SUSTAINABLE FOOD CORNWALL

Good Food, Better Learning

The evidence for nourishing minds through healthy, nutritious, sustainable school food and a food-effective curriculum

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This report presents the growing body of evidence demonstrating how nutrition impacts learning outcomes, behaviour, and mental health. It highlights the importance of nourishing children's minds through good food—both at home and especially in school. The report is structured into three key areas: how food fuels cognition, how it supports emotional wellbeing, and how school-level interventions can create long-lasting educational benefits.

1. How Food Fuels the Brain - Nutrition and Cognition

The brain uses around 25% of the body's daily energy, requiring a steady supply of vitamins, minerals, and healthy fats to function effectively (Neville-Green, 2025). Evidence shows that **good nutrition directly supports cognitive performance and learning.**

Sorhaindo and Feinstein (2006) found that **nutritional deficiencies can impair memory, attention, and brain development**, making children especially vulnerable to factors that affect cognitive function. Similarly, Firth et al. (2020) reported that **overall diet quality—including nutrient intake and meal patterns—affects cognitive ability, behaviour, and readiness to learn.** Regular meals that maintain stable glucose levels also support memory, focus, and mood.

Poor diets, particularly those **high in ultra-processed foods (UPFs), are linked to reduced memory, poor concentration, emotional dysregulation, and even shrinkage of the hippocampus**—the brain area responsible for learning and memory (Neville-Green, 2025; Firth et al., 2020).

Research consistently highlights the importance of micronutrients for brain development and function. Demming Adams (2005) and the British Dietetic Association (2020) identify key nutrients, including:

- Iron, zinc, magnesium, and iodine – **deficiencies can impair cognitive and immune function.**
- Vitamin D – crucial for **neurodevelopment.**
- B vitamins (especially folate and B12) – essential for **memory and nervous system development.**
- Omega-3 fatty acids – vital for **brain health.**
- Dietary fibre – supports gut health and **sustained attention.**

Controlled trials also show that **whole grains improve memory and attention**, while **high sugar and fat intake is linked to reduced executive function** (Cohen et al., 2016). Roberts

(2022) found that nutrition policies and micronutrient support improved focus and memory in preschoolers.

Faught et al. (2017) highlight the combined benefits of healthy eating, sleep, physical activity, and limited screen time on academic outcomes—especially in reading and writing. DiGirolamo, Ochaeta, and Flores (2020) also found strong links between early nutrition and long-term cognitive development, particularly in boys.

For school leaders, the evidence is clear: embedding nutrition into school policy—through improving the nutritional value of school meals and developing a good understanding of nutrition through the curriculum—can significantly enhance learning, behaviour, and student outcomes.

2. Nutrition and Emotional Wellbeing - the food-mood connection

A growing body of research highlights the strong connection between nutrition and mental wellbeing—an area of increasing relevance for schools. Firth et al. (2020) found that poor nutrition is a causal factor in low mood, and that dietary improvements can support both physical and mental health. Similarly, research from the University of Melbourne (Jacka et al., 2010) identified a link between poor diet and increased risk of depression in adolescents, a critical developmental stage when most lifetime mental health conditions begin. These findings support the role of healthy eating in prevention strategies. However, it's essential to recognise that mental illness has multiple causes, and diet should be seen as one important factor among many—not a sole explanation or a basis for stigma. (Firth et al., 2020)

The SMILES trial (Jacka et al., 2018) further demonstrated that food can be therapeutic: participants following a Mediterranean-style diet showed significantly greater improvement in depression symptoms, with 32% achieving remission after 12 weeks, compared to just 8% in the control group. Similar outcomes have been linked to other traditional diets, such as those in Japan and Norway (Neville-Green, 2025). Nutrient-dense foods—particularly leafy greens, legumes, whole grains, and oily fish—have been identified as especially beneficial for supporting neurotransmitter function, emotional regulation, and cognitive performance (LaChance & Ramsey, 2018).

