

Full Title: **HEALTH-RELATED BEHAVIOURS OF NURSES AND OTHER HEALTHCARE PROFESSIONALS: A CROSS-SECTIONAL STUDY USING THE SCOTTISH HEALTH SURVEY**

Running Head: **NURSES' HEALTH-RELATED BEHAVIOURS**

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ABSTRACT

Aims: To estimate the prevalence and co-occurrence of health-related behaviours among nurses in Scotland relative to other healthcare workers and those in non-healthcare occupations.

Design: Secondary analysis of nationally representative cross-sectional data, reported following STROBE guidelines.

Methods: Five rounds (2008-2012) of the Scottish Health Survey were aggregated to estimate the prevalence and co-occurrence of health-related behaviours (smoking, alcohol consumption, physical activity, fruit/vegetable intake). The weighted sample (n=18,820) included 471 nurses (3%), 433 other healthcare professionals (2%), 813 unregistered care workers (4%), and 17,103 in non-healthcare occupations (91%). Logistic regression models compared prevalence of specific health-related behaviours and principal component analysis assessed co-occurrence of health-related behaviours between occupational groups.

Results: Nurses reported significantly better health-related behaviours relative to the general working population for smoking, fruit/vegetable intake, and physical activity. No significant difference was found for alcohol consumption between occupational groups. Nurses reported lower levels of harmful co-occurring behaviours (tobacco smoking and alcohol consumption) and higher levels of preventative behaviours (physical activity and fruit/vegetable intake) compared to the general working population. Other healthcare professionals had the lowest level of harmful health behaviours and highest level of preventative health behaviours. Health-related behaviours were poorest among unregistered care workers.

Conclusion: Nurses' health-related behaviours were better than the general population but non-adherence to public health guidelines was concerning.

Impact: Nurses play an important role in health promotion through patient advice and role-modelling effects. To maximise their impact healthcare providers should prioritise increasing access to healthy food, alcohol awareness and smoking cessation programmes.

Keywords: Health Behaviours; Health promotion; Epidemiology; Lifestyle; Nutrition; Smoking; Physical Activity; Workforce Issues; Nurses; Care Workers

INTRODUCTION

Four non-communicable diseases (NCDs) – cardiovascular disease, cancer, diabetes and chronic respiratory disease – cause the death of 36 million people around the world each year, equating to 68% of annual deaths (WHO, 2014). Global incidence of NCDs continues to rise (WHO, 2014). However, addressing four key health-related behaviours may prevent NCDs: tobacco smoking, physical inactivity, alcohol consumption, and unhealthy diet (WHO, 2017). The United Kingdom (UK) – and Scotland in particular – has high rates of these health-compromising behaviours, increasing disease burden at an individual- and population-level (Whyte *et al.*, 2012) as well as the financial burden on the publicly funded National Health Service (NHS). UK and Scottish Governments have therefore established public health guidelines relating to smoking, alcohol consumption, physical activity, and dietary behaviour and invested in health promotion to reduce incidence of NCDs.

Internationally, healthcare professionals play an important role in encouraging adherence to public health guidelines through their role as health promoters during routine patient interactions (Büscher *et al.*, 2009), delivery of targeted interventions such as smoking cessation programmes or alcohol brief interventions, and potential role-modelling effects (Blake *et al.*, 2011). Nurses are the largest professional group in global healthcare systems, including the NHS in Scotland (Information Services Division, 2014) and are therefore ideally placed to make ‘every contact count’ (Public Health England *et al.*, 2016) and educate patients about living a healthy lifestyle (Scottish Government, 2012). However, a recent systematic review assessing the impact of personal health behaviours on health promotion practice found that patients may be more likely to accept advice offered by a visibly healthy professional

(Kelly *et al.*, 2017). Studies have also shown associations between nurses' own health-related behaviours and the extent to which they engage in health education and promotion (Fie *et al.*, 2012; McKenna *et al.*, 2001).

Concern about the health of the nursing workforce in the United Kingdom has been raised through recent studies using nationally representative datasets that compared prevalence of obesity among nurses to other healthcare professionals, unregistered care workers, and the general working population in Scotland (Kyle *et al.*, 2016) and England (Kyle *et al.*, 2017). Yet, despite increased knowledge around nurses' health outcomes, such as obesity, prevalence and co-occurrence of underlying health-related behaviours has not previously been estimated using nationally representative data. This evidence could potentially enable targeting of workplace interventions and enhance the effectiveness of health promotion efforts with nurses. This study reports nationally representative estimates of prevalence and co-occurrence of four health-related behaviours (smoking, alcohol consumption, physical activity, fruit/vegetable intake) for nurses, other healthcare professionals, and unregistered care workers in Scotland in comparison to the general working population.

BACKGROUND

It might be expected that nurses have healthier lifestyles than the general population given that the influence of behaviour on health outcomes, caring for those in ill health, and engagement in health promotion are integral parts of nurses' education. However, existing international evidence suggests that nurses' health-related behaviours are often no better than the general population. Nurses exhibit high rates of smoking (Perdikaris *et al.*, 2010), low engagement in physical activity (Albert *et al.*,

2014; Lobelo & de Quevedo, 2016), often fail to meet national dietary guidelines (Blake & Harrison, 2013; Malik *et al.*, 2011; Priano *et al.*, 2017), and engage in risky alcohol use, particularly binge drinking (Buchvold *et al.*, 2015; Raistrick *et al.*, 2008).

