



## Adherence to the Mediterranean diet among employees in South West England: Formative research to inform a web-based, work-place nutrition intervention

Angeliki Papadaki \*, Lesley Wood, Simon J. Sebire, Russell Jago

Centre for Exercise, Nutrition and Health Sciences, School for Policy Studies, University of Bristol, Bristol, UK

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### ABSTRACT

**Objective.** The aim of this study is to assess internet usage patterns and adherence to the Mediterranean diet among employees in South West England, UK and their differences by personal characteristics.

**Method.** A cross-sectional survey was conducted in 2014 among 590 adults (428 women, 162 men, mean age 43.8 years), employees of four work-place settings. Mediterranean diet adherence was assessed using a validated food frequency questionnaire. Adherence differences were assessed by gender, marital status, education, number of children and food shopping and preparation responsibility.

**Results.** On average, participants reported moderate adherence to the Mediterranean diet. Higher adherence was reported for alcohol, vegetables, cereals and fruit. Few participants achieved high adherence to the Mediterranean diet recommendations for legumes (5.3%), fish (3.2%), dairy products (4.8%), red meat (11.9%), poultry (11.1%) and olive oil (18.2%). A higher Mediterranean diet score was reported among participants who were married/cohabiting, those with higher education attainment and shared responsibility for food preparation.

**Conclusion.** Improvement in the consumption of several Mediterranean diet components is needed to increase adherence in this sample of adults. The findings have the potential to inform the development of a web-based intervention that will focus on these foods to promote the Mediterranean diet in work-place settings in South West England.

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### Introduction

The importance of studying and promoting dietary patterns, instead of isolated foods or nutrients, in order to increase the likelihood of acceptability and compliance with nutrition interventions, has been established (Hu, 2002). The Mediterranean diet, rich in olive oil, fruits and vegetables, including whole grains, legumes and nuts, low-fat dairy, fish, moderate alcohol consumption and low quantities of red meat, has been associated with a reduced risk of chronic disease incidence and mortality in the general population (Sofi et al., 2014). This dietary pattern has been recognised as a model for healthy eating and the need to promote it to non-Mediterranean populations has recently been recognised (Council of the European Union, 2014; National Institute for Health and Care Excellence, 2014). It has been suggested that its high palatability makes the Mediterranean diet an attractive diet to promote to Western populations (McManus et al., 2001; Willett,

2006). Components of this diet could be easily transferable to non-Mediterranean populations (Renaud et al., 1995; McManus et al., 2001) and therefore represent an opportunity to change dietary behaviours.

The need to design nutrition behaviour change interventions based on formative research has been emphasised (Kok et al., 2004; National Institute for Health and Clinical Excellence, 2007; Craig et al., 2008; World Health Organisation, 2009). The conceptualisation and development of such interventions should include the identification of the evidence and theory base, supplemented by a needs assessment phase, where health problems in the target population are identified and behavioural risk factors for these problems are assessed (Kok et al., 2004; Craig et al., 2008). Identifying the evidence, as well as the specific needs of the target population is suggested to aid the development and delivery of feasible and effective approaches to promote dietary behaviour change (National Institute for Health and Clinical Excellence, 2007; Craig et al., 2008).

The internet is widely accessible to the general public and is one of the most preferred sources of nutrition information (Horgan and Sweeney, 2012). In the first quarter of 2014, 87% of adults in the UK had used the internet, supporting its potential as a cost-effective intervention tool with large reach (Office for National Statistics, 2014a). Work-place settings provide mechanisms to promote dietary behaviour

\* Corresponding author at: Centre for Exercise, Nutrition and Health Sciences, School for Policy Studies, University of Bristol, 8 Priory Road, Bristol BS8 1TZ, UK. Fax: +44 117 3311148.

E-mail addresses: [angeliki.papadaki@bristol.ac.uk](mailto:angeliki.papadaki@bristol.ac.uk) (A. Papadaki), [lesley.wood@bristol.ac.uk](mailto:lesley.wood@bristol.ac.uk) (L. Wood), [simon.sebire@bristol.ac.uk](mailto:simon.sebire@bristol.ac.uk) (S.J. Sebire), [russ.jago@bristol.ac.uk](mailto:russ.jago@bristol.ac.uk) (R. Jago).

change since they offer accessibility to large populations of adults who can be surveyed repeatedly (Maes et al., 2011). Several web-based nutrition intervention studies have been conducted in work-place settings (Block et al., 2004; Irvine et al., 2004; Oenema et al., 2005; Mills et al., 2007; Robroek et al., 2007). The majority of work-place nutrition interventions have focussed on promoting changes in a limited number of outcomes such as fruit, vegetable and fat consumption (Steyn et al., 2009; Mhurchu et al., 2010). To our knowledge, only one small-scale, web-based intervention has promoted the Mediterranean diet and demonstrated favourable changes in several components of this dietary pattern among healthy employees in Scotland (Papadaki and Scott, 2005a, 2005b, 2008). However, this study was conducted only among female employees, thus not allowing the generalizability of the findings to male participants or the exploration of potential gender differences in Mediterranean diet adherence. In addition, this earlier work did not conduct formative research prior to intervention development, which is an essential step for the development of feasible behaviour change interventions (Kok et al., 2004; Craig et al., 2008).

Although several primary nutrition interventions have attempted to promote the Mediterranean diet in Western populations (Goulet et al., 2003; Papadaki and Scott, 2005a; Djuric et al., 2009; Leighton et al., 2009), no such study has been conducted in England. Thus, to build a formative research base, according to current frameworks (Kok et al., 2004; Craig et al., 2008), on which to develop a future web-based, work-place intervention, this study aimed to assess demographic characteristics, internet usage patterns and adherence to the Mediterranean diet among healthy male and female adult employees in South West England. Secondary objectives were to assess potential differences in these characteristics between genders, as well as differences in adherence to the Mediterranean diet according to demographic characteristics.

