

Introduction

- Anxiety and depression are the most common mental illnesses in the U.S.¹
- Almost 50% of people diagnosed with depression also have an anxiety disorder.^{2,3}
- Both anxiety and depression have multifaceted, incompletely-determined etiologies.^{1,5}
- Causal and therapeutic relationships between micronutrients and anxiety and depression have been demonstrated.⁶

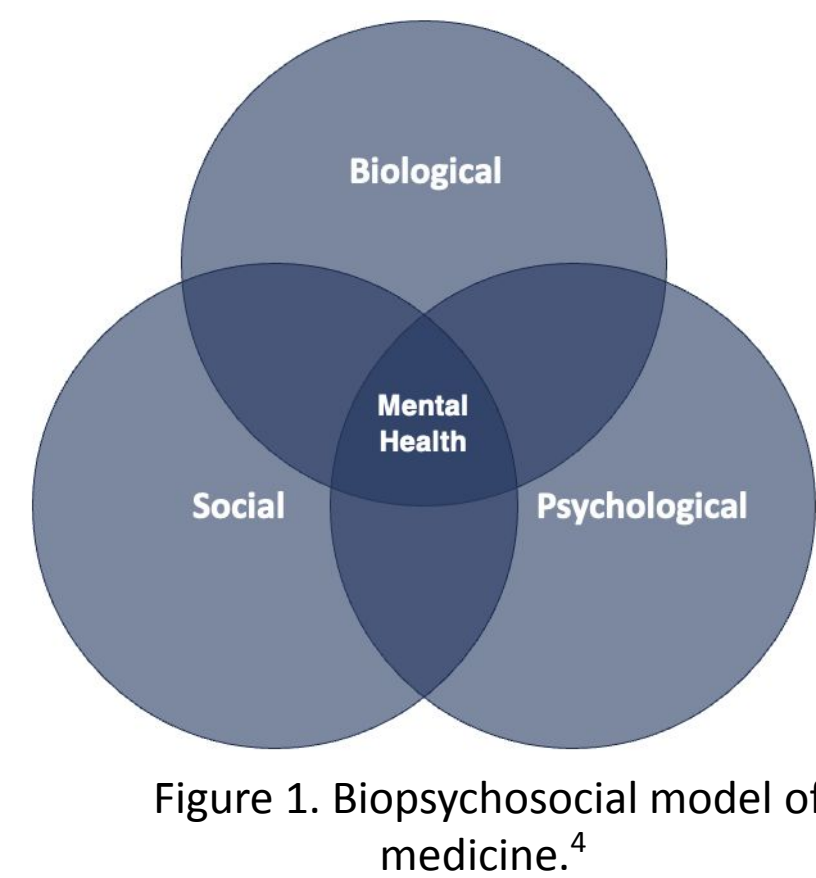


Figure 1. Biopsychosocial model of medicine.⁴

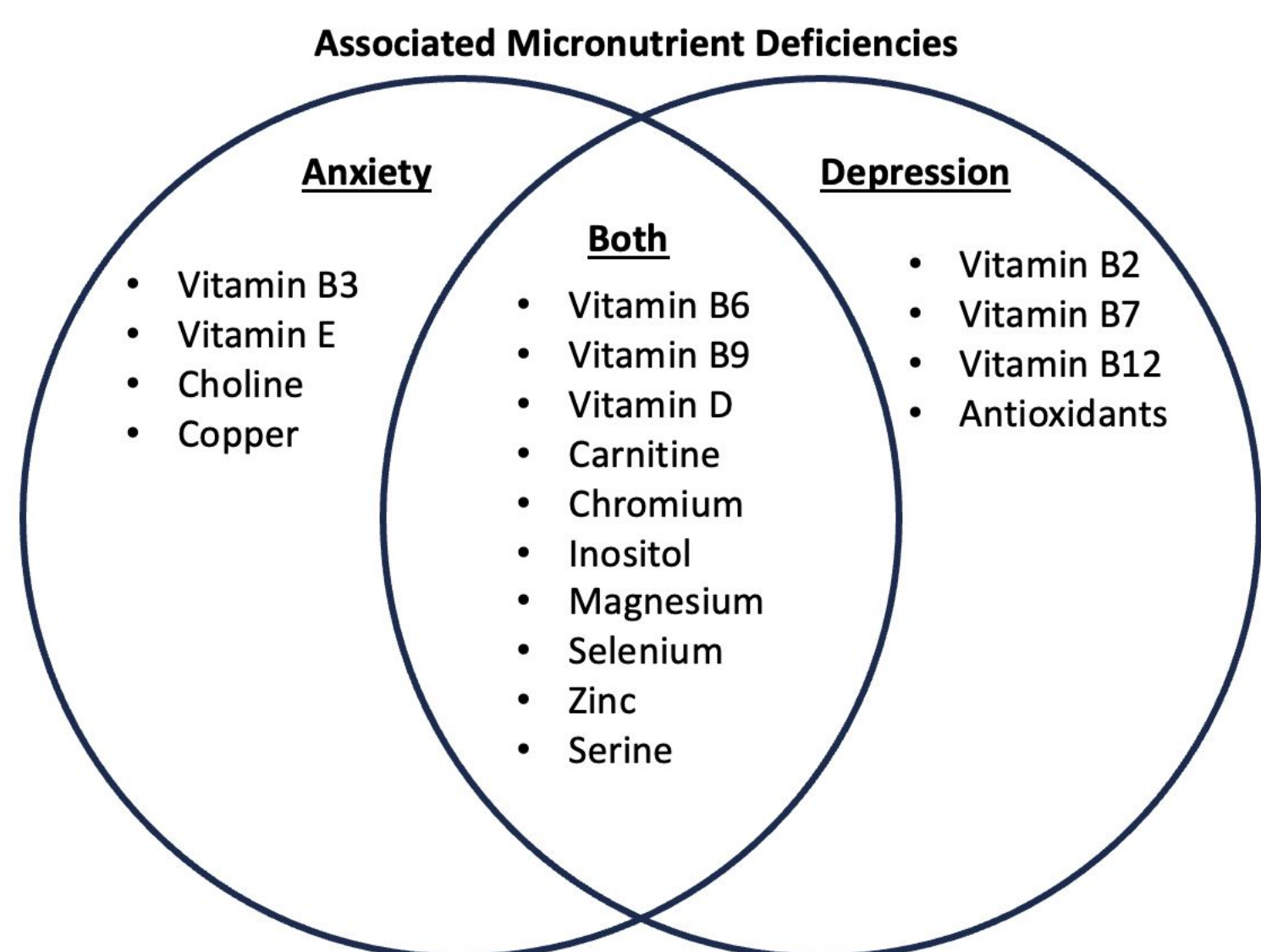


Figure 2. Micronutrient deficiencies associated with anxiety and depression.^{7,8}

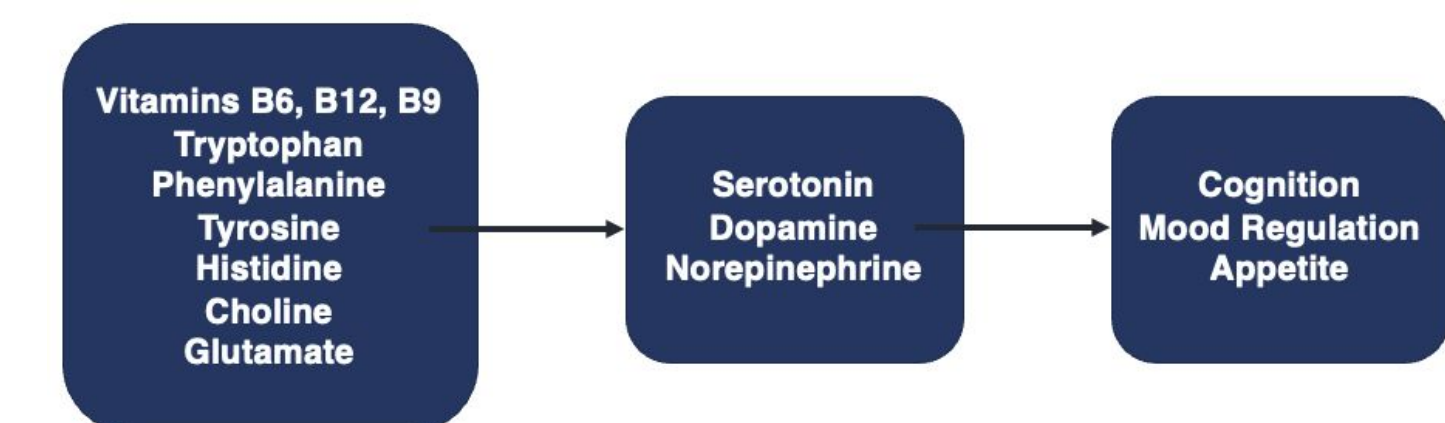


Figure 3. Certain micronutrients are needed for production of neurotransmitters that contribute to processes related to mental health.^{1,9}