However, wide variation in sampling, study design, definitions, and measures of health behaviours used, make it difficult to draw definitive conclusions around nurses' health-related behaviours in the UK or its constituent nations. A cross-sectional survey of nurses in England (Malik *et al.*, 2011) found that a large proportion of participants exhibited poor health-related behaviours, but this cannot be assumed to be generalisable to all UK nurses. Little is known about the prevalence of health-related behaviours in Scottish healthcare professionals, with only one study of 116 health visitors (Barberia & Canga, 2004) having been conducted. No previous studies have been conducted that estimate prevalence or co-occurrence of health-related behaviours among nurses and other healthcare professionals in Scotland.

THE STUDY

Aim

The aim of this study was to estimate the prevalence and co-occurrence of smoking, alcohol consumption, physical activity, and fruit and vegetable consumption among nurses and compare this to other healthcare professionals, unregistered care workers, and the general working population.

Design

This cross-sectional study used the Scottish Health Survey (SHeS) to compare four health behaviours among four occupational groups. To ensure a sufficiently large sample size, five years of data (2008-2012) were combined. SHeS data from the

same survey years have been used in previous analysis of nurses' health outcomes (Kyle *et al.*, 2016). Using the same survey years follows disclosure control guidelines and prevents the risk of small number disclosure by comparing tables across different publications.

Data Source

The SHeS was designed by the Scottish Government to yield a nationally representative sample and is used to track trends in health-related behaviours and outcomes over time. Details about SHeS sampling, recruitment, data collection and analysis processes have been described in detail elsewhere (SCOTPHO 2014; Scottish Government 2009). In summary, households were sampled via a two-stage stratified probability sampling design with data zones selected at the first stage and addresses (delivery points) at the second. Between 2008 and 2012, household response rates ranged from 61-66% and individual response rates from 54-56% (SCOTPHO 2014). Computer-Assisted Personal Interviewing (CAPI) was used for face-to-face data collection in participant's homes with questions of a sensitive nature asked using a self-completion booklet.

Participants

SHeS cases were included in the study if they had worked in the past four weeks and were aged between 17 and 65 years old to ensure that comparisons were of those of working age. The lower limit was selected because students are able to enter nurse education in Scotland at 17 years old.

Measures

Occupation

Survey participants were asked their occupation, which was then classified by SHeS analysts using the standard occupational classification SOC2000 (for survey years 2008–2011) and SOC2010 (2012). This typology classifies people into specific groups indicating their main work, for example registered nurses (Office for National Statistics (ONS), 2010). For this study, SHeS analysts created a variable indicating whether participants were members of four occupational groups: nurses, other healthcare professionals, unregistered care workers, and individuals in non-health related occupations (i.e., the general working population). Using these aggregated groups ensured sufficient numbers to enable meaningful comparison whilst maintaining analytically meaningful occupational groups. Occupational groups were the same as those used in an earlier secondary analysis of health outcomes among nurses and other healthcare professionals in Scotland to ensure consistency (Kyle *et al.*, 2016). SOC2000 and SOC2010 codes used to create each occupational group are shown in Table 1.

[Insert Table 1 here]

Health behaviours

Smoking: All participants were asked about smoking behaviour either through interview (if 20 years old or over), by self-completion booklet (17 years old), or by choosing between these two data collection methods (18-19 years old). All participants were asked whether they smoked cigarettes nowadays and whether

they had ever smoked cigarettes, which allowed for classification of current cigarette smoking status into categories (i.e., current smoker/ex-smoker/never smoked). In addition, interviewers asked participants about the number of cigarettes usually smoked on weekdays and at weekends. This information was combined into a variable measuring the number of cigarettes smoked per day by current smokers.

Diet: At the time of the data collection, in line with World Health Organization (WHO) '5-a-day' guidance, the Scottish Government recommended all individuals to consume at least five varied portions of 80 grams (g) of fruit and vegetables per day. In the SHeS, the total number of fruit and vegetables consumed in the 24 hours prior to the interview was determined by interviewing participants about consumption of the following food types: vegetables, salads, pulses, vegetables in composites, fruit, dried fruit, and fruit in composites. A portion (80 g) was described using terms that participants could easily relate to, such as tablespoons or slices. A binary variable derived by SHeS analysts was used to assess whether the 5-a-day guideline had been met.

Physical Activity: Between 2008 and 2010, the Scottish Government recommended engaging in a total of at least 30 minutes of at least moderate-intensity physical activity a day, on 5 or more days a week (DoH, 2004). In 2011, the guidelines were rephrased to recommend engaging in at least moderate activity for a minimum of 150 minutes a week (Bull, 2010). In our study, a variable based on the pre-2011 guidelines was used in order to ensure consistency, as this variable was present in all SHeS rounds. Participants were asked how many days in the past four weeks

they had engaged in different types of physical activity (i.e. home-based activities, walking, sports and exercise, and activity at work) and what the duration of these activities was. Activities were classified according to their intensity level. A variable derived from these questions was used to indicate whether participants met physical activity guidelines.