Emerging research also links gut health and mental health. Fibre-rich diets and fermented foods, like live yoghurt, may help promote a healthy gut microbiome, which is increasingly recognised as influential in mood and emotional wellbeing (British Dietetic

Association, 2020; Neville-Green, 2025). For school leaders, this evidence **reinforces the importance of prioritising high-quality school meals and food education—not just to support learning, but also to foster emotional resilience and mental health in young people.**

3. The Critical Role of Breakfast in Learning

Breakfast plays a foundational role in preparing children to learn. A major review by Adolphus et al. (2013) found that regular breakfast consumption improves attention, behaviour, and maths performance, **particularly in children from disadvantaged backgrounds.**

Breakfast contributes up to 60% of daily micronutrient intake in children who eat it consistently. Skipping breakfast is associated with lower academic achievement, increased behavioural issues, and reduced classroom engagement. **Wholegrain, fibre-rich breakfasts**—not sugary or ultra-processed ones—support better working memory and concentration (Cohen et al., 2016; Rodgers, 2023). Schools have a powerful opportunity to **optimise breakfast clubs** by offering **nutrient-dense meals that directly enhance learning outcomes.**

4. Changing Food Culture - A Whole-School Approach

The Food for Life programme, led by the Soil Association, is a proven model that supports schools in transforming their food culture. Its whole-school approach includes:

- Nutritious Meals: Emphasising fresh, locally sourced ingredients
- Food Education: Including cooking, growing, and farm visits in the curriculum
- Leadership & Community: Engaging families and local communities in promoting healthy eating

It has demonstrated success in improving children's diets, school food culture, and wider wellbeing across the UK. Evidence shows that pupils in Food for Life schools are twice as likely to eat five portions of fruit and vegetables a day, with benefits extending beyond school into the home (Jones et al., 2012). Schools report increased uptake of school meals, improved behaviour, attendance, and more positive dining experiences (Jones et al., 2011). The programme's whole-school approach—combining food education, growing, cooking, and sustainable sourcing—has also delivered environmental gains, with menus at the Gold Award level having up to 47% lower climate

impact (Soil Association, 2019). A Social Return on Investment analysis found that every £1 invested generates over £3 in social, economic, and environmental value (New Economics Foundation, 2011). These outcomes position Food for Life as a valuable model for school leaders aiming to enhance pupil wellbeing, learning, and community engagement through food.

5. Universal School Meals - Reduce Inequality and Boosting Attainment

The Department for Education (DfE) Free School Meals Pilot (2024) and Malmö's city-wide sustainable school meal programme (Morgan, 2025) offer compelling evidence of the benefits of universal provision:

- Improved academic performance, particularly in literacy and numeracy
- Increased participation, reducing stigma and ensuring more children eat nutritious meals
- Reduced food insecurity, easing family stress and improving readiness to learn
- Enhanced social skills, as shared meals foster community and emotional wellbeing

The Food Foundation's Free School Meals Evidence Pack (2022) found that core benefits of Free School Meals (FSM) included improvements to children's ability to learn and their educational attainment as well as reduced absenteeism. Further to this, in the longer term, FSMs contributed to raised productivity, employment, earnings and contributions in the longer term. These programmes reinforce the importance of equitable access to nutritious food in schools.

Sweden's school food journey offers valuable insights for school leaders seeking to improve student wellbeing, behaviour, and learning through food. Malmö implemented a city-wide policy aiming for 100% organic school meals and a 40% reduction in food-related greenhouse gas emissions. Using the SMART model—prioritising smaller portions of meat, more plant-based foods, and strategic procurement—the city improved meal quality while significantly lowering its environmental impact. Crucially, Malmö invested in training for kitchen staff, collaborated across departments, and began using mealtimes as educational opportunities (pedagogical lunches). (Morgan, 2025) For school leaders, this demonstrates how a whole-school approach to food—rooted in sustainability, health, and learning—can create an environment for students to thrive both academically and socially.