## Methods

### Participants

During autumn 2013, 44 large-scale work-place settings (>200 employees) in South West England (Bristol, South Gloucestershire and Wiltshire areas) were identified and invited by e-mail to participate in the study. Four work-places (one company engaged in business and professional services and three local government branches) agreed to participate. Data were collected via an online questionnaire. A gatekeeper at each work-place circulated a web link to the online questionnaire to their employees via their intranet and/or electronic newsletters. Eligibility criteria were: (a) being currently employed at the work-place, (b) aged 18–65 years, (c) not suffering from a diet-related disease, (d) having internet access at work and/or at home and (e) using the internet at least 2–3 times/month. Participants were entered into a prize draw to receive one of four £20 gift vouchers per work-place. To provide recompense for disruption from data collection, each worksite received a £50 gift voucher. The study was approved by the School for Policy Studies Research Ethics Committee at the University of Bristol. Participants provided informed consent after reading participant information and before completing the survey.

### Online survey

An online survey was used to obtain data about demographic and personal characteristics, internet usage patterns and adherence to the Mediterranean diet. Participants were asked to report their gender, age, marital status ('single'/'married'/'cohabiting'/'separated'/'divorced'/'widowed') (Grundy and Jamieson, 2002), ethnicity ('Caucasian'/'Asian or Asian British'/'Chinese'/'Other Asian background'/'Black or Black British'/'Other Black background'/'Mixed-White and Black Caribbean'/'Mixed-White and Black African'/'Mixed-White and Asian'/'Other mixed background'/'Other ethnic background'/'Disclosure of ethnic origin declined') (Office for National Statistics, 2012), level of education

('postgraduate degree'/'degree or equivalent'/'higher education below degree level'/'A levels'/'high school'/'no qualifications') (Schneider, 2011), occupation ('Managerial'/'Professional'/'Associate professional/technical'/'Administrative/secretarial'/'Skilled trades'/'Personal services'/'Sales/customer services'/'Process'/'Elementary') (Office for National Statistics, 2014b) and number of children (<18 y) living in their household (open response). This part also included questions on participants' working pattern ('full-/part-time status'), food shopping and food preparation responsibility in their household ('I am'/'Family members'/'Shared responsibility'/'Others') (Papadaki and Scott, 2005a). Participants were also asked to report the frequency with which they access the internet at work and at home ('Several times per day'/'Once per day'/'Several times per week'/'Once per week'/'Once per month or less'/'No internet access'), the reasons for accessing the internet (choose all that apply from 'Sending or receiving email'/'Work-business-studies'/'Chatting-social media'/'Online shopping'/'Online gaming'/'Online banking'/'Online education-newspapers'/'Health-related information'/'Entertainment-leisure'/'Other') (Ofcom, 2012) and the level of confidence in their ability to use the internet ('Extremely confident'/'Quite confident'/'Neutral'/'Not very confident'/'Not at all confident').

For ease of interpretation and analysis, categorical variables were collapsed where appropriate. 'Marital status' was collapsed into 'Married/cohabiting', 'Single' and 'Separated/divorced/widowed'. 'Ethnicity' and 'Number of children living in household' were dichotomised into 'Caucasian' and 'Other ethnicity' and 'None' and '≥1', respectively.

### Adherence to the Mediterranean diet

Adherence to the Mediterranean diet was assessed via an 11-item food frequency questionnaire that requested participants to report the frequency of consumption of 11 main components of the Mediterranean diet (Panagiotakos et al., 2006a). A composite Mediterranean diet score was calculated as follows: for the consumption of components commonly consumed in the Mediterranean diet (non-refined cereals, potatoes, fruits and fruit juice, vegetables and salad, legumes and fish), a score of 0 (lowest adherence) to 5 (highest adherence) was assigned when a participant reported consumption of 0, 1–4, 5–8, 9–12, 13–18 and >18 servings/month, respectively. For the consumption of components which are consumed less frequently in the Mediterranean diet (red meat and meat products, poultry and whole-fat dairy products), a score of 0 to 5 was assigned for reported consumption of the above options, using a reverse scale. A score of 0 to 5 was assigned for using olive oil (in cooking and meal preparation) 'never', 'rarely', '<1 time/week', '1–3 times/week', '3–5 times/week' and 'daily', respectively. For alcohol (all alcoholic beverages), a score of 5 was assigned for consumption of '<300 ml/day', a score of 0 for 'no consumption or consumption of >700 ml/day', and scores of 4 to 1 for consumption of '300–400 ml', '400–500 ml', '500–600 ml' and '600–700 ml/day', respectively (Panagiotakos et al., 2006a). The resulting total score ranged from 0 to 55, with calculated tertiles indicating low (score = 0–20), moderate (score = 21–35) and high (score = 36–55) adherence to the Mediterranean diet (Panagiotakos et al., 2004, 2006b). The questionnaire has been validated based on the relationship between the calculated total score and individual food component scores and has been suggested to offer a valid method for assessing Mediterranean diet adherence and providing dietary modification advice for primary prevention purposes (Panagiotakos et al., 2006a, 2006c), in addition to having previously been utilised in Mediterranean diet promotion interventions in non-Mediterranean populations (Sexton et al., 2013).

### Statistical analyses

Descriptive statistics (M, SD, N and %) were used to explore demographic and personal characteristics, internet usage patterns and eating habits of participants. Independent samples *t*-tests and Chi-square tests were used (with a *P*-value adjusted, as necessary, for multiple-paired

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