Alcohol consumption: The Scottish Government has defined hazardous drinking as consuming more than 21 units of alcohol per week (men) or more than 14 units per week (women). In addition to the weekly guidelines, the Government recommends drinking no more than 4 units (men) or 3 units (women) on the heaviest drinking day. Participants were interviewed about their usual weekly consumption in the past 12 months. Reported consumed amounts of, for instance, pints and glasses were converted into units and corrected using a multiplying factor. In addition, participants were asked about drinking in the week before the interview, with particular attention given to alcohol use on their heaviest drinking day. We created a variable to derive whether participants adhered to the guidelines for weekly and/or daily consumption.

Socio-demographic characteristics

Differences in health-related behaviour between occupational groups might be a result of socio-demographic variation. Data on gender, age, and parental socio-economic status were therefore collected for analysis.

Parental socio-economic status: Socio-economic circumstances during childhood may influence health-related behaviour (Cohen *et al.*, 2010). Since the measure of socio-economic status used in the SHeS classifies all nurses in the same group (Rose *et al.*, 2005), it was necessary to include a measure of parental socio-economic status to account for differences among nurses due to social mobility. The survey captured parental occupation at the point when respondents were 14 years old.

Statistical methods

Data analysis was conducted through a three-stage process. First, estimates for the prevalence of tobacco smoking, physical activity, alcohol consumption and fruit and vegetable intake were calculated for each occupational group, with 95% confidence intervals (CI). Second, logistic regression models were built to compare adherence to government guidelines for each of the four health-related behaviours between nurses and the other occupational categories. Survey rounds and socio-demographic characteristics were entered simultaneously into each model to assess the extent to which these variables explained differences found in unadjusted models. No evidence of collinearity between variables entered into models was found. Third, a principal component analysis (PCA) was conducted to assess whether the four measured health behaviours could be grouped into types of health behaviours. PCA was chosen over factor analysis because the interest lay not in identifying underlying, unmeasured characteristics but in a broad distinction of behaviour (Gaskin & Happell 2014; Osborne & Costello 2004). With the varimax rotation with Kaiser normalisation, an orthogonal rotation method was chosen to

arrive at uncorrelated components (a component correlation matrix when using an oblique rotation method found a negligible correlation of -0.05). Four continuous measures were entered into the analysis: smoking (cigarettes/week); physical activity (minutes/week); alcohol consumption (units/week); fruit/vegetable intake (portions/week). The choice of numbers of components was based on the Kaiser–Guttman rule (retaining all factors with eigenvalues of more than 1.0) and a scree test. Linear regression models were then built to assess the extent to which occupation independently predicted the identified components. Data were analysed using SPSS version 23 (IBM Armonk, NY, USA), and a weight provided by the survey administrators was applied to all analysis to balance out household and individual nonresponse.

Validity, reliability, and rigour

The SHeS is a nationally representative survey, which provides this study with added reliability and validity in comparison to previous studies that combined data from different sources to be able to compare occupational groups' health behaviours (Bogossian *et al.*, 2012). The same question items were used in each survey wave, making aggregated measures reliable. The included survey waves used the same sampling methods and aimed for the same sample sizes, with the exception of the 2012 wave that aimed for a smaller sample size and excluded a small number of households that had previously been interviewed for other Scottish Government surveys in the 2012-2015 period. The SHeS is designed to enable aggregation of survey data across years. Although a small risk exists that the same individual is included in more than one survey year, because annual samples are weighted to be

representative of the population the potential influence of this on analysis after aggregation is minimal. Weights applied match the age and sex profile of the sample to the General Register Office for Scotland (GROS) mid-year household population estimates for Scotland (Scottish Centre for Social Research 2010). Hence, including only those in employment ensures that the sample represents the distribution of occupations in the population. The use of a population-based survey may also help to overcome social desirability bias around disclosing less desirable behaviours for fear of stigma or potential repercussions for their careers in terms of fitness to practise (Schluter *et al.*, 2012). Social desirability bias may be more likely in primary surveys focussed on nurses' health-related behaviours. Study reporting follows STROBE guidelines to enhance rigour and transparency.

Ethics

Ethical approval was granted from School of Health & Social Care Research Integrity Committee at Edinburgh Napier University. Anonymised secondary data were used, for which consent had been collected by the survey administrators.

RESULTS

Sample

After application of inclusion criteria, the weighted sample comprised 18,820 participants: 471 nurses (2.5%), 433 other healthcare professionals (2.3%), 813 unregistered care workers (4.3%), and 17,103 individuals with non-health related occupations (90.9%). Table 2 presents the unweighted sample characteristics.

[Insert Table 2 here]

Prevalence of health-related behaviours

Smoking

Reported prevalence of cigarette smoking among nurses was 17.4% (95% Confidence Interval [CI] 14.0%–20.8%). Prevalence was higher in nurses than other healthcare professionals (7.2%, CI 4.9%–9.2%) yet lower than amongst both unregistered care workers (36.8%, CI 33.5%–40.1%) and those in non-health related occupations (24.0%, CI 23.4%–24.7%) (Table 3). On average, nurses smoked 13.2 (Standard Deviation [SD]=6.5) cigarettes per day, which was greater than among other healthcare professionals (6.8, SD=6.5) yet fewer than among unregistered care workers (14.3, SD=7.6) and non-health related professionals (13.5, SD=8.4).