Gaps:	Examination of multiple simultaneous micronutrient deficiencies via use of serum micronutrient levels
Goal:	To improve the understanding of the relationship between micronutrient deficiencies and anxiety/depression by employing serum micronutrient levels
Impact:	This project provides greater insight into the nutritional needs of Corewell Integrative Medicine patients and further informs the use of nutrition approaches in addressing symptoms and progression of anxiety and depression.
Hypothesis:	Multiple simultaneous micronutrient deficiencies consistent with previously established associated deficiencies will be observed in patients with anxiety and/or depression.

Aims and Objectives

Aim 1: Identify the most common micronutrient deficiencies present in Corewell Health Integrative Medicine Clinic (CHIMC) adult patients with anxiety and/or depression.

Aim 2: Quantify the prevalence of micronutrient deficiencies in CHIMC patients with anxiety and/or depression.

Objective 1: Data was collected via a retrospective chart review of CHIMC patients who had a diagnosis of anxiety and/or depression and who have SpectraCell Micronutrient testing (SMNT) data between 2012 and 2023.

Objective 2: Data was analyzed to identify and determine the prevalence of micronutrient deficiencies in the study population.

Methods

- Retrospective chart review
- Inclusion criteria: at least one visit at CHIMC between 01/01/2012 and 12/31/2023, aged 18 and older, diagnosis of anxiety and/or depressive disorders via ICD-10 codes, and available SMNT.
- SMNT analyzes blood levels of 31 vitamins, minerals, and metabolites as well as assessment total antioxidant function, fructose/glucose metabolism, and T-lymphocyte proliferation and immune response.

Table 1: Vitamins, minerals, metabolites, antioxidants, and functional assays reported by SpectraCell MNT.

B-Vitamins	Amino Acids and Metabolites	Other Vitamins & Minerals	Carbohydrate Metabolism	Antioxidants	Functional
B1 B2 B3 B6 B12 Folate Pantothenate Biotin	Serine Glutamine Asparagine Choline Inositol Carnitine Oleic Acid	Vitamin D3 Vitamin A Vitamin K2 Manganese Calcium Zinc Copper Magnesium	Fructose sensitivity Glucose-insulin interaction Chromium	Glutathione Cysteine Coenzyme Q10 Selenium Vitamin E Alpha lipoic acid Vitamin C	SpectraCell® total Antioxidant function Immune function

