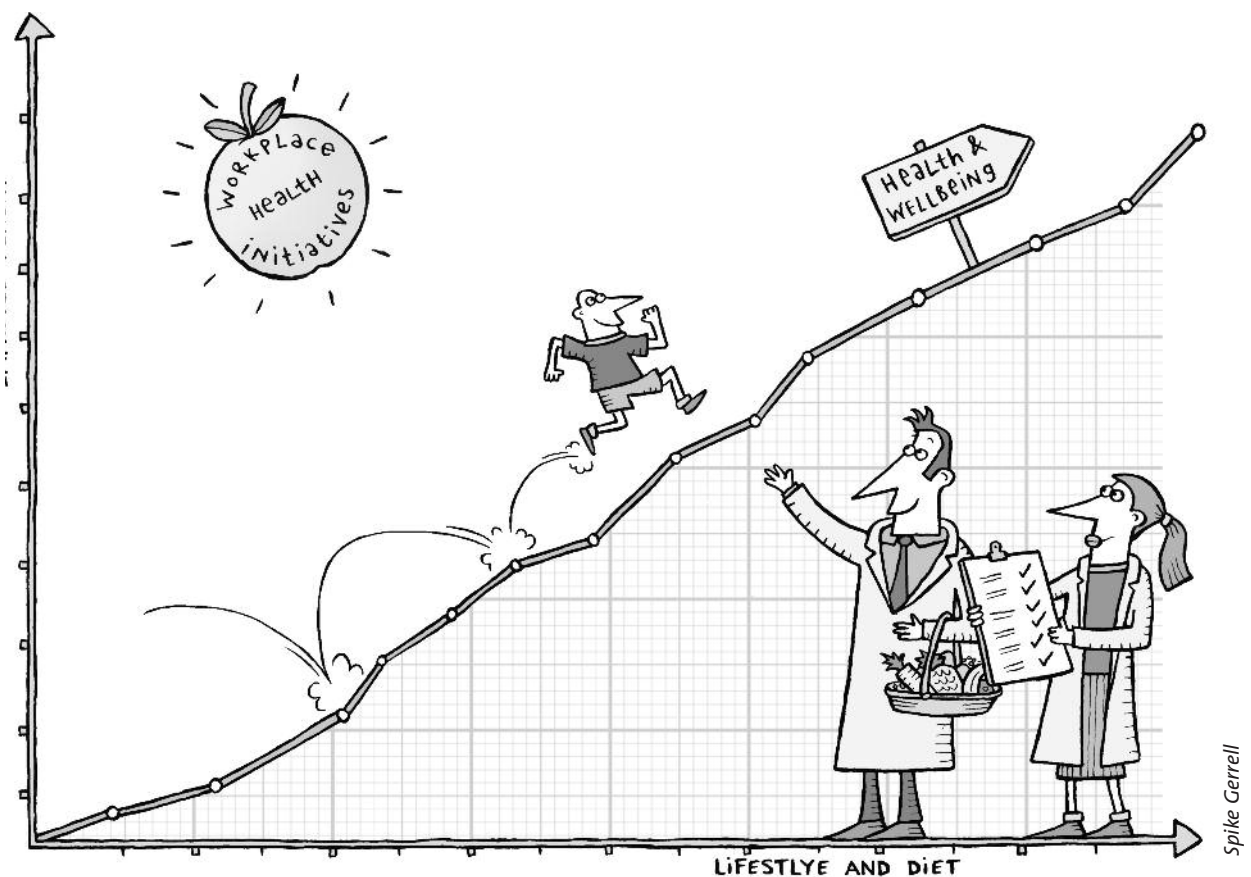


Nutrition at work

Nutrition interventions in workplace health programmes: a literature review

With employers increasingly interested in workplace wellbeing programmes, Elaine Gardner and Kathy Cowbrough present the findings of their systematic review of the evidence underpinning workplace interventions to improve employees' nutrition.



THE benefits of workplace health initiatives have been identified in publications from the National Institute for Health and Care Excellence (NICE)^{1,2} and the NHS England *Five-year forward review*³. A government response⁴ to a review of the health of Britain's working-age population recognised the key role workplaces can play in preventing illness and promoting health and wellbeing⁵.

