Effects of Probiotic Treatment for Attention Deficit/Hyperactivity Disorder, A Systematic Review

Julian Betz, Carroll College Health Sciences Department

Introduction

- Attention-Deficit/Hyperactivity Disorder (ADHD) is a common neuropsychiatric disorder, characterized by symptoms of inattention and/or impulsivity and hyperactivity. ADHD has been associated with abnormalities in the monoamine neurotransmitter systems dopamine and noradrenaline, putting individuals at risk for addictive, impulsive, and compulsive behavioral propensities.[1]
- Though the primary treatment for ADHD is often stimulant medication, long-term negative effects of stimulants on cognitive functioning are not well known [4] and often disregarded. Studies have found that families typically decline the use of pharmacotherapy due to the negative side effects that come as a result, particularly the negative impacts on sleep and dietary patterns.[5]
- For this reason, researchers are interested in the impacts of natural supplementation for ADHD due to the significant relationship between important neurotransmitters in our brains and our gut microbiome. Gut microbiome dysbiosis has been directly connected to increased symptoms of ADHD and autism. Nutritional deficiencies of fatty acids, zinc and iron have been observed in children with ADHD.[8] It has been observed by many researchers that this bodily imbalance of proper nutrients and neurotransmitters may have a potential solution through natural supplementation that promotes gut microbiome symbiosis.
- The purpose of this study is to review relevant findings to determine the effects of probiotic supplementation on gut microbiome diversity for individuals with ADHD. The findings of this study will help inform clinicians both treating and recommending treatment for patients with ADHD, of the benefits of participating in natural supplementation directed at the gut microbiome as an alternative to stimulant medications.

Methods

- Primary sources for this systematic review, retrieved from the search engines PubMed and CINAHL, were collected in September and October of 2023.
- The search terms used for both engines are as follows, Attention Deficit/Hyperactivity Disorder AND Probiotic Treatment AND Natural Supplementation AND Stimulant Medication AND Effects.
- After screening for article relevancy and removing review studies,, the search was narrowed down to 13 articles

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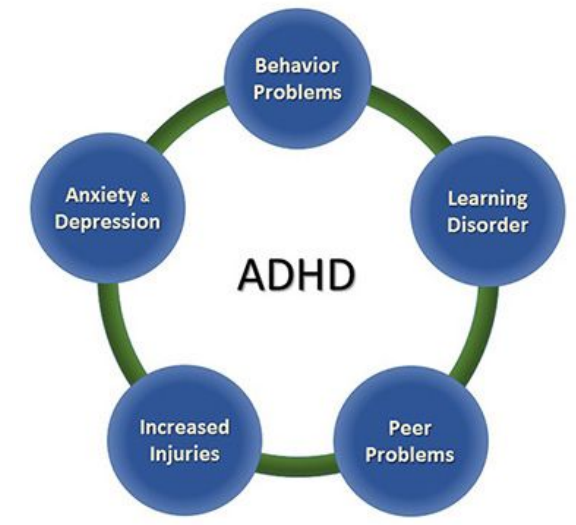

