Depression, diet and exercise

Summary

- Unhealthy lifestyle behaviour is driving an increase in the burden of chronic non-communicable diseases worldwide.
- Recent evidence suggests that poor diet and a lack of exercise contribute to the genesis and course of depression.
- While studies examining dietary improvement as a treatment strategy in depression are lacking, epidemiological evidence clearly points to diet quality being of importance to the risk of depression.
- Exercise has been shown to be an effective treatment strategy for depression, but this is not reflected in treatment guidelines, and increased physical activity is not routinely encouraged when managing depression in clinical practice.
- Recommendations regarding dietary improvement, increases in physical activity and smoking cessation should be routinely given to patients with depression.
- Specialised and detailed advice may not be necessary. Recommendations should focus on following national guidelines for healthy eating and physical activity.

The past century has seen major global shifts in lifestyle. Dietary intakes have changed, with a marked increase in consumption of sugar, snack and take-away foods, and high-energy foods, while the consumption of nutrient-dense foods has diminished.[1] Industrialisation and urbanisation have had a substantial impact on physical activity levels, and more than 30% of the global population are now categorised as insufficiently physically active.[2] The World Health Organization reports that chronic, lifestyle-driven non-communicable diseases are now the largest contributor to early mortality in developed and developing countries.[3] Although not classified as a non-communicable disease, depression now imposes the largest burden of illness in middle- and high-income countries.[4] Concerning new data indicate that the prevalence of depression may be increasing,[5-7] suggesting that population-level environmental factors may be modulating depression burden or risk.

Depression shares many pathophysiological factors with non-communicable somatic conditions, particularly inflammation and oxidative stress.[8,9] Compelling evidence now suggests that depression has a significant lifestyle-driven component. There is growing recognition that diet and nutrition may be important modifiable risk factors for depressive and anxiety disorders, and a substantial evidence base for physical activity as both a risk factor and a treatment strategy for depression. However, the evidence for efficacy of physical activity has not translated into treatment guidelines, and clinical practice has often neglected physical activity as a therapeutic target. Similarly, psychiatry has not actively pursued preventive approaches, despite the success of such approaches in other lifestyle-based chronic medical disorders, and lifestyle is usually ignored as a contributing factor to the genesis and course of depressive illness. Addressing lifestyle factors may be particularly important for people whose illness has failed to respond to psychotherapy or pharmacotherapy.

Here, we present a brief review of the best-quality studies in the nascent field of diet–mental health research and an overview of the most recent and compelling research into the link between physical activity and depression.

Diet and depression

The recognition of diet quality as a factor in depression is very recent. In late 2009, a seminal study reported that individuals adhering more closely to a Mediterranean-style diet, long recognised as a healthful way of eating, had a reduced risk of depression over 10 years of follow-up.[10] The relationship was not explained by socioeconomic or lifestyle factors; nor was there evidence of reverse causality. A study published soon after showed that adults followed over 5 years had a reduced risk of developing depression if they scored higher on a "whole food" dietary pattern, and an increased risk if they scored higher on a "processed food" dietary pattern. Again, these associations were robust after adjusting for a comprehensive range of potentially confounding variables and did not appear to be explained by reverse causality.[11]

A potential weakness of these studies was the use of self-reported or proxy measures of depression. However, a 2010 Australian study found that a dietary pattern of vegetables, fruit, beef, lamb, fish and wholegrain foods was associated with a reduced likelihood of major depressive disorder, dysthymia and anxiety disorders, diagnosed by a gold-standard clinical interview.[12] Conversely, a dietary pattern characterised by higher intake of processed and "unhealthy" foods was associated with an increased likelihood of higher psychological symptomatology and clinical depression. Another study in the same cohort reported similar associations between diet quality and clinically determined bipolar disorders.[13]

Data from a study of more than 7000 Australian adolescents also showed inverse relationships between measures of diet quality and the likelihood of adolescent depression.[14] A study published in 2009 reported that fruit and vegetable consumption was related to fewer internalising and externalising behaviours in adolescents, while an unhealthy Western dietary pattern was linked to higher scores on mental health measures.[15] In a more recent study, diet quality was associated with adolescent mental health both cross-sectionally and prospectively in 3040 Australian adolescents, even after mental health at baseline was taken into account.[16] Improvements in diet quality were mirrored by improvements in mental health over the 2-year follow-up, while reductions in diet quality were associated with declining psychological functioning. These are the first robust prospective data suggesting that diet quality is an independent risk factor for the development of adolescent mental health problems.

Several other studies published in the past 2 years have demonstrated inverse associations between measures of diet quality and depression.[17-21] Notable are the consistent

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effect sizes and lack of negative data, although publication bias may be an issue.

What has not been tested is the impact of improving diet in those with existing depressive illness. Given the strength of the observational data, this is an area of considerable therapeutic promise. A randomised, single-blind trial is currently underway to address this evidence gap.