The consequences of poor diet and ill health impact directly on employers as well as employees. Obese people suffer more sickness and absences from work⁶, with around 16 million lost working days attributable to obesity-related illness in the UK in 2002⁷. Not maintaining a healthy weight and being overweight or obese is a common health problem at work with back

pain, stress, coronary heart disease and type-2 diabetes all being causally linked to poor diet and obesity⁸ and negatively impacting on sickness absence, presenteeism and productivity. Good nutrition and a healthy weight are also important for mental health as well as physical health². While estimates of the total cost of ill health to the economy vary, a comprehensive review⁶ put the cost of poor health in the UK working age population in 2007 at between £103 billion and £129 billion.

Behaviour change interventions have been shown to improve behaviour and prevent disease, particularly in the short term⁹. Cavill and Ells¹⁰ looked at the evidence from NICE and the Cochrane Collaboration and found that behaviour change strategies are effective in

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leading to weight loss among people who are overweight or obese.

Meta-analysis and systematic reviews published before 2010 show that nutrition interventions on health in the workplace that include behaviour change are effective in the short term^{11,12}. The aim of this review is to identify the more recent evidence base concerning nutrition interventions in the workplace and the outcomes, and to summarise the impact of nutrition interventions on business factors – eg presenteeism, sickness absence and productivity.

SYSTEMATIC REVIEW

Workplace studies that had a major component concerning nutrition were systematically reviewed for the period January 2010 to June 2015. Articles were initially screened on the basis of title and abstract, and full-text copies were then retrieved for articles that met the inclusion criteria.

The selection criteria were that: the studies included a nutrition intervention as a major component and had measurements of behaviour change; were full peer-reviewed reports published in English; and were conducted in a workplace setting. All interventions were graded by both authors using the Practice Based Evidence in Nutrition (PEN) Grading Criteria and Checklist¹³. PEN is an international nutrition and dietetic evidence grading system that supports the critical appraisal of the quality of evidence through the use of standardised grading criteria. Consideration is given to factors that influence findings, such as consistency, impact, generalisability and applicability to the evidence base, which together contribute to the overall grade.

RESULTS

A total of 54 articles met the inclusion criteria. Using PEN, four studies were graded as good evidence (A grade), 13 as fair evidence (B grade) and 37 as limited evidence (C grade). No evidence of Grade D quality, (poor-quality or contradictory evidence) was included.

Table 1 presents a summary of the meta-analysis studies and systematic reviews published in the period 2010–2015 that are based in a workplace and have a major nutrition component. Two distinct areas of ‘weight management’ and ‘diet quality’ were identified.

There is evidence of moderate quality (three A-grade, eight B-grade and one C-grade studies) that programmes aimed at improving nutrition behaviour to decrease weight and to improve diet quality are effective in promoting behaviour change, confirming the findings of earlier (pre-2010) studies. Multi-level interventions in nutrition where both individual and environmental determinants of health are addressed are effective. In addition to the nutrition component, all programmes included physical activity, which appears to be most effective in combination with dietary measures.

Eleven controlled trials that looked at the effect of nutrition interventions at an individual level, addressing determinants such as knowledge or behaviours are summarised in table S1 (online only at ohaw.co/NutritTables). Ten cohort studies and one comparative study were also identified. Summaries of these are available in table S2 (online only at ohaw.co/NutritTables). At an individual level all interventions reported some benefits (either weight loss or reduced risk factors). There is a lack of long-term follow-up (ie more than two years) to see if benefits are maintained or to determine any impact on disease outcomes. There was insufficient data to conclude whether one-to-one counselling or group sessions were more beneficial.

Studies that examine effects at an organisational level and include changes in food and drink provision are found in table S3 (online only at ohaw.co/NutritTables). The results suggest that providing healthy food and drink in the workplace can improve dietary intakes at work.

Impact on business factors

Four additional studies reviewed the association between employees’ body weight and sickness absence. In a cross-sectional ($n = 1,489$) and prospective analysis ($n = 625$) Harvey et al²⁵ found that there was a positive linear association between employees’ body mass index (BMI) and the number of days’ work missed due to sickness absence and that obesity was a risk factor for both short- and long-term sickness absence. This was echoed in a prospective study²⁶ ($n = 4,164$), which also identified that women who maintained a normal weight had the lowest risk of sickness absence. This finding was extended to men in a study by VanWormer et al when looking at maintaining a healthy body weight for over two years²⁷. Korpela et al²⁸ looked at the different measures of body weight (BMI – self reported and measured, waist circumference, waist-to-hip ratio) as predictors of sickness absence in 5,750 employees and found that all measures predicted sickness absence.