6. Key Insights - What the Research Shows

- **Nutrition fuels learning and resilience:** Quality food—rich in whole grains, fruits, vegetables, lean protein, and fibre—supports cognition, behaviour, and emotional wellbeing.
- **Healthy meals + food literacy = increased impact:** Pairing nutritious food with learning about cooking, growing, and sourcing builds lifelong habits and a strong school ethos.
- **A good start matters:** Nutritious breakfasts improve attention, behaviour, and help close the equity gap.
- **Whole-school engagement drives success:** Training for staff, shared mealtimes, and cross-department collaboration will create sustainable culture change.
- **Policy and procurement are important:** Reducing UPFs, adopting SMART sourcing (e.g., Malmö), and promoting school meals can transform outcomes.
- **Food connects community and improves climate resilience:** Linking meals to local produce and sustainability deepens community ties and long-term impact.
- **Measuring progress:** Use data to track impact, support accountability, and show return on investment.

7. What Schools Can Do - Practical Actions

Schools can lead the way in promoting lifelong healthy eating habits. Based on the evidence, the following actions are recommended:

1. **Embed nutrition in school policy:** Recognise healthy eating as foundational to academic and behavioural success (Demming Adams, 2005).
2. **Boost school meal uptake:** Packed lunches often fall short nutritionally—only 1.6% meet school food standards (Evans et al., 2020).
3. **Eliminate UPFs:** Reduce availability of ultra-processed and sugary items that undermine cognition and mood (Neville-Green, 2025).
4. **Prioritise food education:** Equip pupils with cooking skills, food literacy, and knowledge about sustainable eating. Introduce sensory food education in the early years to allow children to explore unfamiliar foods, encouraging them to try these in a non-challenging, safe environment.

5. **Encourage traditional, balanced diets:** Use the Mediterranean or Japanese diet models to inspire more plant-based, nutrient-rich options.
6. **Strengthen breakfast provision:** Offer wholegrain, low-UPF options through school breakfast clubs to ensure all children start the day ready to learn. See: https://chefsinschools.org.uk/support/resources/breakfast-essentials/

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References

Azat Samigullin, Gählert, J., Groß, G., Morcos, M., Schwertz, R., Rickard Öste, Siegel, E. and Humpert, P. (2025). A central role of nutrition in cognitive function among primary school children: a cross-sectional analysis. *BMC Nutrition*, 11(1). doi:https://doi.org/10.1186/s40795-025-01016-2.

Bellisle, F. (2004). Effects of diet on behaviour and cognition in children. *British Journal of Nutrition*, [online] 92(S2), p.S227. doi:https://doi.org/10.1079/bjn20041171.

British Dietetic Association (2020). *Diet, behaviour and learning in children*. [online] www.bda.uk.com. Available at: https://www.bda.uk.com/resource/diet-behaviour-and-learning-children.html [Accessed 3 Jun. 2025].

Cohen, J.F.W., Gorski, M.T., Gruber, S.A., Kurdziel, L.B.F. and Rimm, E.B. (2016). The effect of healthy dietary consumption on executive cognitive functioning in children and adolescents: a systematic review. *British Journal of Nutrition*, 116(6), pp.989–1000. doi:https://doi.org/10.1017/s0007114516002877.

DiGirolamo, A.M., Ochaeta, L. and Flores, R.M.M. (2020). Early Childhood Nutrition and Cognitive Functioning in Childhood and Adolescence. *Food and Nutrition Bulletin*, [online] 41(1_suppl), pp.S31–S40. doi:https://doi.org/10.1177/0379572120907763.

Evans, C.E.L., Melia, K.E., Rippin, H.L., Hancock, N. and Cade, J. (2020). A repeated cross-sectional survey assessing changes in diet and nutrient quality of English primary school children's packed lunches between 2006 and 2016. *BMJ Open*, [online] 10(1), p.e029688. doi:https://doi.org/10.1136/bmjopen-2019-029688.

Faught, E.L., Ekwaru, J.P., Gleddie, D., Storey, K.E., Asbridge, M. and Veugelers, P.J. (2017). The combined impact of diet, physical activity, sleep and screen time on academic achievement: a prospective study of elementary school students in Nova Scotia, Canada. *International Journal of Behavioral Nutrition and Physical Activity*, [online] 14(1). doi:https://doi.org/10.1186/s12966-017-0476-0.

