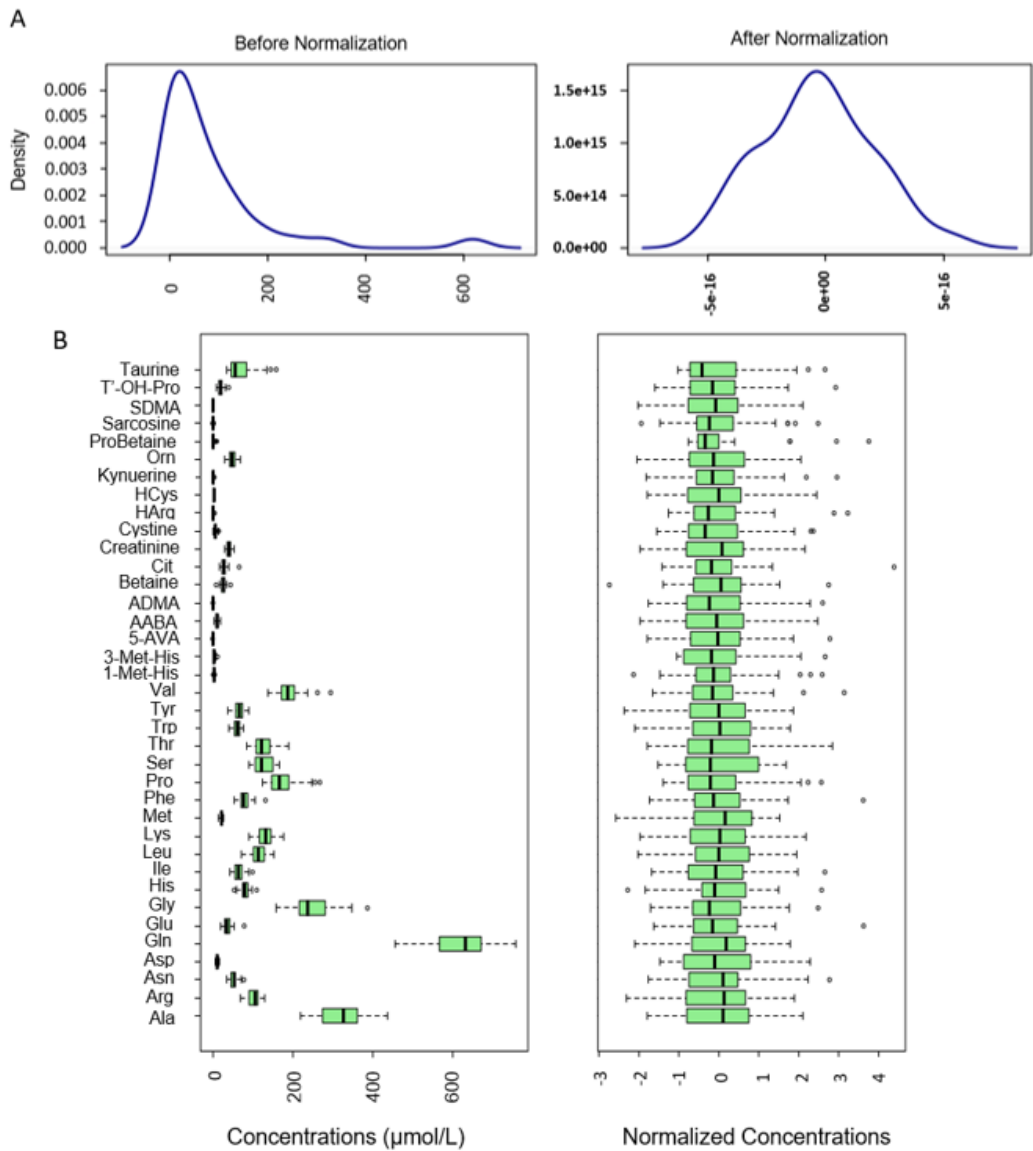


Supplementary Table S1. List of proteogenic and amino acids related

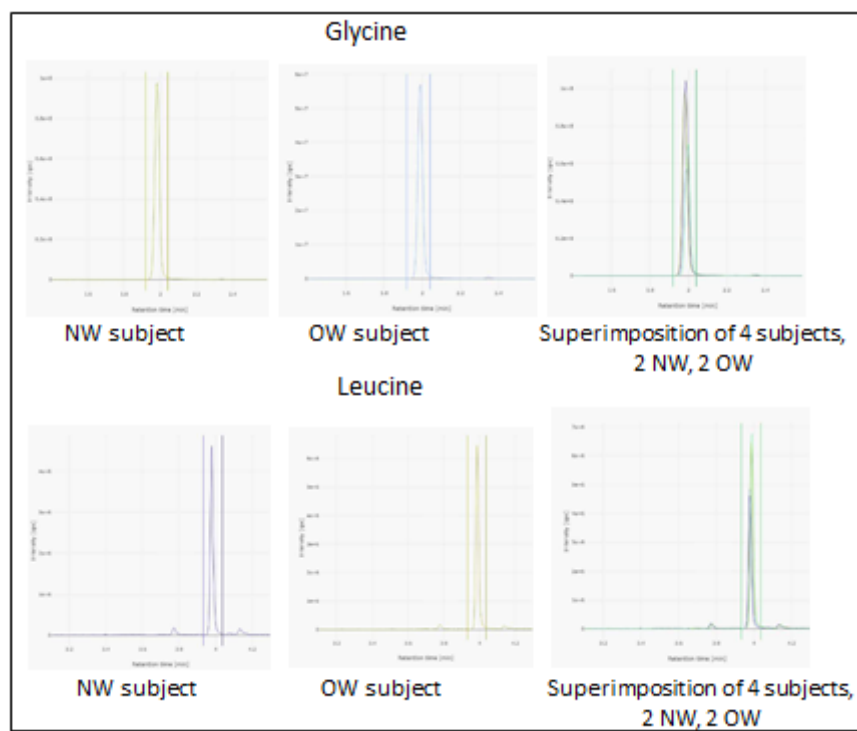
Proteogenic Amino acids		Aminoacids related	
Ala	Alanine	alpha-AAA	α -Aminoadipic acid
Arg	Arginine	1-Met-His	1-Methylhistidine
Asn	Asparagine	3-Met-His	3-Methylhistidine
Asp	Aspartic Acid	5-AVA	5-Aminovaleric acid
Cys	Cysteine	AABA	α -Aminobutyric acid
Gln	Glutamine	Ac-Orn	Acetylornithine
Glu	Glutamic Acid	ADMA	Asymmetric dimethylarginine
Gly	Glycine	Anserine	Anserine
His	Histidine	BABA	β -Aminobutyric acid
Iso	Isoleucine	Betaine	Betaine
Leu	Leucine	c4-OH-Pro	cis-4-Hydroxyproline
Lys	Lysine	Carnosine	Carnosine
Met	Methionine	Cit	Citrulline
Phe	Phenylalanine	Creatinine	Creatinine
Pro	proline	Cystine	Cystine
Ser	Serine	DOPA	Dihydroxyphenylalanine
Thr	Treonine	HArg	Homoarginine
Trp	Tryptophan	HCys	Homocysteine
Tyr	Tyrosine	Kynurenine	Kynurenine
Val	Valine	Met-SO	Methionine sulfoxide
		Nitro-Tyr	Nitrotyrosine
		Orn	Ornithine
		PAG	Phenylacetyl glycine
		PheAlaBetaine	Phenylalanine betaine
		ProBetaine	Proline betaine
		Sarcosine	Sarcosine
		SDMA	Symmetric dimethylarginine
		t4-OH-Pro	trans-4-Hydroxyproline
		Taurine	Taurine
		TrpBetaine	Tryptophan betaine