[Insert Table 3]

A logistic regression model adjusted for socio-demographic composition indicated that, compared to nurses, the odds of adhering to government guidelines that recommend not to smoke were significantly higher for other healthcare professionals (Odds Ratio [OR] 2.73, CI 1.74-4.27) and lower for unregistered care workers (OR 0.41, CI 0.30-0.54) and those in non-health related occupations (OR 0.76, CI 0.59-0.97) (Table 4).

[Insert Table 4]

Physical Activity

Nurses were found to be active for more than 30 minutes on 3.0 (SD=1.3) days of the week, which was similar to other healthcare professionals (3.0, SD=1.2), unregistered care workers (3.1, SD=1.3) and those in non-health related occupations (2.8, SD=1.4). Under half of nurses (46.0%, CI 41.5%-50.5%), other healthcare professionals (48.7%, CI 44.0%–53.4%), unregistered care workers (43.5%, CI 40.1%–47.0%), and just over half of those in non-health related occupations (50.6%, CI 49.8%–51.3%) did not meet government physical activity guidelines.

A logistic regression model indicated that compared to nurses, the odds of meeting physical activity guidelines were statistically significantly lower among other healthcare professionals (OR 0.72, 95% CI 0.55-0.95) and participants with non-health related occupations (OR 0.63, 95% CI 0.52-0.77). No statistically significant difference was observed between nurses and unregistered care workers (Table 4).

Alcohol consumption

Mean weekly unit consumption among those who reported to drink alcohol was lowest among nurses (8.7, SD=10.7), higher among other healthcare professionals (9.4, SD=10.2) and unregistered care workers (9.4, SD=14.5) but lower among each group of healthcare professionals than those in non-health related occupations (13.6, SD=18.1) (Table 3). Almost half of Scottish nurses (49.5%, CI 45.0%-54.0%) and

other healthcare professionals (49.7%, CI 44.9%-54.4%) and two fifths of unregistered care workers (43.0%, CI 39.6%-46.4%) did not meet government guidelines on alcohol consumption, yet adherence was higher among each group of healthcare professionals than those in non-health related occupations (53.1%, CI 52.4%-53.9% did not meet the guidelines) (Table 3).

No statistically significant differences were found between nurses and the three other occupational groups regarding meeting the weekly and/or daily guidelines on alcohol consumption when controlling for socio-demographic characteristics in a logistic regression model (Table 4). The model suggests instead that the differences between nurses and people with other occupations is mostly explained by the high share of female nurses and their specific parental socio-economic background.

Fruit/vegetable intake

Two-thirds (67.9%, CI 63.7%-72.2%) of nurses did not meet the daily government guidelines for fruit and vegetables intake. Non-adherence was higher among nurses than other healthcare professionals (52.7%, CI 48.0%-57.4%). Unregistered care workers (81.5%, CI 78.9%-84.2%) had the highest levels of non-adherence, with those in non-health related occupations having the second-highest non-adherence rate (77.6%, CI 77.0%-78.3%) (Table 3).

A logistic regression model suggested that these results hold true also when controlling for the socio-demographic composition of the occupational groups. It showed that compared to nurses, the odds of meeting fruit/vegetable intake guidelines were statistically significantly higher among other healthcare professionals (OR 1.76, CI 1.33-2.32) but lower among unregistered care workers (OR 0.53, CI 0.41-0.70) and those in non-health related occupations (OR 0.71, CI 0.58-0.88) (Table 4).

Types of health behaviours

Principal component analysis identified two components with an eigenvalue greater than 1. Component 1 showed a positive association with alcohol consumption (0.72) and cigarette smoking (0.69), which suggests that this component is related to harmful health behaviour. Component 2 showed a positive association with physical activity (0.79) and fruit/vegetable intake (0.66). It appears to measure preventative health behaviour. These findings are congruent with findings from a Dutch study examining high school students' health-related behaviours (Busch *et al.* 2013), which also identified one factor ('risk-prone behaviour') with high factor loadings on alcohol and smoking (together with use of other drugs) and another factor for unhealthy diet and a lack of exercising ('sedentary behaviour').

In Scotland, harmful health-related behaviours were most prevalent among unregistered care workers: 26.4% of nurses had a positive value for harmful health behaviour compared to 43.9% of unregistered care workers and 38.8% of those in non-health related occupations. Preventive health behaviours were higher among

nurses (63.0%) than unregistered care workers (51.7%) and those in non-health related occupations (52.8%). Other healthcare professionals exhibited the lowest level of harmful health behaviours (12.1%) and the highest level of preventative health behaviours (68.1%). Hence, although there is a significant percentage of nurses not adhering to public health guidelines around smoking, physical activity, alcohol consumption and fruit/vegetable intake (Table 3), overall their health-related behaviour is better than that of those in non-health related occupations (Table 5).

[Insert Table 5 here]

Linear regression models showed that this observation remained largely true when controlling for gender, age, and parental socio-economic status. However, nurses perform noticeably worse than other healthcare professionals in the model of harmful health behaviours. Moreover, these models show that while a positive trend towards reduced engagement in harmful health behaviours is apparent between survey years, engagement in preventative health behaviours has remained static over the five-year study period (Table 6).

