

## Associations between plant-rich dietary patterns and mental health in UK university students: a cross-sectional study

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University students are a unique demographic group, as their physical and social environmental characteristics change significantly at this important life stage<sup>(1)</sup>. Noticeably, the prevalence of adverse mental health outcomes among university students in the UK is increasing<sup>(2)</sup>. Although many studies have investigated the relationship between dietary patterns and mental health, only a few studies have specifically investigated the association between plant-rich dietary patterns and mental health in university students. This study investigated the associations between adherence to plant-rich dietary patterns [RMA1] including Plant-based diet index (PDI), Mediterranean-DASH Diet Intervention for Neurodegenerative Delay (MIND), and the recently developed (poly)phenol-rich dietary score (PPS), and mental health among university students. Our hypothesis is that higher plant-rich dietary scores are associated with better mental health.

In this cross-sectional study with 67 university students in the UK (Ethics number: RESCM-21/22-26721) we used the validated European Prospective Investigation into Diet and Cancer Norfolk Food Frequency Questionnaire to assess dietary intakes. Adherence to the PDI and the MIND dietary pattern was examined using scoring methods by Satija<sup>(3)</sup> and Morris<sup>(4)</sup>, respectively. Additionally, the PPS was recently developed by our research group. To assess stress, anxiety and depression levels, the Perceived Stress Scale and the Hospital Anxiety and Depression scale validated questionnaires were used.

A moderate level of stress ( $n = 17.99 \pm 5.43$ ; 14–26 = moderate stress), and normal levels of anxiety ( $n = 7.73 \pm 3.53$ ; 0–7 = normal) and depression ( $n = 3.97 \pm 2.72$ ; 0–7 = normal) were found among our participants. The sum of average daily intake of fruits ( $191.04 \pm 174.06$ ) and vegetables ( $266.35 \pm 226.08$ ) [RMA1] of our cohort satisfied the requirement of 5 A Day (a minimum intake of 400 g/day) in the UK, and the figures also exceeded the number of 3.7 portions per day for adults aged 19 to 64 years reported by the National Diet and Nutrition Survey 2020<sup>(5)</sup>. We observed that participants with higher overall PDI adherence were more likely to have lower depression levels (adjusted standard  $\beta$ : -0.250; 95% CI: -0.176, -0.006;  $P = 0.036$ ), but no correlation was found with stress or anxiety level. No significant relationship was found between other plant-rich dietary scores and mental health. Besides, we found reverse associations between mental health and intakes of vegetable (adjusted standard  $\beta$ : 0.267; 95% CI: 0.001, 0.008;  $P = 0.027$ ), dairy (adjusted standard  $\beta$ : 0.253; 95% CI: 0.00, 0.007;  $P = 0.031$ ), and flavonols (adjusted standard  $\beta$ : 0.257; 95% CI: 0.002, 0.049;  $P = 0.035$ ).

Our study found evidence indicating an inverse relationship between adherence to the plant-based diet index and depression levels among university students in the UK. However, due to the limited sample size, further studies are needed to confirm our findings.

### References

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