There is no single standard definition of presenteeism but in essence it means that an employee is present at work but their job performance is limited in some aspects by a health problem. This can lead to lost productivity through time not spent on job tasks, as well as decreased quality of work. It is a hidden cost for employers and a health and wellness issue for employees. A systematic review of the effectiveness of health promotion programmes including nutrition at improving presenteeism reviewed 14 studies and found a positive effect of some programmes²⁹. Potential risk factors contributing to presenteeism included being overweight and having a poor diet. A randomised controlled trial (RCT)³⁰ ($n = 144$) found that an intervention – calorie-limited diet, physical exercise and cognitive behavioural training – had a significant effect on productivity after three months. After 12 months,

Table 1: summary of meta-analyses and systematic reviews of nutrition interventions in the workplace, 2010–2015

| Author (Year) | Number of studies; years covered by review (Type of review) | Nutrition-related outcome measures (Business measures) | General results |
|-------------------------------------|---|--|---|
| Weight management | | | |
| Schröder et al (2014) ¹⁴ | 15 studies; 2006–2012 (Systematic review) | BW; body fat; BMI; intake of fruit, vegetables, fat, fibre, energy (productivity, sickness absence, presenteeism, work attendance) | Employees' dietary behaviours are influenced by workplace interventions based on nutritional education solely or combined with environmental modifications. Multi-component interventions that focus on both physical activity and nutrition favoured over single dietary programmes. Overall, there was a lack of data in studies on economic impact on business factors. |
| Ausburn et al (2014) ¹⁵ | 10 studies; 2005–2013 (Systematic review) | Changes in BMI, body composition, body mass | Workplace weight management programmes with a combination of interventions that address physical activity, diet, and education are effective in lowering BMI and weight loss. |
| Power et al (2014) ¹⁶ | 13 RCTs (including seven in meta-analysis); 1994–2011 (Systematic review and meta-analysis) | BW change; dietary intakes | Meta-analysis of all trials reporting weight data demonstrated that those allocated to dietary and physical activity interventions lost significantly more body weight (-3.95 kg; CI -4.96--2.95) than controls up to 12 months follow-up. Evidence base is limited, studies heterogeneous. |
| Archer et al (2011) ¹⁷ | 136 studies; 1966–2005 (Systematic review) | Changes in weight-related outcomes | Key practices that promote employee weight loss were: enhanced access to opportunities for physical activity combined with health education; exercise prescriptions; multi-component educational practices; weight loss competitions/incentives; and behavioural practices with/without incentives. |
| Verweij et al (2011) ¹⁸ | 22 studies 1980–2009 (Meta-analysis) | BW; BMI, body fat percentage | Evidence of moderate quality that workplace physical activity and dietary behaviour interventions significantly reduce the following metrics: BW (nine studies) – MD = 1.19 kg; BMI (11 studies) – MD = 0.34 kg/m ² ; and body fat percentage (three studies) – MD = -1.12%. Greater reduction in BW when physical activity and diet interventions contained an environmental component. |
| Maes et al (2011) ¹⁹ | 17 studies 1990–2010 (Systematic review) | BW; body composition; dietary behaviour | Moderate evidence that both educational and multi-component interventions can favourably change dietary behaviours and potential determinants of these behaviours. |

however, there were no significant effects on presenteeism or sickness absence. It must be noted that due to the lack of an agreed definition of presenteeism, its measurement and the calculation of costs associated with it is difficult³¹.

Four publications (a meta-analysis³², a literature review³³ and two cohort studies^{34,35}) examined workplace health promotions – including nutrition interventions – on productivity. Jensen³³ reported a 1%–2% improvement in labour productivity, but it is not clear how this was calculated. The review was based on stated reductions in sickness absence and presenteeism in 13 intervention studies that measured direct economic consequences. All studies showed a favourable effect on employees. Fourteen studies examining indirect

measurements of productivity – by looking at behaviour change and health gains – found a largely positive effect through reduction of the considered health risk factors (such as a high BMI, and/or blood cholesterol levels) which was associated with reduced sickness absence and reduced cost of productivity loss in terms of presenteeism and high labour turnover. A case study by Kumar et al states that 'there is a correlation between eating a balanced diet and being more productive at work'³⁶, although this is not quantified.