[Insert Table 6 here]

DISCUSSION

Our study found that non-adherence to public health guidelines among nurses in Scotland is high: 17% of nurses smoked, 50% did not meet alcohol consumption guidelines, 46% did not meet physical activity guidelines, and 68% did not consume the recommended number of fruit and vegetables. These findings are similar to research among qualified nurses in England, which showed that 1 in 5 nurses in England is a cigarette smoker, and that just under half of all nurses do not adhere to physical activity guidelines, and three in five nurses do not consume sufficient fruits and vegetables (Malik *et al.*, 2011). While no recent studies are available on alcohol use of registered nurses in the UK, it has been shown that alcohol consumption levels among student nurses in England are high (Blake *et al.*, 2011).

Despite high *absolute* levels of non-adherence, nurses showed significantly better health-related behaviours *relative* to the general working population in terms of smoking prevalence, fruit and vegetable intake and physical activity. No significant differences across occupational groups in terms of alcohol consumption were observed. Principal component analysis identified two distinct behaviour types classified as *harmful* (i.e., smoking, alcohol consumption) and *preventive* (i.e., physical activity, fruit/vegetable intake). Comparisons of these co-occurring behaviours across occupational groups confirmed that the health profile of nurses was better than that of the general working population. While we detected a small but significant trend towards a decrease in harmful health behaviours (which was found among all four occupational groups), there was no trend found for preventative health behaviours.

Our analysis suggests that, as these two types of health behaviour are not strongly associated with one another, harmful and preventive behaviours should be targeted with different health improvement strategies. Further, given that a positive trend towards decreased engagement in harmful behaviours was observed, the immediate focus for supportive interventions may be best targeted towards dietary behavioural interventions at both an individual and structural level. For example, this could be addressed by providing greater access to fruits and vegetables than high-calorie sugar- and salt-based snacks in the hospital setting. Phiri *et al.* (2014) identified a lack of access to healthy food in the workplace, especially for those working night shifts, as one reason for unhealthy diet. Moreover, it is known that shift work negatively influences dietary and exercise habits (Amani & Gill, 2013) and that nurses experiencing work-related stress engage in emotional eating (Phiri *et al.*, 2014), as well as use excessive alcohol consumption and smoking as coping strategies (Happell *et al.*, 2013). A survey of 3,500 nurses in the UK revealed that six out of every ten nurses experience too much stress to maintain a healthy diet (Keogh, 2014). Smoking and alcohol consumption is positively associated with emotional stress (Azagba & Sharaf 2011) and studies have shown that greater perceived stress is associated with lower fruit, vegetable, and protein intake, greater consumption of salty snacks, and lower participation in physical activity (e.g., Laugero *et al.* 2011, Chang *et al.* 2008). Hence, a renewed focus on system-level initiatives that aim to reduce physical and mental stress among healthcare professionals is needed alongside interventions focused on individual behavioural outcomes.

Our study showed a 'gradient' in terms of non-adherence to public health guidelines among healthcare professionals. Other healthcare professionals had healthier behaviour than nurses, and, in turn, nurses showed healthier behaviours than unregistered care workers. Reasons for these differences may reflect decreasing duration of health education or remuneration across these professional groups. This suggests that measures to promote healthier behaviours directed at a structural and organisational level are required. For example, at a structural level increased emphasis should be placed on personal health in education and continuing professional development (CPD) for healthcare professionals and national pay settlements could be enhanced. At an organisational level, the expectations and responsibilities of employers to provide healthy working conditions and environments should also be explored. Nevertheless, despite disparity between professional groups, the high levels of non-adherence to health guidelines among unregistered care workers are especially concerning. In this study, unregistered care workers had the highest rate of smoking and the lowest intake of fruits and vegetables. Interventions to support smoking cessation and healthier dietary behaviours among unregistered care workers should therefore be prioritised.

Implications for policy and practice

Our study has several implications for health promotion policy and practice, as well as for future education and research. First, the observed low adherence to lifestyle-related health guidance among nurses raises concerns about the effectiveness of health promotion during routine patient interactions, which is particularly important considering the poor health profile of the Scottish general population. Nurses are

ideally placed to engage in public health roles by educating patients about healthy lifestyles. However, nurses who demonstrate health-compromising behaviours are themselves less likely to engage in patient education (Fie *et al.*, 2012; McKenna *et al.*, 2001) and, similarly, the public may be less likely to accept their advice (Hicks *et al.*, 2008). Therefore, it is crucial that nurses are supported by their employer and through workplace intervention to 'practice what they preach', especially around visibly displayed behaviours, such as smoking.

Second, supporting nurses to maintain a healthy lifestyle is necessary to safeguard the health of the nursing workforce, which is particularly important at a time when internationally there is an ageing population with increased demands for nursing care (Karlsson *et al.*, 2006), yet a global shortage of nurses (Huston, 2013). Staff shortages are being experienced across the healthcare sector in many Western countries (Forster, 2017; Woratschka, 2017; Wiget, 2017; WHO, 2013) and thus keeping existing staff as healthy as possible is paramount. It is important to understand and support the health of the current workforce to both enhance the effectiveness, and ensure the ongoing presence, of a healthy workforce to deliver health promotion interventions.

