Healthy eating and physical activity among new graduate nurses: A qualitative study of barriers and enablers during their first year of clinical practice

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10.1016/j.colegn.2020.12.008
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Healthy eating and physical activity among new graduate nurses: a qualitative study of barriers and enablers during their first year of clinical practice.

New graduate nurses’ barriers and enablers to healthy eating and physical activity.
Background

New graduate nurses entering the workforce experience numerous barriers to maintaining a healthy lifestyle including shift work, the high cost of healthy foods at the workplace and high levels of exhaustion which reduce motivation to participate in regular physical activity. Research has documented unhealthy lifestyles among nurses across the profession. However, few studies focus on graduates’ experiences during their transition into their careers.

Aim

To investigate the barriers and enablers to healthy eating and participation in physical activity for new graduate nurses during their first year of clinical practice, and to explore attitudes to participation in workplace health promotion programs.

Methods

Semi-structured interviews informed by the socioecological model were conducted with 24 new graduate nurses and analysed using thematic analysis.

Findings

Four key themes emerged as barriers to healthy eating and physical activity: time, shift work, work environment and work culture. Participants indicated a high interest in workplace health promotion programs.
Discussion

Limited time and shift work impact on the eating and physical activity behaviours of new graduate nurses which leads to unhealthy snacking to maintain energy, as does high levels of exhaustion, reduced motivation to eat healthy foods and decreased participation in physical activity. The work culture and environment also influence eating behaviours. Inadequate breaks lead to consumption of foods that are quick to eat but often low in nutrients.

Conclusion

New graduate nurses experience the same difficulties in maintaining healthy lifestyles as more experienced nurses. Understanding the barriers which influence their dietary and physical activity behaviours can help inform strategies to improve the health of nurses at a critical time when they enter the nursing workforce.

Keywords

Nurses, shift work, health promotion, physical activity, healthy eating, lifestyle behaviours.
Problem

Unhealthy eating and limited physical activity contribute to increasing levels of obesity across the Australian population. Overweight and obesity is associated with many chronic non-communicable diseases, with implications for the current and future workforce.

What is Already Known

Given their knowledge and skills, Australian nurses are expected to promote population health and to role-model positive lifestyle behaviours. However, nurses are more likely to be overweight and have poorer dietary and physical activity behaviours than the general population.

What this Paper Adds

This paper highlights that the factors affecting the health status of nurses throughout the profession are prevalent even during the first year of clinical practice. New graduate nurses face numerous barriers to maintaining a healthy diet and participation in regular physical activity, including shift work, limited availability of healthy foods and high levels of exhaustion.
1. **Introduction and Background**

New graduates are the next generation of the nursing workforce, with approximately 11,000 nurses graduating each year in Australia (Australian Government, 2014). New graduates frequently commence full-time employment at either a public or private hospital, with the majority participating in a 12-month new graduate program. These programs often include face-to-face education, mentoring and support to facilitate the transition to practice. New graduates are predominately female and aged under 24 years (Australian Government, 2014).

Ensuring new nurse graduates are healthy employees is critical as workforce shortages persist internationally and here in Australia (Duffield et al., 2015), yet little is known about their diet and physical activity behaviours. Research examining student nurses reports that many pre-registration nurses engage in poor lifestyle behaviours such as not consuming a healthy diet (Blake, Stanulewicz, & Griffiths, 2017; Mak et al., 2018; Malik, Blake, & Batt, 2011).

However, the impact that poor dietary behaviours may have on new graduates is not widely reported in the literature. Also, nursing work is associated with numerous barriers to maintaining a healthy lifestyle (Faugier, 2001; Nicholls, Perry, Duffield, Gallagher, & Pierce, 2017). These factors both singularly and in combination, may have major implications for the future workforce.

As new graduates’ transition into the workforce, they face numerous barriers to maintaining healthy lifestyle behaviours including heavy workloads and occupational stress (Chin, Nam, & Lee, 2016; Malik et al., 2011). Heavy workloads and long hours are associated with high levels of fatigue which negatively impact on nurses’ ability to participate in structured mealtimes and engage in regular physical activity (Caruso, 2014; Malik et al., 2011).
Occupational stress impacts on the dietary behaviours of nurses as it may influence food choices and the number of portions consumed. Power, Kiezebrink, Allan, and Campbell (2017), explored nurses dietary and physical activity behaviours and found workplace stress was associated with increased consumption of discretionary and takeaway foods by nurses. Similarly, Torquati, Kolbe-Alexander, Pavey, Persson, and Leveritt (2016) reported that occupational stress was associated with increased consumption of chocolates, chips and takeaway food. By way of contrast, Katz, Pronk, and Lowry (2014) reported that participation in healthy lifestyle behaviours may assist in reducing the effect of occupational stress and may lead to reduced consumption of discretionary foods.

A growing body of literature describes the association between shift work and the development of chronic diseases (Books, Coody, Kauffman, & Abraham, 2017; Huth, Eliades, Handwork, Englehart, & Messenger, 2013; Wang, Armstrong, Cairns, Key, & Travis, 2011). Recently Gifkins, Johnston, & Loudoun (2018) examined the impact of shift work on the eating patterns and self-care strategies of experienced and inexperienced nurses; where the average age of experienced nurses was 43 years and inexperienced nurses 33 years. Nurses from both groups reported that shift work led to changes in their dietary behaviours including increased snacking and meal skipping (Gifkins, Johnston, & Loudoun, 2018). These factors may have long-term implications for the future nursing workforce such as early attrition, reduced productivity and increased rates of absenteeism (Boamah & Laschinger, 2015; Spence Laschinger, Leiter, Day, & Gilin, 2009).