- SMNT results: deficient, borderline deficient, adequate

Figure 4. Sample SpectraCell Micronutrient Test Report Page.²⁰

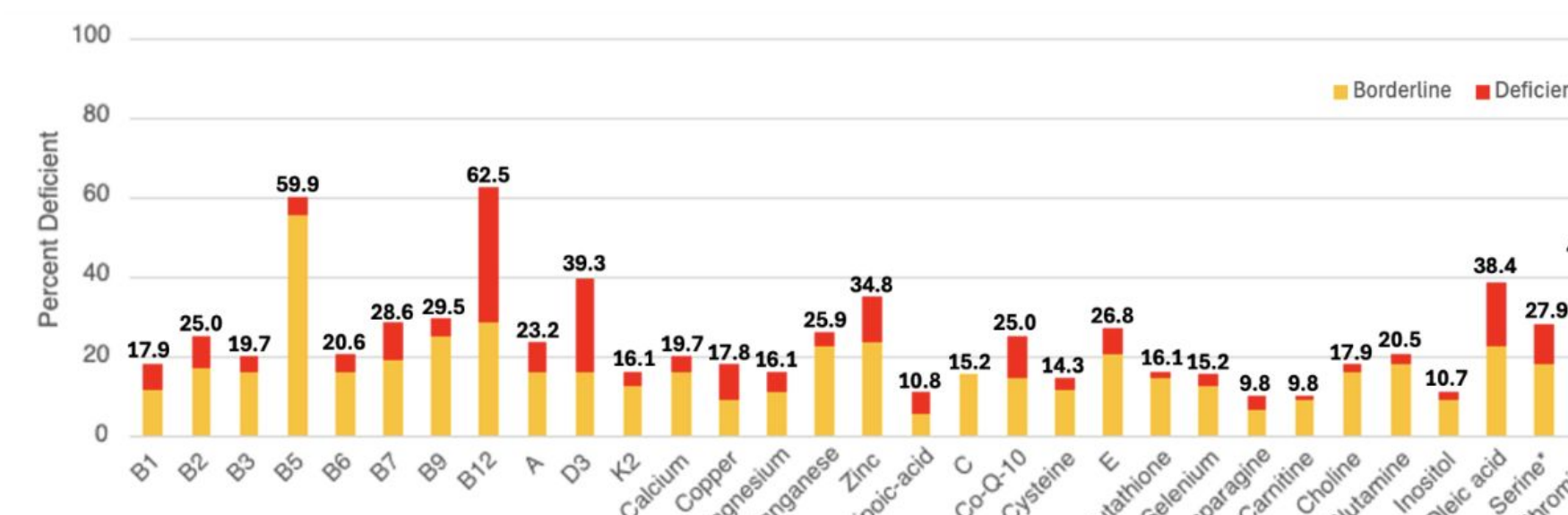
Results

Table 2: Demographics and most common micronutrient deficiencies of study population.

	All participants	Participants with both anxiety and depression	Participants with anxiety only
	% (n)		
Median age*	46(18,93)	45(18,75)	47(19,93)
Sex (F)	92.0(103)	92.7(51)	92.9(52)
Anxiety only	50.0(56)		
Depression only	0.9(1)		
Both	49.1(55)		
Had comorbidities	91.1(102)	90.9(50)	91.1(51)
Took at least 1 medication	74.1(83)	83.6(46)	66.1(37)
Took at least 1 supplement	86.6(97)	85.4(47)	89.3(50)
Reported some form of exercise	68.8(35)	37.0*(34)	77.4**(41)
Most common micronutrient deficiencies			
Vitamin B12	62.5(70)	63.6(35)	62.5(35)
Vitamin B5	59.9(67)	58.1(32)	62.5(35)
Chromium	43.7(49)	36.4(20)	50.0(28)
Vitamin D3	39.3(44)	36.3(20)	41.1(23)
Oleic acid	38.4(43)	41.8(23)	20(35.7)
Zinc	34.8(39)	41.8(23)	26.8(15)

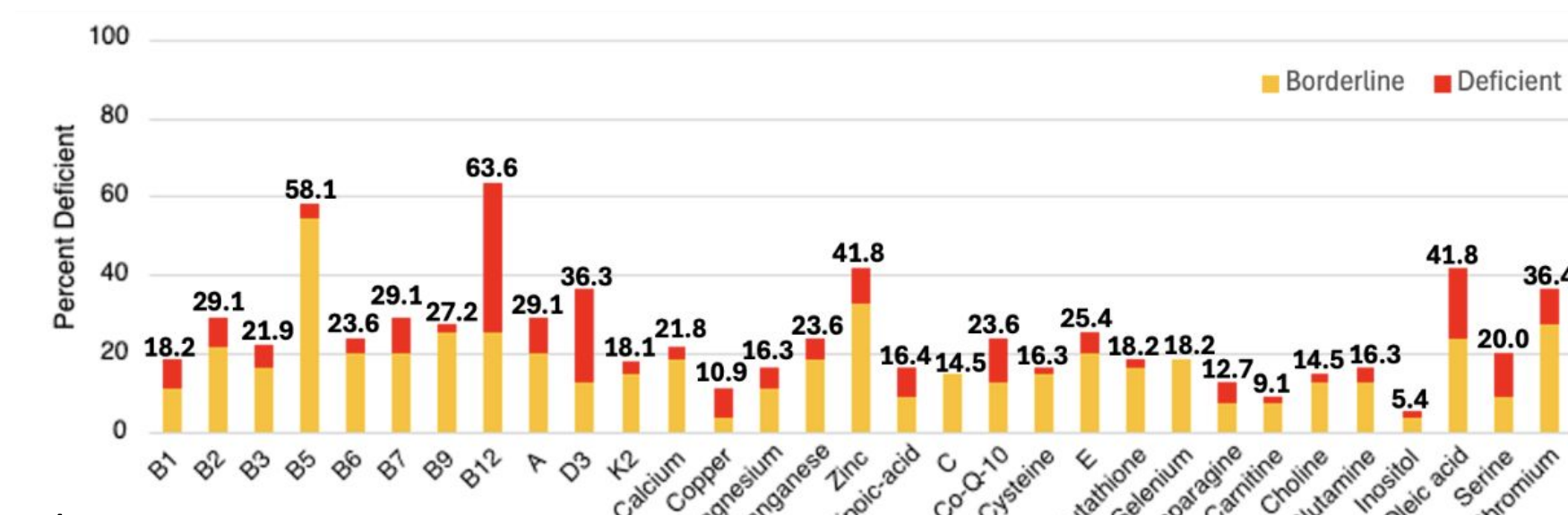
+ age in years(min, max) *n=54 **n=53

Graph 1: Micronutrient deficiencies in all participants.



