



Low dietary intake of magnesium is associated with increased externalising behaviours in adolescents

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Adequate zinc and magnesium intakes may be beneficial for the prevention and treatment of mental health problems, such as depression, anxiety and attention-deficit hyperactivity disorder. Zinc is a co-factor of many enzymes that play a role in brain function⁽¹⁾ and zinc modulates neuronal excitability by inhibiting both the *gamma*-aminobutyric acid (GABA) and N-methyl-D-aspartate (NMDA) receptors⁽²⁾. Magnesium is another potent antagonist of the NMDA receptor complex⁽³⁾ and magnesium deficiency has been related to symptoms such as agitation, anxiety, irritability and hyperexcitability⁽⁴⁾. We aimed to investigate the prospective associations of dietary intakes of zinc and magnesium with internalising and externalising behaviour problems in adolescents participating in both the 14 and 17 year follow-ups of the Western Australian Pregnancy Cohort (Raine) Study (*n* 684).

Dietary intakes of zinc and magnesium were assessed using a validated food frequency questionnaire and mental health symptoms were assessed using the Youth Self-Report (YSR). General linear mixed models were used to investigate the prospective relationships between zinc and magnesium intakes and YSR T-scores, adjusting for sex, physical activity, family income, supplement status, dietary misreporting, BMI, family functioning and energy intake.

	Zinc			Magnesium	
	β (95% CI) ¹	<i>P</i>		β (95% CI) ¹	<i>P</i>
			Unadjusted		
Total	-0.48 (-0.96, 0.01)	0.053		-0.34 (-0.82, 0.15)	0.173
Internalising	-0.30 (-0.83, 0.23)	0.268		0.22 (-0.31, 0.75)	0.416
Externalising	-0.67 (-1.17, -0.17)	0.009*		-0.80 (-1.30, -0.29)	0.002*
			Adjusted		
Total	-0.48 (-1.29, 0.32)	0.241		-0.44 (-1.35, 0.47)	0.342
Internalising	-0.07 (-0.97, 0.84)	0.887		0.52 (-0.50, 1.53)	0.316
Externalising	-0.73 (-1.57, 0.10)	0.085		-1.45 (-2.40, -0.50)	0.003*

¹ Estimated difference in Youth Self Report T-scores per standard deviation increase in zinc and magnesium intakes; **P* < 0.05

After adjusting for potential confounders, higher dietary intake of magnesium (per standard deviation) was significantly associated with reduced externalising behaviours and there was a trend towards reduced externalising behaviours with higher zinc intake.

This study shows an inverse association between dietary magnesium intake and externalising behaviour problems in adolescents. We observed a similar trend, although not statistically significant, for zinc intake. Promoting increased consumption of mineral-rich foods, such as leafy/cruciferous vegetables, nuts and legumes, along with supplementation to address identified micronutrient deficiencies, may be a useful strategy to prevent mental health and behavioural problems in adolescents. In order to determine any benefit of magnesium and/or zinc supplementation in the prevention and treatment of externalising behaviour problems, randomised controlled trials using optimal doses are necessary.

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