamically. Based on perceived threat proximity, distinct neural circuits and bodily responses are activated. Hypervigilance engages sensory processing areas and the amygdala even before direct threat exposure. Nearer danger shifts activation to midbrain structures while eliciting autonomic arousal. This framework conceptualizes anxiety pathology, distinguishing normal from dysfunctional defenses. Identifying physiological markers at each stage informs psychophysiological treatments targeting the mind and body. Hamm's work highlights the integrated nature of psychological threat appraisal and physiological activation in anxiety.

References

Hamm, A. O. (2019). Fear, anxiety, and their disorders from the perspective of psychophysiology. *Psychophysiology*, *57*(2). https://doi.org/10.1111/psyp.13474