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Invited Commentary

Nutrition and mental health: bidirectional associations and multidimensional measures

If modification of diet could help prevent mental health conditions, or reduce their symptoms, the benefits could be large: mental health disorders are common around the world[1] and their health burden is high and increasing[2]. Brain structure, brain function and neuronal plasticity are all influenced by nutrients, and the immune system and antioxidant defence system too; thus there are various plausible mechanisms through which dietary factors could influence mental health[3].

However, there is more to the link between nutrition and mental health than the role of nutrients in biological mechanisms that may influence mental health. Associations between nutritional factors and mental health are likely to be bidirectional. While nutritional factors may influence mental health, mental health may also influence diet and nutrition. For example, inability or lack of motivation to purchase healthy foods and prepare these, preferential selection of foods that may enhance mood such as sweet foods[4], changed physical activity levels and possible interactions with psychiatric drugs[5,6] are all factors that may cause a person's diet to change with the development of poor mental health.

The need for evidence that addresses this bidirectional relationship between nutrition and mental health has been identified by systematic reviews and meta-analyses of the relationship between dietary patterns and depression[7–9]. As with the study of many disease outcomes, there is a growing body of evidence suggesting that dietary patterns may influence a person's chance of developing poor mental health, particularly depression. Dietary patterns capture correlations between foods or nutrients consumed, characterising the totality of a person's dietary choices (and thus move beyond the focus on individual nutrients or foods). However, the heterogeneity in findings from these studies is high and their study design often does not make it possible to assess the temporal relationship between diet and depression[7–9].

The current issue of *Public Health Nutrition* includes evidence from a study that considers this temporal relationship and acknowledges the possible bidirectional relationship between diet and mental health. Dr Kate Northstone and colleagues used data from the Avon Longitudinal Study of Parents and Children (ALSPAC) to investigate whether dietary patterns of mothers and fathers of young children were associated with depressive symptoms[10]. A food pattern characterised by consumption of processed foods appeared to increase the risk of depressive symptoms in mothers in unadjusted analyses; however, with adjustment for confounders, and after restriction of analyses to the subgroup of women who were free of depression symptoms at baseline, these associations were attenuated. Findings like these illustrate the need for longitudinal data collections that assess diet prior to the development of mental health outcomes and thus for studies that can deal with possible reverse causation due to the bidirectional association between diet and mental health. These findings also illustrate the need for studies that collect data on important confounding factors.

Two other papers in this issue of *Public Health Nutrition* highlight an important different way in which nutrition-related factors may be relevant to mental health. Poor household food security occurs when household members perceive their food to be insufficient in quantity or quality; they may have feelings of anxiety over their access to food and may report reduced food intake[11]. It is not difficult to imagine that food insecurity could lead to poor mental health outcomes; however, evidence that elucidates this relationship is limited.

The current issue includes two reports that assess household food insecurity in rural areas of Africa. Dr Seifu Hagos Gebreyesus and colleagues carried out a cross-sectional study in the Southern Nations and Nationalities regional state of Ethiopia and included data from more than 3000 mothers with children younger than 5 years of age. Eighty per cent of these women identified their household as being food insecure; questionnaire-assessed prevalence of depression among the mothers was almost 5 %[12]. This study indicates a clear dose–response relationship, with the prevalence of depression increasing with increasing levels of food insecurity.

A similar cross-sectional study was carried out by Dr Jessica M. Perkins and colleagues in rural villages of south-western Uganda[13]. The findings from their study indicated that the severity of depression symptoms was worse in food-insecure households. Interestingly, the study also showed that this association may vary depending on the characteristics of the household members' social networks, in particular for men[13]. Both studies indicate very high levels of food insecurity in these rural African regions. Food insecurity is a significant problem in many high-income countries also[14,15], and deserves our foremost attention when considering associations between nutrition and mental health.

Like nutrition, mental health including depression is a multidimensional entity that can be assessed in many

different ways. Clinically, depression is a heterogenous disorder, and subtypes can be distinguished for example based on symptoms, polarity, onset and other factors[16]. In future studies of nutrition and depression it would be good to assess these subtypes (and plan this in the design of studies), because evidence indicates that different aetiologies, and therefore different risk factors and health consequences, exist for some of these depression subtypes[17]. Drawing on the cancer research field where risk factors are found to be specific for clinical or molecular subtypes[18,19], it would be a shame to miss out on detecting relevant risk factors for depression by grouping aetiologically different subtypes together in data analysis.