Supplementary figure S1 (A,B)

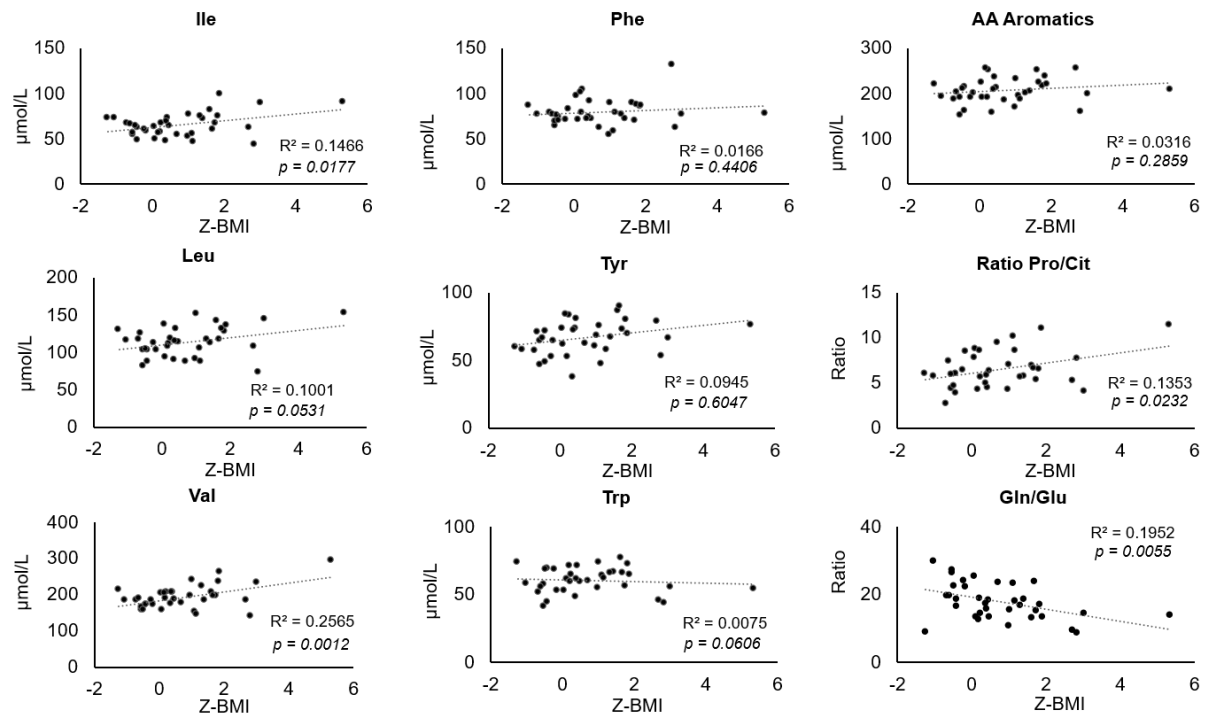


Supplementary figure S1 (C)