As well as a limited amount of literature in this area as a whole, the available evidence is hampered by non-uniformity in the types of interventions and study populations, which makes it difficult to draw concrete conclusions.

Table 1 (contd.)

| Author (Year) | Number of studies; years covered by review (Type of review) | Nutrition-related outcome measures (Business measures) | General results |
|---|---|--|--|
| Diet quality | | | |
| Aneni et al (2014) ²⁰ | 18 randomised trials, 11 follow-up studies, up to November 2012 (Systematic review) | Cardiovascular health outcomes (BMI, WC, lipid profiles, HbA1c, dietary changes) | Modest improvements were observed in more than half of the studies with weight-related outcomes (20 studies). Dietary outcomes assessed in nine studies, of which five found no improvements while four demonstrated significant intervention effects on diet. |
| Geaney et al (2013) ²¹ | Six RCTs, up to November 2011 (Systematic review) | Fruit and vegetable consumption | Limited evidence suggests that workplace dietary modification interventions alone and in combination with nutrition education increase fruit and vegetable intakes (less than half serving/day). |
| An (2013) ²² | 24 articles on 20 interventions, 1990–2012 (Systematic review) | Purchase or consumption of subsidised healthy food items (various populations, including workplace) | All but one study found subsidies on healthier foods significantly increased the purchase and consumption of promoted products. Subsidising healthier foods tends to be effective in modifying dietary behaviour. |
| Hutchinson and Wilson (2012) ²³ | 29 studies, 1999–2009 (Meta-analysis) | Dietary intake of fruit, vegetables and fat; BW, cholesterol | Interventions were grouped according to the theoretical framework on which the interventions were based – eg education, cognitive-behavioural, motivation enhancement, social influence, exercise. Most theoretical approaches were associated with small effects. However, large effects were found for some measures of interventions using motivational enhancement. Effect sizes were larger for studies focusing on one health behaviour and for RCTs. |
| Ni Mhurchu et al (2010) ⁸ | 16 studies, 1995–2009 (Systematic review) | Diet outcomes (energy, fat, fruit/vegetable intake) | Eight studies focused on employee education; eight focused on workplace environment either alone or in combination with education overall plus changes in diet outcomes. Evidence that they can lead to moderate improvements in diet. |
| Davies et al (2010) ²⁴ | 19 reviews (Review of reviews) | Various dietary measurements including dietary intakes of fruit and vegetables, reduction of fat intakes | Most effective interventions include educational interventions directed at behaviour change. These include: behavioural interventions that include self-monitoring, prompts, feedback and contingency management; computer-tailored nutrition intervention; individually tailored information in printed materials and in the media; dietary advice (such as increasing fruit and vegetable consumption, reducing fat intake and reducing total cholesterol); increasing the availability and accessibility of healthy foods in the workplace; and a multi-component approach. |
| BW = body weight; BMI = body mass index; RCT = randomised controlled trial; CI = 95% confidence interval; MD = mean difference; WC = waist circumference; HbA1c = glycated haemoglobin. | | | |

DISCUSSION

Most of the intervention studies included in this review were of short duration; commonly less than six months. Only four of the 11 trials (table S2 – online only at ohaw.co/NutritTables) contained a follow-up period to examine longer-term impacts. It has been recommended that a follow-up after at least one year should be included to accurately measure longer-term impact and allow for dietary change due to seasonal variations²¹.

Due to the short duration of interventions and limited

follow-up, no relationships between disease prevention and long-term outcomes have been examined in any of the studies. Different types of interventions, regarding both diet quality and weight management, and varying from internet-based programs to changes in the workplace environment and dietary modification, were shown to be effective in changing dietary behaviour, at least in the short term. Future workplace interventions, however, should consider strategies such as updates, refresher courses, ongoing incentives or long-term

involvement of influential peers to sustain and measure behaviour change in the longer term. Currently, information on long-term impact is lacking.

There are many different intervention methods used in promoting health, but no single method can effectively address major public health problems because changes are required at multiple levels. There is a relationship between the individual and their environment and while individuals are responsible for instituting and maintaining lifestyle changes, individual behaviour is also determined by the social environment. The social ecological model of health promotion targets multiple levels of influence and is an effective approach to lead healthy behaviour, including in workplace health. Interventions that include environmental components can also be more cost-effective and are less likely to generate health inequalities than interventions using individually focused components alone. Concurrent individual and environmental interventions are recommended.