Maintaining and improving the health of nurses may be achieved through behavioural interventions and the establishment of health-promoting workplaces and campuses, especially through increasing access to healthier food options. Looking at connections between health behaviours, as done here by distinguishing *harmful* (or addictive) behaviours, such as smoking and alcohol consumption, and *preventive*

behaviours, such as exercising and healthy eating, may help in improving intervention strategies. These behaviour types may have shared influential factors which require further investigation, especially among the nursing workforce. Some research also suggests they interact and cluster, and that targeting related behaviours in tandem may be more effective than targeting only one of them (Prochaska *et al.* 2008). Therefore, a holistic approach is needed to address lifestyles that encompass multiple unhealthy behaviours and move beyond siloed, single behaviour interventions. A consistent socio-demographic gradient has been found in relation to the clustering of unhealthy behaviours (Halonen *et al.*, 2012; Shankar *et al.*, 2010), which suggests that interventions may also need to take into account socioeconomic, cultural, and/or community backgrounds in future interventions to improve the health of health care workforces.

Interventions to promote and maintain health should start early. Nursing students in England are known to have poor health-related behaviour on entry to undergraduate nursing programmes (Blake *et al.*, 2011), although evidence from Scotland is currently lacking. To promote healthy behaviours and attitudes among the future workforce, nurse educators should consider ways to integrate additional teaching about health-related behaviours, and perhaps even personal lifestyle advice, into nursing curricula.

Finally, further research is required to investigate the paradox that while our study found that nurses' health-related behaviours were better than the general working population, previous research using the SHeS over the same time period found that

nurses were statistically significantly more likely to be overweight or obese compared to the general working population (Kyle *et al.*, 2016). This apparent disparity requires further exploration, as it may be that aspects of nurses' role or environment may exacerbate the outcomes of harmful health-related behaviours.

Strengths and weaknesses

This study is the first to use nationally representative routinely collected data to estimate adherence to public health guidance among nurses, and to compare prevalence and co-occurrence of health-related behaviours with other healthcare professional groups and the general working population. The notable strength of this study is its use of the same dataset (SHeS) to compare occupational groups rather than reliance on comparison between primary data collection and population level data held in two different datasets as has been conducted previously (Bogossian *et al.*, 2012). Other advantages of using secondary data for our analysis are the high quality of the dataset which was developed by researchers specialised in the design of national surveys, and the unobtrusiveness to participants given that the data had already been collected.

However, there remain four main limitations of our study. First, to obtain a sufficiently large cross-sectional sample, data from five survey rounds were aggregated. No nationally representative dataset currently exists in Scotland (or the UK) that includes a sufficiently large cohort of nurses to estimate health-related behaviour for a single year, hampering efforts to track trends in behaviour on an annual basis.

Although this limitation was mitigated through linear regression modelling that

highlighted trends over time in terms of the two factors identified from the dataset, tracking changes in adherence over a longer period would further aid the process of targeting and tailoring supportive interventions. Second, due to aggregation of survey years and changes in government guidelines, not all variables were consistent across years. New physical activity guidelines established in 2011 were absent from the 2008-2010 survey rounds and thus the pre-2011 guidelines – which albeit do not differ substantially from the new guidelines – were used for analysis. Third, there is the potential for underreporting of health-compromising behaviour, especially due to social acceptability bias after having identified as a nurse to the interviewer. Hence, our estimates of nurses' engagement in health-compromising behaviours could be conservative. Finally, due to a lack of a measurement of stress at the workplace in our data, we could not explore its effect on our outcome measures.

CONCLUSIONS

Nurses' health-related behaviours were found to be better *relative* to the general population. However, *absolute* levels of adherence to public health guidelines among nurses are a cause for concern, and especially worrying among unregistered care workers. Further research to understand the reasons for high levels of non-adherence is required to determine whether aspects of working roles and environments explain or exacerbate observed differences between groups of healthcare professionals. More immediately, efforts to increase access to healthy food should be prioritised and smoking cessation programmes among unregistered care workers are urgently required.

Data sharing statement: Data were provided and downloaded from the UK Data Archive. Occupational categories were provided to the researchers by Scottish Government's SHeS analyst team along with a variable enabling linkage.

Ethics approval: Ethical approval was granted from the {anonymised for review} Research Ethics and Governance Committee at {anonymised for review}.

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Table 1: SOC2000 and SOC2010 codes for occupational groups

Occupational categories	SOC2000 (2008-2011)	SOC2010 (2012)
Nurses	3211	2231
Other health professionals		
Medical practitioners	2211	2211
Psychologists	2212	2212
Pharmacist	2213	2213
Ophthalmic opticians	2214	2214
Dental practitioners	2215	2215
Medical radiographers	3214	2217
Podiatrists	3215	2218
Physiotherapists	3221	2221
Occupational therapists	3222	2222
Speech and language therapists	3223	2223
Therapy professionals (N.E.C.)	3229	2229
Midwives	3212	2232
Unregistered care workers		
Nursing auxiliaries and assistants	6111	6141
Care workers and home carers	6115	6145
Senior care workers	–	6146
Non-health related occupations	All other codes	All other codes

Note: ¹ N.E.C = Not Elsewhere Classified.