With both nutrition and mental health being multidimensional entities, and associations likely being bidirectional, much research work needs to be done to find better ways to utilise nutritional factors in the prevention of poor mental health and to establish how we can best help people affected by poor mental health to eat a healthy diet. This is certainly a cause worth putting our minds to.

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References

1. Steel Z, Marnane C, Iranpour C *et al.* (2014) The global prevalence of common mental disorders: a systematic review and meta-analysis 1980–2013. *Int J Epidemiol* **43**, 476–493.
2. Patel V, Chisholm D, Parikh R *et al.* (2016) Addressing the burden of mental, neurological, and substance use disorders: key messages from Disease Control Priorities, 3rd edition. *Lancet* **387**, 1672–1685.
3. Sarris J, Logan AC, Akbaraly TN *et al.* (2015) Nutritional medicine as mainstream in psychiatry. *Lancet Psychiatry* **2**, 271–274.
4. Jeffery RW, Linde JA, Simon GE *et al.* (2009) Reported food choices in older women in relation to body mass index and depressive symptoms. *Appetite* **52**, 238–240.
5. Teasdale SB, Samaras K, Wade T *et al.* (2017) A review of the nutritional challenges experienced by people living with severe mental illness: a role for dietitians in addressing physical health gaps. *J Hum Nutr Diet* **30**, 545–553.
6. Correia J & Ravasco P (2014) Weight changes in Portuguese patients with depression: which factors are involved? *Nutr J* **13**, 117.
7. Lai JS, Hiles S, Bisquera A *et al.* (2014) A systematic review and meta-analysis of dietary patterns and depression in community-dwelling adults. *Am J Clin Nutr* **99**, 181–197.
8. Li Y, Lv MR, Wei YJ *et al.* (2017) Dietary patterns and depression risk: a meta-analysis. *Psychiatry Res* **253**, 373–382.
9. Rahe C, Unrath M & Berger K (2014) Dietary patterns and the risk of depression in adults: a systematic review of observational studies. *Eur J Nutr* **53**, 997–1013.
10. Northstone K, Joinson C & Emmett P (2018) Dietary patterns and depressive symptoms in a UK cohort of men and women: a longitudinal study. *Public Health Nutr* **21**, 831–837.
11. Coates J, Swindale A & Bilinsky P (2007) *Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide (v. 3)*. Washington, DC: Food and Nutrition Technical Assistance Project, Academy for Educational Development.
12. Gebreyesus SH, Endris BS, Hanlon C *et al.* (2018) Maternal depression symptoms are highly prevalent among food-insecure households of Ethiopia. *Public Health Nutr* **21**, 849–856.
13. Perkins JM, Nyakato VN, Kakuhikire B *et al.* (2018) Food insecurity, social networks and symptoms of depression among men and women in rural Uganda: a cross-sectional, population-based study. *Public Health Nutr* **21**, 838–848.
14. Gunter KB, Jackson J, Tomayko EJ *et al.* (2017) Food insecurity and physical activity insecurity among rural Oregon families. *Prev Med Rep* **8**, 38–41.
15. Kleve S, Davidson ZE, Gearon E *et al.* (2017) Are low-to-middle-income households experiencing food insecurity in Victoria, Australia? An examination of the Victorian Population Health Survey, 2006–2009. *Aust J Prim Health* **23**, 249–256.
16. Kessing LVB & ukh JD (2017) The clinical relevance of qualitatively distinct subtypes of depression. *World Psychiatry* **16**, 318–319.
17. Lasserre AM, Strippoli MF, Glaus J *et al.* (2017) Prospective associations of depression subtypes with cardio-metabolic risk factors in the general population. *Mol Psychiatry* **22**, 1026–1034.
18. Weisenberger DJ, Levine AJ, Long TI *et al.* (2015) Association of the colorectal CpG island methylator phenotype with molecular features, risk factors, and family history. *Cancer Epidemiol Biomarkers Prev* **24**, 512–519.
19. Bandera EV, Chandran U, Hong CC *et al.* (2015) Obesity, body fat distribution, and risk of breast cancer subtypes in African American women participating in the AMBER Consortium. *Breast Cancer Res Treat* **150**, 655–666.