Physical activity and depression

Observational data have shown that regular exercise is protective against developing depression, while physical inactivity is a risk factor for developing depressive symptoms. Results from the Nurses' Health Study, involving nearly 50 000 American women, showed that women who were more physically active had a reduced risk of clinical depression over 10 years of follow-up.[22] In the 1958 and 1970 British birth cohort studies, comprising nearly 30 000 people, increased leisure-time physical activity in adolescence was consistently related to increased wellbeing in adulthood.[23] Another study reported that regular physical activity in childhood was associated with a reduced likelihood of depression in adulthood, even after accounting for adult levels of activity.[24] Higher levels of habitual physical activity in people aged 60 years or older have been found to be associated with a reduced risk of developing de-novo depression.[25] However, some of the evidence from prospective population studies of older adults has been equivocal.[26]

A compelling body of literature relates to exercise as a treatment strategy for depression. A meta-analysis of results from 11 randomised controlled clinical trials concluded that exercise is highly effective as a treatment intervention in depression, with a large pooled effect size.[27] As an example, in a randomised controlled trial involving 156 patients aged 50–77 years with major depressive disorder, a group program of aerobic exercise for 16 weeks was as effective as pharmacotherapy in reducing depressive symptoms.[28] A 6-month follow-up study showed that the effects of exercise training on depression were long-lasting.[29] A randomised trial involving over 200 middle-aged and previously sedentary patients with major depression compared a placebo pill with a supervised exercise program, a home-based exercise program, or sertraline.[30] Although each of the exercise interventions was as effective as pharmacotherapy, and all treatments tended to be more beneficial than placebo, the results at the end of the 4-month treatment period were equivocal, with no significant differences in outcomes between groups. However, self-reported exercise during 12-month follow-up was associated with lower depression scores and a greater likelihood of improved depression status, although the benefits plateaued after about 3 hours of exercise per week.[31] This supports the findings of the most recent Cochrane review of exercise as a treatment for depression. It concluded that, although exercise appears to be effective at relieving symptoms of depression:

> The evidence suggests that exercise probably needs to be continued in the longer-term for benefits on mood to be maintained.[32]

Aerobic exercise may not be the only option for patients with depression. A study of resistance training in older patients with clinical depression reported that those in the training group had a significantly lower level of depressive symptoms than those in the control group at the end of the 10-week study.[33] The antidepressant effect of exercise persisted more than 2 years after the study, with more than a third of the original participants continuing to undertake regular weightlifting.[33]

How much exercise?

Australian public health recommendations are for at least 30 minutes of moderate-intensity physical activity on most, preferably all, days.[34] A US study reported that aerobic exercise at the recommended public health dose was more effective than low-intensity exercise for alleviating depressive symptoms in adults.[35] However, there was no difference in treatment response when comparing exercise three and five times per week. In the Nurses' Health Study,[22] the most pronounced reductions in relative risk of clinical depression were seen when comparing the highest level of activity ($\geq$ 90 min/day) with the lowest level ($<$ 10 min/day). However, reductions in risk were also seen for 10–30 min/day compared with $<$ 10 min/day. Walking at an average or brisk to very brisk pace, but not slow walking, was also associated with a reduced risk of depression. Another study found that a modest exercise program for older adults (eg, 30 min of walking or jogging at 70% of maximum heart rate, three times per week) was equal to medication in alleviating depression.[28] Finally, a large review of 27 observational and 40 interventional studies concluded that, while vigorous-intensity physical activity was more strongly associated with decreased likelihood of depression than lower-intensity activity, even low doses of physical activity may be protective against depression over the long term.[36]

Clinical care

There are many reasons why lifestyle may not be routinely addressed in clinical practice. Unhealthy food, inactivity and smoking have been, and arguably still are, part of the culture of mental health treatment settings. The implicit acceptance of these practices is likely to be a result of practitioners seeing them as normal or as self-comfort strategies, with little clinical relevance. Snack food vending machines are common in inpatient mental health units, exercise programs are rare, and smoking areas are still commonplace. A 2007 study aimed to determine perceptions and practices relating to physical activity counselling among mental health practitioners.[37] While 51% of respondents agreed that providing advice about physical activity was part of their job, only 40% had recommended physical activity to their patients. A significant minority also believed that their patients would not benefit from such advice and would be more likely to follow conventional treatment strategies. Although mental health practitioners may not feel competent to provide advice on diet and exercise improvements, the evidence suggests that specific and detailed advice may not be necessary. Recommendations and encouragement to follow national guidelines for dietary and exercise practices[34,38] should be a part of care for all people with depression. This is particularly so for patients with difficult-to-treat depression that has not responded to standard elements of care.

Randomised controlled trial evidence on the therapeutic effect of improved diet is not yet available. However, consistent evidence from observational studies suggests that people with poor diets are particularly at risk of depression, and adherence to national dietary guidelines[38] is an important recommendation. Referral to a dietitian can be made when the patient's diet is particularly poor or when there are medical issues that make dietary changes more complex.

Similarly, the standard recommended public health dose of physical activity[34] is appropriate for patients with depression. Individuals who have not been physically active for some time might gradually increase their exercise frequency and duration to recommended levels. Resistance training, which may be more appealing to older or habitually sedentary individuals, appears to be a reasonable alternative to aerobic exercise in the treatment of depression.[33] It is important to tailor interventions to the person's age, health, social situation, resources, and previous sporting or physical activity interests. Referral to an exercise physiologist can be made when the patient has particular medical issues that act as a barrier to participation in simple physical activity.

We have not focused on the link between smoking and depression in this article. However, there is a consistent body of evidence suggesting that smoking is the third lifestyle risk factor for depression,[39] as well as for potentially decreasing the probability of response to treatment of mood disorders.[40] In the context of difficult-to-treat depression, patients should be counselled regarding the potential contributory role of smoking, and smoking-cessation support should be provided to those motivated to quit.[41] The important point is that these lifestyle interventions should be routinely provided to all patients with depression and incorporated into treatment guidelines.

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