Most individual-level studies – apart from four systematic reviews^{21,22,8,24}, which focused on diet quality, and two controlled trials^{34,37} examining electronic media use – used body weight and in particular BMI as an outcome measure, irrespective of whether or not the intervention was linked to weight management. Studies that looked at cardiovascular health^{20,38} used BMI and waist circumference as proxy measures of health. Behaviour change was measured predominately through food choices^{21,22,8,24}, sometimes in conjunction with weight change^{14,23}, and through the use of self-reported behaviours and use of a website³⁴. Similar results were found in the cohort and comparative studies, but additionally two studies reported on quality-of-life measures, both in association with body weight^{39,40}. It has been suggested that using weight measures, such as BMI, may create stigma and prejudices associated with being overweight and obese⁴¹ rather than improvements in health and wellbeing. This could be detrimental in a workplace where weight bias can already be prevalent^{42,43} and fuel a bullying culture undermining team-based workforces. A focus on measures including ‘change of feeling’ and quality-of-life factors, such as perceived physical and mental health, may be more appropriate and potentially more successful for a cohesive workforce. Removing the emphasis from ‘body weight’ and BMI, and refocusing outcomes on wellbeing and healthy lifestyles, means that programmes can be inclusive for all employees and have less potential for negative attitudes towards people who are overweight or obese.

Where specified, the individual-level studies (tables S2 and S3 – online only at ohaw.co/NutritTables) included both men and women, with 10 studies having predominately female workers, compared with just two with a majority of male participants – possibly reflecting

the predominance of studies on healthcare workers in this area of research. Only one cohort study⁴⁴ identified any differences in responses associated with gender. In this case, 18% of the men who attended interventions lost at least 5% of their body weight compared with the 8.4% of non-attendees ($p = 0.031$), but there were no significant differences amongst females. No studies considered gender-specific interventions but it has been suggested that the gender make-up of workforce is an important consideration. In a multi-level intervention⁴⁵, the acceptability of the delivery method varied between male and female employees. The mode of delivery considered most useful by male workers was the use of pamphlets, followed by labelling to identify healthy food items, posters and leaflets/fliers in the rest area (rather than the canteen) and messages on the tables in the canteen. Women reported finding a more interactive delivery method more useful. These included weight-loss competitions and incentives, behaviour change education, opportunities for physical activity combined with health education and ‘exercise prescriptions’. In Cash et al⁴⁶ there were gender-specific responses to obesity and weight-loss quality-of-life factors. If gender sensitivity in the design and delivery of interventions is not taken into account, it may prove to be a barrier to interaction and engagement.

Return on investment (ROI) is a key driver for the provision of workplace health promotion. A high-quality review of 18 studies⁴⁷ examined the financial return of workplace health promotion programmes aimed at improving nutrition and/or increasing physical activity. It concluded that they generated financial savings in terms of reduced sickness absence costs, medical costs or both. However, it should be noted that the majority of these studies were carried out in the US where healthcare costs are often covered by employers and thus there is greater potential for savings than in the UK. Loeppke et al⁴⁸ measured productivity among 50,000 US employee respondents. Health-related productivity costs were shown to be significantly greater than medical and pharmacy costs alone (on average by a ratio of 2.3 to 1).

In the UK, 55 workplace health case-studies were reviewed with specific business benefits attributed to them⁴⁹. These showed that programme costs can be translated into financial benefits – mainly through cost savings rather than increased income. The magnitude of the benefits varied significantly and depended on the type of business and programme involved, as well as the way the programme was planned and executed. According to the paper, only evidence from peer-reviewed articles, ‘grey literature’ (research reports not published in academic or commercial journals) and business case assessments that were supported by robust and transparent research and analysis were included. Chronic conditions that respond well to good nutritional care as part of a wider intervention – such as depression and

anxiety, obesity, arthritis, and back or neck pain – were noted as especially important causes of productivity loss, and NICE estimates that a company employing 1,000 people, could lose more than £126,000 a year in lost productivity due to obesity alone⁵⁰. Productivity gains are likely to more than offset the costs of implementing interventions, and other factors such as sickness absence also need to be taken into account when looking at ROI.