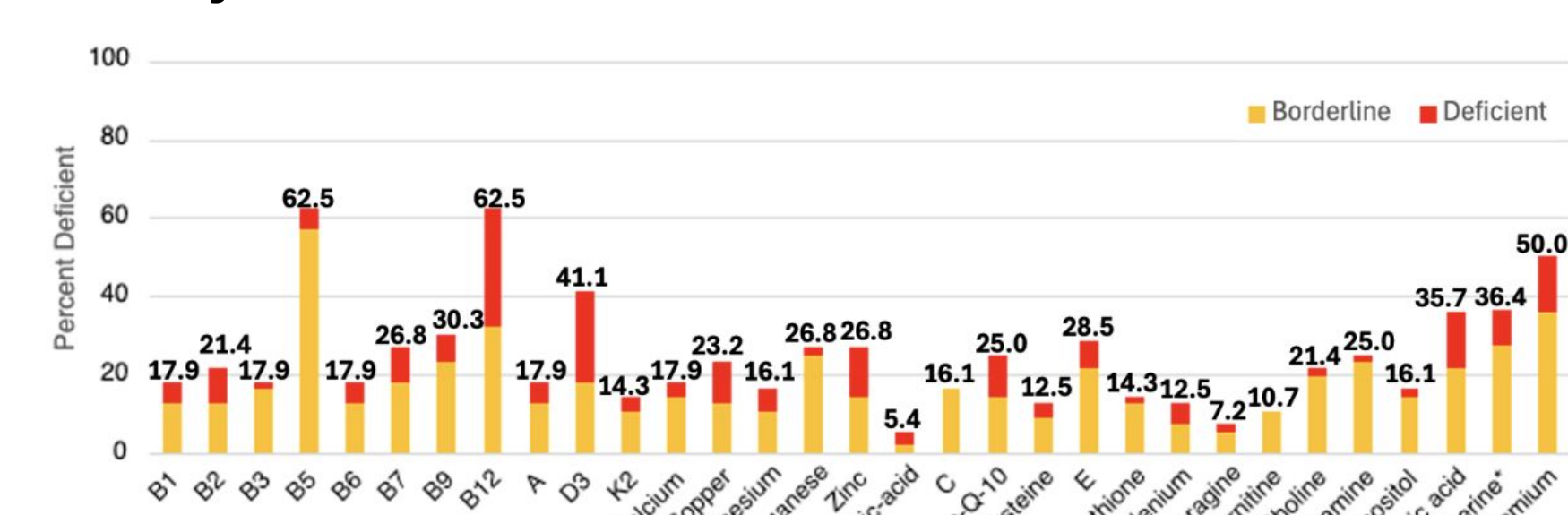
*n=111

Graph 2: Micronutrient deficiencies in participants with anxiety and depression.



*n=54

Graph 3: Micronutrient deficiencies in participants with anxiety.



*n=55

Conclusions

- Majority of CHIMC patients had at least one micronutrient deficiency with vitamin B12, vitamin B5, chromium, vitamin D3, oleic acid, and zinc deficiency being the most common.
- Vitamin B12, chromium, vitamin D3, and zinc deficiencies have been previously associated with anxiety and depression.^{7,8,21}
- Vitamin B5 deficiency has not previously been isolated in association with these mental illnesses. However, it is hypothesized to be associated with anxiety and depression through its roles in energy production, mitochondrial function, and acetylcholine production.^{21,22}
- Oleic acid has been found to be decreased in people with depression in one study.²³
- Both vitamin B5 and oleic acid are posited to have roles in anti-inflammatory processes through their involvement in lipid metabolism, which could support the neuro-inflammatory process of mental illness.^{22,24}
- Micronutrient deficiencies are an important consideration in the investigation of the pathophysiology and therapeutic interventions for anxiety and depression.
- Limitations: only one participant with depression; primarily female study population; no control group
- Future directions:
 - Comparison of micronutrient deficiencies between participants with anxiety and/or depression and a control population
 - Investigation of confounding factors (i.e. comorbidities, medications, supplements, etc.) possibly contributing to deficiencies

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