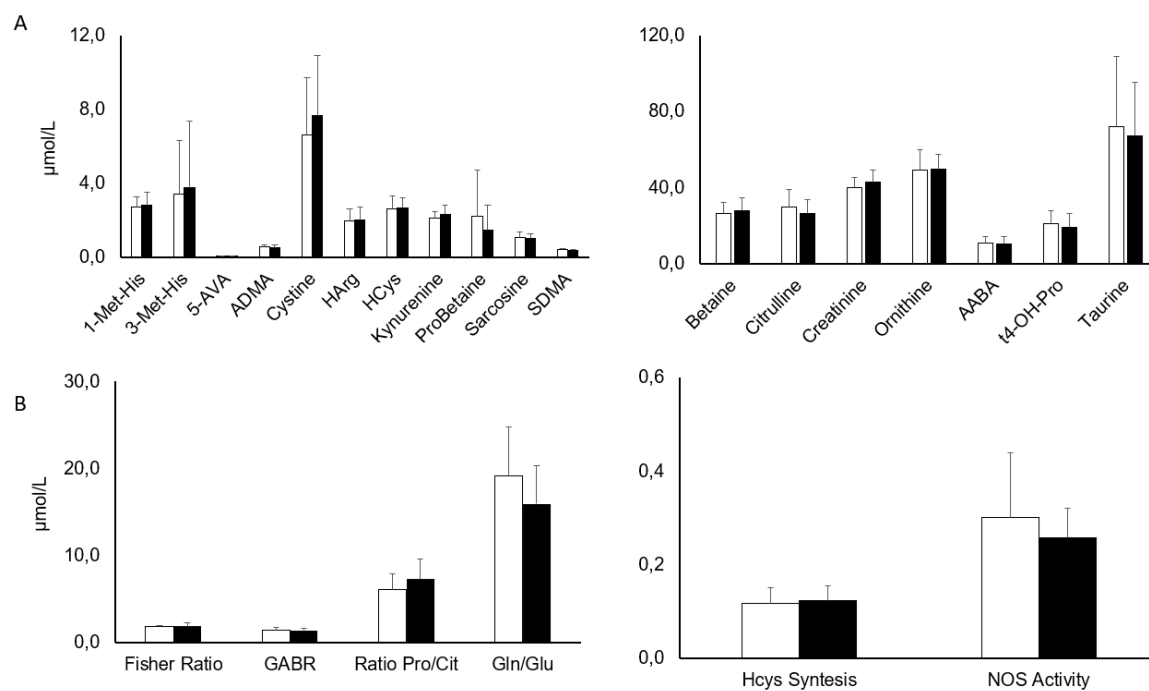
C



Supplementary figure S2



Supplementary figure S3



Supplementary figures legends

Supplementary Figure S1. Data Normalization prior to metabolomics analysis. **A.** Density distribution (upper graph) and metabolite concentrations (lower graph) prior to normalization. **B.** Density distribution (upper graph) after auto scaling (mean-centered and divided by the standard deviation of each variable) and normalized metabolite concentrations (lower graph). **C.** Representative LC-MS/MS chromatographic separations of Glycine (upper part) and Leucine (Lower part). A separation from a NW subject (left), and OW subject (center), and overlapping peaks from 2 NW and 2 OW subjects (right) are shown.

Supplementary Figure S2: correlations between plasma AA and ratios of amino acids concentrations and BMI z-Score in children aged 7-12. Ile: isoleucine, Leu: leucine, Val: valine, Phe: phenylalanine, Tyr: tyrosine, Trp: Tryptophan, AAA: aromatics amino acids (Phe+ Tyr+ Trp), Ratio Pro/Cit: proline/ citrulline, Gln/Glu: glutamine/glutamic acid. R^2 correlation coefficients and significance are reported on each graph.

Supplementary Figure S3: A. Amino acids related concentrations and amino acids ratios in normal weight and overweight children aged 7-12. AABA: α -Aminobutyric acid; ADMA: Asymmetric dimethylarginine; 5-AVA: 5-Aminovaleric acid; Cit: Citrulline; Harg: Homoarginine; HCys: Homocysteine; t4-OH-Pro: trans-4-Hydroxyproline; 1-Met-His: 1-Methylhistidine; 3-Met-His: 3-Methylhistidine; Orn: Ornithine; ProBetaine: Proline betaine; SDMA: Symmetric dimethylarginine. **B.** Fisher ratio: BCAA/AAA; GABR: Arg/(Orn+Cit); Hcys syntesis: Hcys/ Met; Ratio Pro/Cit: Proline/Citrulline; NOS activity: Citrulline/arginine; Gln/Glu: Glutamine/Glutamic acid. Data represent means and standard deviations. For all t-test comparisons, significance was >0.05 .