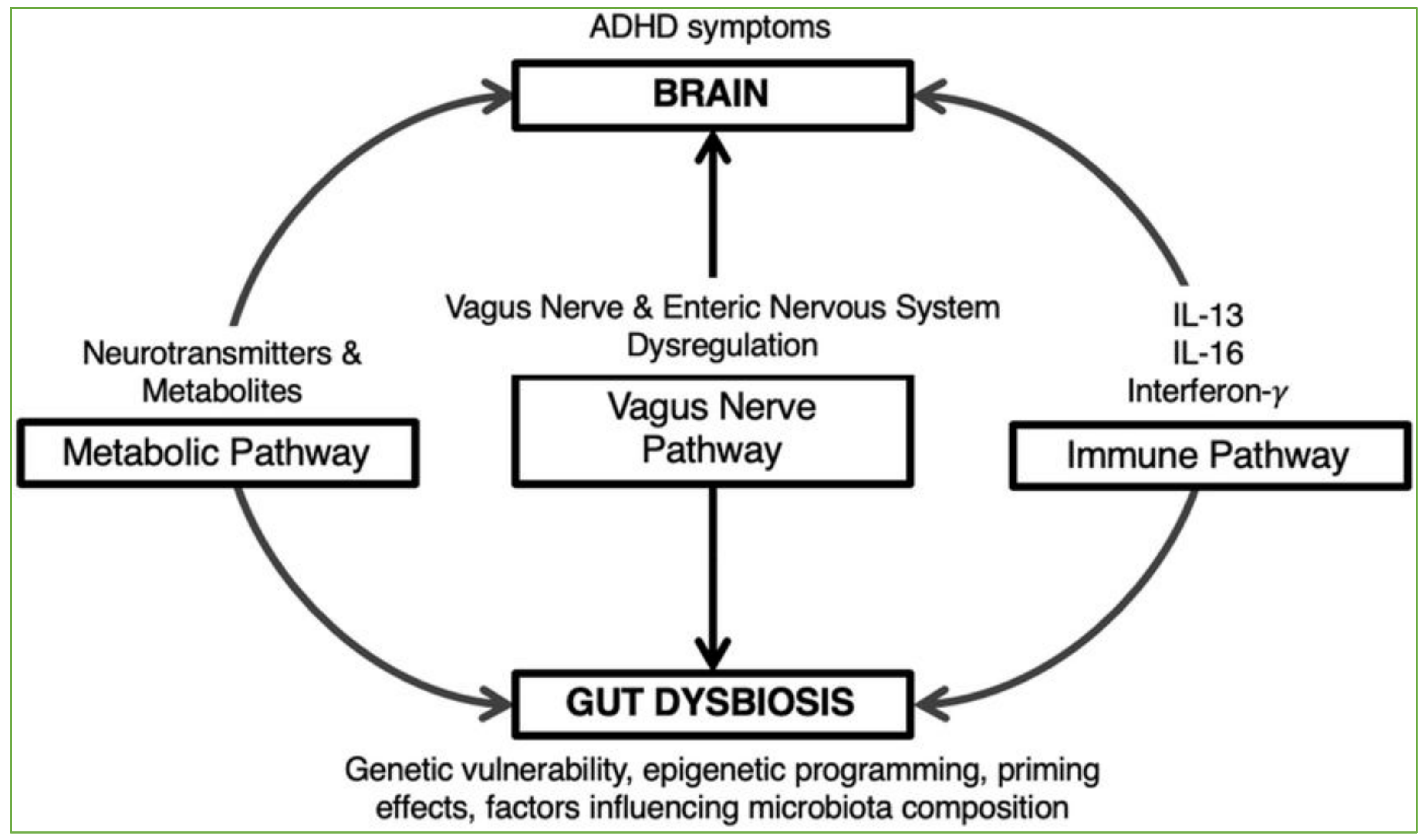

Figure. 1 Links between gut−microbiota and ADHD gut−brain axis [12]

