



Research report

Nutrition label use mediates the positive relationship between nutrition knowledge and attitudes towards healthy eating with dietary quality among university students in the UK ☆

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ABSTRACT

The aim of this study was to investigate whether nutrition knowledge and attitudes towards healthy eating are predictors of nutrition label use (NLU) and dietary quality in a diverse sample of university students in the UK. An online cross-sectional survey was conducted in 2013 among 500 students (mean age 24.9 years; 75% females) in 37 UK universities. Nutrition knowledge, attitudes, NLU and dietary quality were assessed using previously validated questionnaires. The majority of participants met dietary recommendations for fat, added sugar and fast food intake, and failed to meet recommendations for calcium, fibre, fruit and vegetable and dairy product intake, resulting in a median dietary quality score of 2.0 (score range = 0–8). Nutrition knowledge differed according to gender, age, body mass index (BMI), nationality and NLU. Attitudes towards healthy eating differed according to BMI and NLU and dietary quality differed according to gender. Nutrition knowledge and attitudes were significant predictors of NLU and dietary quality, with NLU mediating the latter relationship, whereas NLU, when controlled for knowledge and attitudes, negatively predicted dietary quality but did not have a significant independent relationship with diet. Future nutrition interventions to improve dietary quality in this sample of UK university students should focus on improving nutrition knowledge and attitudes towards healthy eating.

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Introduction

Unhealthy eating patterns have been linked to increased rates of cardiovascular disease, diabetes and other non-communicable diseases (World Health Organisation, 2003). In the United Kingdom (UK), health promoting dietary and lifestyle changes at the population level could significantly reduce the overall costs of diet-related disease, which were found to be £5.8 billion in 2006–2007 (Scarborough et al., 2011). To facilitate a healthy diet and in order to inform consumers' dietary choices, nutrition labels have been added to packaging and made voluntary but highly recommended for most packaged foods across the UK (Grunert & Wills, 2007). The UK has the highest penetration of nutrition labelling found on products in the European Union, with 63% of products featuring front-of-packaging nutrition information (Storcksdieck Genannt Bonsmann et al., 2010).

For the majority of university students in the UK, going to university is a time when individuals become primarily responsible for their own dietary behaviours (Beasley, Hackett, & Maxwell, 2004). Adopting healthy dietary practices during this transitional period might track into adulthood, thus reducing the risk of chronic disease later in life (Steptoe et al., 2002). Nevertheless, university students have often been reported to adopt unhealthy lifestyle behaviours and unfavourable dietary habits during their studies (Hendricks & Herbold, 1998). Currently, there are no effective national health promotion programmes focussing on promotion of a healthy diet specifically among university students in the UK (Irwin, 2010; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). Nutrition label use (NLU) could be of dominant interest since it presents a national intervention that all students in the UK are currently exposed to. Earlier research into the role of personal factors, such as attitudes, nutrition knowledge and NLU, in healthy eating behaviours among US college and university students showed that attitudes and nutrition knowledge were positively associated with NLU (Rasberry, Chaney, Housman, Misra, & Miller, 2007), which in turn mediated the relationship between attitudes and dietary quality (Graham & Laska, 2012), whereas attitudes and knowledge were significantly, yet only weakly associated (Rasberry et al., 2007). Nutrition knowledge has also been consistently associated with NLU in the general population, suggesting that knowledge facilitates label use

Abbreviations: BMI, body mass index; EU, European Union; NLU, nutrition label use; UK, United Kingdom.

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(Grunert, Wills, & Fernández-Celemín, 2010; Guthrie, Fox, Cleveland, & Welsh, 1995; Li, Miniard, & Barone, 2000; Misra, 2007; Rasberry et al., 2007). In addition, a positive association between NLU and dietary quality has consistently been reported in observational studies (Drichoutis, Lazaridis, & Nayga, 2006; Guthrie et al., 1995; Kim, Nayga, & Capps, 2001; Kreuter, Brennan, Scharff, & Lukwago, 1997; Kristal, Hedderston, Patterson, & Neuhauser, 2001; Nayga, 1999; Neuhauser, Kristal, & Patterson, 1999; Satia, Galanko, & Neuhauser, 2005; Variyam, 2008), whereas socioeconomic status, gender, age, education and ethnicity have all demonstrated cross-sectional associations between NLU and dietary quality (Huang et al., 2004; Kim & Douthitt, 2004; Kim et al., 2001; Variyam, 2008).

To our knowledge, no research study to date has examined the relationship between personal determinants of eating behaviour, namely nutrition knowledge, attitudes towards healthy eating and NLU with dietary quality among university students in the UK. The aim of the present study was to investigate the relationship between nutrition knowledge, attitudes towards healthy eating, NLU and dietary quality in a diverse sample of university students in the UK. It was hypothesised that those with greater nutrition knowledge and more favourable attitudes would be more likely to engage in healthy dietary practices and would use nutrition labels more frequently than those with less knowledge and unfavourable attitudes. It was also hypothesised that self-reported NLU would mediate the relationship between personal determinants and dietary quality, such that those with greater nutrition knowledge and more favourable attitudes would have higher dietary quality through using nutrition labels.