Table 2: Sample sociodemographic characteristics (unweighted, column %)

	Occupational Group									
	Nurses (n=497)		Other Health Care Professionals (n=396)		Unregistered Care Workers (n=887)		Non-health Related Occupations (n=15,481)		Total (n=17,261)	
	n	%	n	%	n	%	n	%	n	%
Survey										
2008	85	17.1	67	16.9	166	18.7	3,094	20.0	3,412	19.8
2009	121	24.3	90	22.7	183	20.6	3,598	23.2	3,992	23.1
2010	95	19.1	91	23.0	197	22.2	3,239	20.9	3,622	21.0
2011	111	22.3	92	23.2	215	24.2	3,421	22.1	3,839	22.2
2012	85	17.1	56	14.1	126	14.2	2,129	13.8	2,396	13.9
Gender										
Males	35	7.0	101	25.5	128	14.4	7,744	50.0	8,008	46.4
Females	462	93.0	295	74.5	759	85.6	7,737	50.0	9,253	53.6
Age										
≤29	41	8.2	55	13.9	126	14.2	2,842	18.4	3,064	17.8
30-34	48	9.7	59	14.9	59	6.7	1,567	10.1	1,733	10.0
35-39	53	10.7	52	13.1	94	10.6	1,774	11.5	1,973	11.4
40-44	83	16.7	63	15.9	135	15.2	2,175	14.0	2,456	14.2
45-49	111	22.3	62	15.7	129	14.5	2,285	14.8	2,587	15.0
50-54	85	17.1	48	12.1	137	15.4	1,985	12.8	2,255	13.1
55-59	50	10.1	36	9.1	130	14.7	1,684	10.9	1,900	11.0
≥60	26	5.2	21	5.3	77	8.7	1,169	7.6	1,293	7.5
Parental NS-SEC (missing: 13.8%)										
Managerial and professional	183	38.4	232	61.4	176	22.2	4,725	34.1	5,316	34.3
Intermediate	60	12.6	36	9.5	84	10.6	1,475	10.7	1,655	10.7
Small employers/own account	58	12.2	39	10.3	91	11.5	1,593	11.5	1,781	11.5
Lower supervisory/technical	58	12.2	33	8.7	129	16.2	2,074	15.0	2,294	14.8
Semi-routine	117	24.6	38	10.1	314	39.5	3,970	28.7	4,439	28.7

Table 3: Health-related behaviours (weighted sample; missing <2.0%)

	Occupational Group									
	Nurses (n=471)		Other Health Care Professionals (n=433)		Unregistered Care Workers (n=813)		Non-health Related Occupations (n=17,103)		Total (n=18,820)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	N	% (95% CI)	n	%
Smoking										
Current cigarette smoker	82	17.4 (14.0-20.8)	31	7.2 (4.9-9.2)	299	36.8 (33.5-40.1)	4,099	24.0 (23.4-24.7)	4,511	24.0
Ex-smoker	144	30.6 (26.4-34.7)	90	21.0 (17.2-25.2)	229	28.2 (25.1-31.3)	4,077	23.9 (23.3-24.6)	4,540	24.2
Never smoked	245	52.0 (47.5-56.5)	312	72.7 (68.1-76.9)	284	35.0 (31.7-38.2)	8,872	52.0 (51.3-52.8)	9,713	51.8
Number of cigarettes per day (smokers) [Mean (SD)]	13.2	(6.5)	6.8	(6.5)	14.3	(7.6)	13.5	(8.4)	13.5	(8.3)
Physical Activity										
Number of days active 30+ minutes [Mean (SD)]	3.0	(1.3)	3.0	(1.2)	3.1	(1.3)	2.8	(1.4)	2.8	(1.4)
Does not meet government guidelines	216	46.0 (41.5-50.5)	211	48.7 (44.0-53.4)	354	43.5 (40.1-47.0)	8,648	50.6 (49.8-51.3)	9,429	50.1
Alcohol Consumption										
Drinks alcohol	399	84.7 (81.5-88.0)	393	90.8 (88.0-93.5)	657	81.2 (78.5-83.9)	15,164	88.9 (88.4-89.4)	16,613	88.5
Number of units per week [Mean (SD)]	8.7	(10.7)	9.4	(10.2)	9.4	(14.5)	13.6	(18.1)	13.2	(17.8)
Number of units on heaviest drinking day [Mean (SD)]	4.1	(4.8)	4.4	(4.5)	3.9	(5.6)	5.7	(6.9)	5.5	(6.8)
Does not meet government guidelines (units per week/on heaviest drinking day)	233	49.5 (45.0-54.0)	215	49.7 (44.9-54.4)	346	43.0 (39.6-46.4)	8,952	53.1 (52.4-53.9)	9,746	52.5
Fruit/Vegetable Intake										
Number of portions [Mean (SD)]	3.9	(2.5)	4.8	(3.0)	3.0	(2.4)	3.3	(2.5)	3.3	(2.5)
Does not meet government guideline	320	67.9 (63.7-72.2)	228	52.7 (48.0-57.4)	662	81.5 (78.9-84.2)	13,277	77.6 (77.0-78.3)	14,487	77.0

