

Review

Role of the Gut Microbiota in Anxiety and Mental Health Regulation: A Comprehensive Review

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ABSTRACT:

The gut microbiota has emerged as an important contributor to mental health through its bidirectional communication with the central nervous system via the microbiota gut brain axis. Dysbiosis has increasingly been associated with anxiety, depression, and other neuropsychiatric disorders, although the causal nature of these associations remains under investigation. The MGB axis operates through multiple interconnected pathways, including neural (vagus nerve, enteric nervous system), endocrine (hypothalamic–pituitary–adrenal axis), immune (cytokine signaling), and metabolic (short-chain fatty acids, tryptophan metabolites, bile acids) mechanisms. Emerging evidence from preclinical and clinical studies have reported compositional changes in the gut microbiota is characterized by reductions in *Lactobacillus*, *Bifidobacterium*, and butyrate-producing genera alongside elevations in pro-inflammatory taxa are have frequently been associated with heightened anxiety and depressive symptomatology. Therapeutic modulation of the gut microbiota through psychobiotics, prebiotics, synbiotics, dietary interventions, and fecal microbiota transplantation (FMT) has emerged as a promising adjunctive approach, although clinical evidence remains heterogeneous. This review systematically synthesizes current evidence on the mechanistic underpinnings of the gut–brain axis in anxiety and mental health regulation, evaluates the therapeutic landscape of microbiota-targeted interventions, and identifies critical gaps requiring further investigation in the context of personalized psychiatry.

Keywords:

Gut microbiota; microbiota–gut–brain axis; anxiety; depression; psychobiotics; dysbiosis; short-chain fatty acids; tryptophan; HPA axis; neuroinflammation

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