One general limitation in the included studies is that the interventions frequently contained modification of physical activity and sedentary behaviour *in addition* to nutritional changes. It is difficult to separate the effect of all these components, but as both good nutrition and suitable activity levels are recommended for health and weight management both components are required. NICE guidance⁵¹ acknowledges that addressing a range of both dietary habits and physical activity behaviours is more likely to be effective than changing a single factor in isolation, and that a multicomponent approach is likely to be the most successful. The workplace as a setting is recognised as being important in facilitating improvements in physical activity and dietary habits.

Implications for OH practice

Occupational health professionals should be aware that workplace nutrition programmes can improve the health and wellbeing of employees. The involvement of employees in planning – through a nutritional-needs assessment – is at least as important as the delivery^{52,53,54,55}. The needs assessment should be multi-level and include, for example, the environment (such as canteen, vending and activity facilities), the company ethos (such as ‘not eating lunch at the desk’), the organisation (eg timing of breaks) as well as employee and employer ‘needs’ and ‘wants’. The gender mix and culture of the employee population as well as the work profile must also be considered.

This initial assessment leads to more informed decisions being made about planning the content, the implementation (for example at an appropriate time and via appropriate methods) as well as the choice of realistic evaluation methods and outcomes to maximise success and impact. Just as with the planning stage, the interventions themselves are more effective with employee and employer involvement in the process, alongside clear communication and using existing engagement channels, such as trade unions, health and safety committees and employee benefit teams.

OH professionals can be supported in developing and delivering the nutrition component of any workplace programme by accredited workplace dietitians who assess and translate food-based research into practical guidance. Such guidance can help employees take responsibility for their individual lifestyle and food choices, and support employers to consider the

CONCLUSIONS

- **Nutrition** interventions in the workplace can be effective, particularly in the short term
- **The evidence** for long-term effectiveness of workplace nutrition interventions is limited due to the lack of studies on longer-term outcomes
- **Providing** healthy food and drink in the workplace can improve dietary intake at work
- **Wellbeing** programmes that include nutrition interventions can have a positive impact on business factors, such as sickness absence, presenteeism and productivity, although these can be difficult to quantify in financial terms
- **A nutritional** needs assessment is a key starting point in a workplace intervention and leads to more informed decisions being made about planning the content, the implementation and the evaluation methods and outcomes
- **Monitoring**, evaluation and review processes are crucial in assessing the effectiveness and impact of a programme. The assessment can make use of data that are already being collected – such as sickness absence records – but should also include measurements of wellbeing
- **Accredited** workplace dietitians can support businesses and occupational health professionals in the planning and delivery of nutrition wellbeing services

workplace environment, which can in turn reduce unhealthy practices. An accredited workplace dietitian can act simply as a consultant to ensure that nutrition interventions complement existing OH services or can support the development of a full nutrition programme.

All programmes should be bespoke, to reflect the results of the nutritional needs assessment, and could involve a single or a variety of elements such as:

- fully interactive group sessions, road shows and demonstrations
- the assessment of food and drink provisions with guidance on implementing practical changes
- integration of nutritional wellness into workplace policies
- training ‘workplace champion’ teams to develop shared ownership, and to drive momentum and sustainability of a programme
- tailored materials and interactive elements via electronic media and individual nutritional assessment with employee support sessions for health problems linked to nutrition.

The development of monitoring, evaluation and review processes are crucial in assessing the effectiveness and impact of a programme. This does not need to focus on weight but may involve the collection of new information – including lifestyle and nutrition behaviours and assessing what people know or have learnt – and can use data that is already being collected, such as sickness absence records.

In conclusion, nutrition interventions in the workplace

with multi-level programmes addressing both individual determinants, such as knowledge or attitudes, as well as broader social and environmental determinants can be effective, particularly in the short term. Research into long-term effectiveness and impact of workplace nutrition interventions is limited and needs to be addressed. Although commonly used as a proxy for health, body weight changes may not be the most appropriate outcome measure and consideration should be given to other metrics, such as attitude change, improvements in health or positive mental health wellness in future studies.

Elaine Gardner and Kathy Cowbrough are public health dietitians. They were commissioned by the British Dietetic Association, the professional body for UK dietitians, to undertake a review of published workplace health nutrition studies. This article presents one aspect of the review – findings relevant to the workplace.

Accredited workplace dietitians can be contacted via the British Dietetic Association at www.bdaworkready.com

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