Materials and methods

Participants

During summer 2013, 134 UK universities were identified from the Universities and Colleges Admission Service database and were invited by electronic mail to participate in the study. Thirty-seven universities accepted to circulate a web link to an online survey to their students via their university electronic mail system. Two weeks following the students' invitation, a convenient sample of 500 participants was reached, allowing the survey to be closed. Informed consent was obtained prior to completing the online survey and participants were entered in a lottery to receive one of five £10 gift vouchers. All study procedures were approved by the Centre of Exercise, Nutrition and Health Sciences Research Ethics Committee.

Outcome assessment

An online, self-administered questionnaire was used to obtain data about demographic and personal characteristics, nutrition knowledge, attitudes towards healthy eating, nutrition label use and dietary quality. These five constructs were assessed using previously validated questionnaires and the final questionnaire required approximately 30 minutes to complete.

Demographic and personal characteristics

Participants were asked to report their gender, age, field and year of study, and whether they were an international or UK student. Participants also self-reported their weight and height and body mass index (BMI) was calculated as weight (kg) divided by height squared (m^2).

Nutrition knowledge

Nutrition knowledge was assessed using a previously validated nutrition knowledge questionnaire (Parmenter & Wardle, 1999). This

questionnaire has been pre-tested in an adult UK population and has proved to have high internal consistency (Cronbach's $\alpha = 0.7-0.97$), test-retest reliability (Pearson's $r = 0.98$) and good construct validity ($P < 0.001$) to provide a measure of nutritional knowledge of UK adults (Parmenter & Wardle, 1999). The questionnaire is divided in four sections: knowledge of dietary recommendations (11 items); knowledge of sources of nutrients (69 items); knowledge of choosing everyday foods (10 items); and knowledge of diet-disease relationships (20 items). A score of 1 or 0 was given for each answer depending on whether it was correct or not. The total nutrition knowledge score range was 0–110, and the sub-section score ranges, for each questionnaire section, were 0–11, 0–69, 0–10, and 0–20 (Parmenter & Wardle, 1999).

Attitudes towards healthy eating

The section on attitudes towards healthy eating included three statements previously validated to assess this construct among Irish adults (Cronbach's $\alpha = 0.71$) (Kearney et al., 2001). The statements ('I make conscious efforts to try and eat a healthy diet'; 'I try to keep the amount of fat I eat to a healthy amount'; and 'I don't need to make changes to my diet as it is healthy enough') were answered on 5-point Likert scales (ranging from 'most of the time' to 'hardly ever' for the first two statements and from 'strongly agree' to 'strongly disagree' for the third statement). Participants were given a healthy eating attitude score based on the sum of the scores for each of the three statements. The score for all statements ranged from 1–4, with the highest score allocated to the response 'most of the time' for the first two statements, and to the response 'strongly agree' for the third statement. The response 'I don't know', which was included in the Likert scales for all statements, did not receive a score. Overall, higher scores indicated favourable attitudes towards healthy eating (Kearney et al., 2001).

Nutrition label use

The measure for nutrition label use was adopted from a recent study conducted among US college students (Graham & Laska, 2012). The measure consisted of one item ('How often do you read the nutrition labels on food labels before purchasing foods or beverages?') with four response categories ('never or rarely', 'sometimes', 'often' and 'always or almost always'). Participants who reported either of the two latter categories were categorised as frequent nutrition label users (Graham & Laska, 2012).

Dietary quality

Dietary quality was assessed using the measures applied in the study by Graham and Laska (2012). Thus, this section included the previously validated Five Factor Screener (National Health Interview Survey, 2005), All-Day Fruit and Vegetable Screeners (National Cancer Institute, 2000; Thompson et al., 2000), Percentage Energy from Fat Screener (National Cancer Institute, 1996) and Fast Food Consumption Screener (Nelson & Lytle, 2009). Similar to the study by Graham and Laska (2012) and for comparison purposes, participants were also asked to report whether they followed a vegetarian diet. Minor rewording, where appropriate, was made to the food lists so that they better reflected British names for foods (e.g. fries were changed to chips).

The dietary quality section consisted of a total of 63 items, from which daily mean intakes were calculated on the following variables: percentage of energy from fat (%), dietary fibre (g/day), calcium (mg/day), added sugar (teaspoons/day), fruits and vegetables (servings/day), and dairy products (servings/day). Scoring procedures followed a standardised protocol (available at <http://riskfactor.cancer.gov/diet/screeners/>). These calculated values,

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