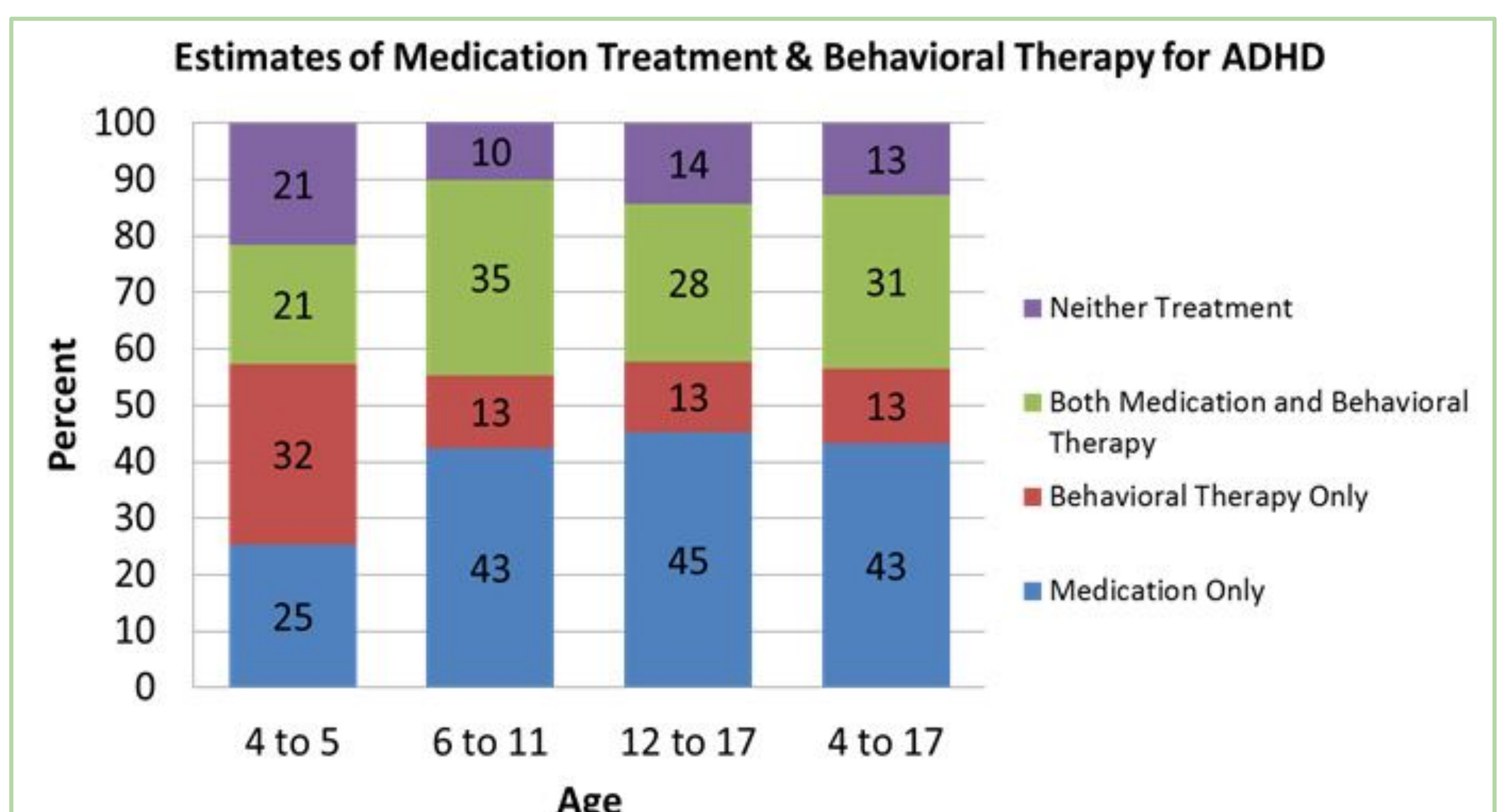

Figure 2. Estimates of Medication Treatment & Behavioral Therapy for ADHD [13]

Results

- Probiotic intervention for ADHD showed significant evidence of improving sleep, decreasing side effects of ADHD, as well as improving overall quality of life.[2,4-8,11]
- When comparing probiotic treatment to the more commonly prescribed stimulant medications, individuals taking stimulants improved test scores quicker than the probiotic group while decreasing sleep quality, while the probiotic group reached similar test scores over time and had no negative impacts on sleep.[2]
- As seen throughout the studies, **probiotic treatment for ADHD results in long lasting positive effects including increased diversity of the individuals gut microbiome, improving sleep, increased attention span, and overall bettering the quality of life for individuals with ADHD.**[1,5,10,11]

Discussion

- Within all studies included in this review, the use of probiotics when treating Attention-Deficit/Hyperactivity Disorder showed positive outcomes when used as an alternative to pharmacotherapy. Major developmental outcomes analyzed in placebo-controlled trials showed significant benefits from probiotic treatment including improved sleep, improved cognitive functioning, and decreased attention hyperactivity.[3,5-10]
- Most articles used were placebo-controlled trials.[3,5-10] All but two of the articles were published within the last thirty years. Some limitations within these studies were a few small sample sizes (32,16,34)[5,3,7] Increasing length of the study and sample size would improve statistical evidence supporting these studies in the future.
- The findings of this review can be used to help guide patients with ADHD or their caretakers when considering probiotic treatments for their disorder to avoid adverse effects of medication treatments which include lack of sleep and decreased appetite. Some beneficial outcomes resulting from probiotic treatment of ADHD includes increased gut microbiome which in turn results in improving sleep quality, cognitive functioning, and overall quality of life for individuals suffering from this disorder.

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