Firth, J., Gangwisch, J.E., Borsini, A., Wootton, R.E. and Mayer, E.A. (2020). Food and mood: how do diet and nutrition affect mental wellbeing? *BMJ*, [online] 369(1). doi:https://doi.org/10.1136/bmj.m2382.

Food Foundation (2022). *Free School Meals of Evidence Pack Autumn 2022 3*. [online] Available at: https://foodfoundation.org.uk/sites/default/files/2022-11/FSM%20Evidence%20Pack_0.pdf.

Jacka, F.N., Kremer, P.J., Leslie, E.R., Berk, M., Patton, G.C., Toumbourou, J.W. and Williams, J.W. (2010). Associations Between Diet Quality and Depressed Mood in Adolescents: Results from the Australian Healthy Neighbourhoods Study. *Australian & New Zealand Journal of Psychiatry*, [online] 44(5), pp.435–442. doi:https://doi.org/10.3109/00048670903571598.

Jacka, F.N., O'Neil, A., Opie, R., Itsiopoulos, C., Cotton, S., Mohebbi, M., Castle, D., Dash, S., Mihalopoulos, C., Chatterton, M.L., Brazionis, L., Dean, O.M., Hodge, A.M. and Berk, M. (2018). A randomised controlled

trial of dietary improvement for adults with major depression (the 'SMILES' trial). *BMC Medicine*, 16(1). doi:https://doi.org/10.1186/s12916-018-1220-6.

Jones, M., Dailami, N., Weitkamp, E., Salmon, D. and Kimberlee, R., 2012. Food for Life Partnership Evaluation Summary Report. University of the West of England.

Jones, M., Orme, J., Kimberlee, R., Salmon, D. and Weitkamp, E., 2011. Evaluating the impact of the Food for Life Partnership programme: Final Report. University of the West of England.

Jones, M., Pitt, H., Orme, J., Oxford, L., Gray, S., Salmon, D., Means, R., Powell, J., Kimberlee, R. and Weitkamp, E. (2016). *Evaluation of Food for Life 2013-15 Summary and Synthesis Report*. Bristol: UWE.

Jones, M., Pitt, H., Oxford, L., Bray, I., Kimberlee, R. and Orme, J. (2017). Association between Food for Life, a Whole Setting Healthy and Sustainable Food Programme, and Primary School Children's Consumption of Fruit and Vegetables: A Cross-Sectional Study in England. *International Journal of Environmental Research and Public Health*, 14(6), p.639. doi:https://doi.org/10.3390/ijerph14060639.

LaChance, L.R. and Ramsey, D. (2018). Antidepressant foods: An evidence-based nutrient profiling system for depression. *World Journal of Psychiatry*, [online] 8(3), pp.97–104. doi:https://doi.org/10.5498/wjp.v8.i3.97.

Morgan, K. (2025). *Serving the Public*. Manchester University Press.

Neville-Green, H. (2025). Good Mood Food. *Veg & Table*, (2), Apr., pp.37–40.

New Economics Foundation, 2011. The Benefits of Procuring School Meals through the Food for Life Partnership. London: NEF.

Roberts, M. (2022). The Effects of Nutritional Interventions on the Cognitive Development of Preschool-Age Children: A Systematic Review. *Nutrients*, [online] 14(3), p.532. doi:https://doi.org/10.3390/nu14030532.

Soil Association, 2019. The Impact of the Food for Life Served Here Award on Greenhouse Gas Emissions. [online] Available at: https://www.soilassociation.org [Accessed 16 June 2025].

Sorhaindo, A. and Feinstein, L. (2006). *WHAT IS THE RELATIONSHIP BETWEEN CHILD NUTRITION AND SCHOOL OUTCOMES?* [online] Available at: https://discovery.ucl.ac.uk/id/eprint/10015414/1/WBLResRep18.pdf.

Wright, D. (2022). *How Blackpool Council puts local food on school menus*. [online] Lovebritishfood.co.uk. Available at: https://www.lovebritishfood.co.uk/how-blackpool-council-puts-local-food-on-school-menus [Accessed 13 May 2025].