Table 4: Binary logistic regression models

	Adherence to health-related behaviour guidelines†			
	Smoking	Physical Activity	Alcohol	Fruit/Vegetable
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Occupational groups				
Nurses	Comparison	Comparison	Comparison	Comparison
Other health care professionals	2.73 (1.74-4.27)*	0.72 (0.55-0.95)*	1.08 (0.82-1.42)	1.76 (1.33-2.32)*
Unregistered care workers	0.41 (0.30-0.54)*	1.06 (0.83-1.34)	1.22 (0.96-1.55)	0.53 (0.41-0.70)*
Non-health related occupations	0.76 (0.59-0.97)*	0.63 (0.52-0.77)*	0.92 (0.76-1.12)	0.71 (0.58-0.88)*
Survey round	1.05 (1.02-1.08)*	1.00 (0.98-1.03)	1.06 (1.03-1.08)*	0.96 (0.93-0.99)*
Gender				
Female	Comparison	Comparison	Comparison	Comparison
Male	1.07 (0.99-1.16)	0.64 (0.60-0.68)*	1.25 (1.18-1.34)*	1.22 (1.13-1.32)*
Age				
≤29	Comparison	Comparison	Comparison	Comparison
30-34	1.16 (1.02-1.33)	0.87 (0.78-0.98)*	1.05 (0.93-1.18)	1.34 (1.17-1.54)*
35-39	1.23 (1.08-1.41)*	0.81 (0.72-0.91)*	1.18 (1.05-1.33)*	1.27 (1.10-1.46)*
40-44	1.34 (1.18-1.52)*	0.81 (0.72-0.90)*	1.03 (0.92-1.15)	1.14 (1.00-1.31)
45-49	1.43 (1.26-1.62)*	0.70 (0.63-0.78)*	1.08 (0.97-1.21)	1.30 (1.14-1.49)*
50-54	1.61 (1.41-1.84)*	0.63 (0.56-0.70)*	1.15 (1.02-1.29)*	1.52 (1.32-1.74)*
55-59	1.70 (1.47-1.98)*	0.57 (0.50-0.65)*	1.23 (1.08-1.39)*	1.67 (1.45-1.93)*
≥60	2.42 (2.00-2.92)*	0.48 (0.41-0.55)*	1.67 (1.44-1.93)*	1.74 (1.47-2.05)*
Parental NS-SEC				
Managerial and professional	Comparison	Comparison	Comparison	Comparison
Intermediate	1.03 (0.90-1.17)	0.89 (0.80-1.00)*	0.97 (0.87-1.08)	0.77 (0.68-0.87)*
Small employers/own account	0.84 (0.74-0.96)	0.88 (0.79-1.00)*	1.35 (1.21-1.50)*	0.88 (0.78-1.00)*
Lower supervisory/technical	0.75 (0.67-0.84)*	0.94 (0.85-1.04)	1.04 (0.94-1.14)	0.64 (0.57-0.71)*
Semi-routine	0.62 (0.56-0.68)*	0.98 (0.90-1.06)	1.17 (1.08-1.27)*	0.54 (0.49-0.59)*

* p <0.05. Missing (in order of models): 13.8% (n=16219), 13.8% (n=16221), 14.1% (n=16167), 13.8% (n=16229). †Guidelines: not smoking; doing 30 minutes of exercise on at least 5 days per week; drinking no more than 14 (women)/21 (men) units of alcohol per week and no more than 4 units (men)/3 units (women) on the heaviest drinking day; eating at least 5 portions of fruit à 80g each daily.

Table 5: Types of health-related behaviours

Component	Occupational Group				Total
	Nurses	Other Health Care Professionals	Unregistered Care Workers	Non-health Related Occupations	
Harmful Behaviours	26.4%	12.1%	43.9%	38.8%	38.1%
Preventative Behaviours	63.0%	68.1%	51.7%	52.8%	53.4%
Total (n)	469	429	806	16,851	18,555

Table 6: Linear regression models

	Harmful Health Behaviours (Component 1)			Preventative Health Behaviours (Component 2)		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta	B	Std. Error	Beta
(Constant)	0.37*	0.02		0.15*	0.02	
Occupational groups (reference: non-health-related occupations)						
Nurses	-0.10*	0.05	-0.02	0.28*	0.05	0.04
Other healthcare professionals	-0.40*	0.05	-0.06	0.41*	0.05	0.06
Unregistered care workers	0.23*	0.04	0.05	0.05	0.04	0.01
Survey year	-0.04*	0.01	-0.05	0.00	0.01	-0.01
Female	-0.37*	0.02	-0.19	-0.15*	0.02	-0.08
Age (ref: <30)						
30-34	-0.14*	0.03	-0.04	0.06*	0.03	0.02
35-39	-0.14*	0.03	-0.05	0.06*	0.03	0.02
40-44	-0.07*	0.03	-0.03	-0.01*	0.03	0.00
45-49	-0.12*	0.03	-0.04	-0.01	0.03	0.00
50-54	-0.13*	0.03	-0.04	-0.02	0.03	-0.01
55-59	-0.24*	0.03	-0.07	-0.06	0.03	-0.02
≥60	-0.35*	0.03	-0.08	-0.05	0.03	-0.01
Parental NS-SEC (reference: Managerial and professional)						
Intermediate	-0.01	0.03	0.00	-0.06*	0.03	-0.02
Small employers / own account	-0.06*	0.03	-0.02	-0.08*	0.03	-0.02
Lower supervision / technical	0.06*	0.02	0.02	-0.14*	0.02	-0.05
Semi-routine	0.14*	0.02	0.06	-0.22*	0.02	-0.09

*p<0.05. Missing: 1.4%.