Any factor which impacts on the retention of nurses is of great concern due to the predicted nursing shortage and the aging workforce. Early attrition is occurring in an environment of
increased demand for healthcare services due to the aging Australian population and the growth in chronic diseases (Australian Institute for Health and Welfare, 2018; World Health Organization, 2016). Health Workforce Australia (2014) predicted that in 2025 there will be a shortage of 109,000 nurses. To ensure that the nursing workforce can meet the increased demand for healthcare services, future nurses need to be healthy and physically active. The aging nursing workforce is another critical factor in workforce supply. The proportion of nurses aged 55 and over increased from 19.8% in 2009 to 25.9% in 2018 with this figure predicted to continue to rise, emphasising the need for maintaining healthy lifestyles (Health Workforce Australia, 2014; Nursing and Midwifery Board of Australia, 2018). As these nurses retire and demands for healthcare services continue to increase, the profession becomes more reliant on a supply of new graduates. It is critical that new nursing graduates embrace lifestyles that help them remain fit and healthy throughout their careers. The prevention of unhealthy eating behaviours and participation in regular physical activity become important factors in maintaining a healthy nursing workforce. One approach to improving diet and physical activity behaviours is workplace health promotion programs.

There are many reasons why workplaces have been highlighted as suitable for the delivery of health promotion programs, particularly those targeting diet and physical activity (World Health Organization, 2013). Firstly, the workplace offers access to diverse populations at a central location (Blake, Zhou, & Batt, 2013). Secondly, individuals spend nearly two-thirds of their waking hours at work, which makes the workplace a viable location to target specific unhealthy behaviours (World Health Organization, 2013). Recently there has been an increased interest in the development of workplace health promotion programs which target nurses’ diet and physical activity behaviours. However, two systematic reviews on this topic
reported mixed results for improvements in the nurses’ diet and physical activity behaviours (Chan & Perry, 2012; Torquati, Pavę, Kolbe-Alexander, & Leveritt, 2015).

The use of an appropriate theoretical framework to examine diet and physical activity enables an exploration of the factors which may influence these lifestyle behaviours. The socio-ecological model (SEM) consists of five distinct domains: the individual, interpersonal, community, organisational and policy (McLeroy, Bibeau, Steckler, & Glanz, 1988). The SEM was selected for this study as it examines how social, cultural, physical and environmental factors interact to influence an individual’s health behaviours and enables the development of potential strategies to improve these behaviours (McLeroy et al., 1988).

Despite the extensive literature on the health status and behaviours of nurses and the development of workplace health promotion programs for nurses (Lavoie-Tremblay et al., 2014; Perry et al., 2018; Torquati, Kolbe-Alexander, Pavę, & Leveritt, 2018; Zapka, Lemon, Magner, & Hale, 2009), little is known about the diet and physical activity behaviours and attitudes towards these of new graduates. This study used the SEM to explore the barriers and enablers which influence the health behaviours of new graduates, and their attitudes towards workplace health promotion programs at a pivotal time in their careers.

2. Methods

2.1 Design

This study used a qualitative design with semi-structured interviews informed by the SEM (McLeroy et al., 1988) to gather information regarding the barriers and enablers for new
graduates in the selection of healthy food and participation in physical activity during their first year of clinical practice. The interviews asked questions about workplace health promotion programs for new nurses which targeted diet and physical activity, and about any potential barriers or enablers to participation in workplace health promotion programs and preferred communication strategies.

2.2 Sampling and Participants

Researchers identified potential participants through their networks. Snowball sampling was used to recruit additional participants from current participants’ peer networks. Snowball sampling commences with network linkages which then lead to recruitment from participants until a target sample has been attained (Heckathorn & Cameron, 2017). Due to the diverse work locations of participants, some of whom were enrolled in new graduate transition programs, snowball sampling was appropriate. Snowball sampling occurred concurrently with data collection and preliminary analysis and ceased when no new themes or information were observed.

The sample comprised new graduate registered nurses (RN) and enrolled nurses (EN [equivalent to licensed practical nurse, licensed vocational nurse or Division 2 nurse]). Registered nurses in Australia have a bachelor's degree qualification, while enrolled nurses have diploma level qualifications. New graduate registered and enrolled nurses work collaboratively under the supervision of an experienced registered nurse. Study inclusion criteria were less than 12 months' clinical experience post-qualification, currently employed as an RN or EN and working a rotating roster, which comprises any combination of morning shifts, evening shifts and night duty as this is the most common work pattern for new
graduate nurses. Participation was voluntary, and participants provided their mobile number to the first author who contacted them via SMS to arrange a suitable time to conduct the interview. A participant information sheet and consent form were sent via email before the interview. After the interview, participants were asked if their colleagues would be interested in being interviewed. Those potential participants who agreed to be interviewed after being asked by their colleagues then initiated contact with the first author via SMS.

2.3 Research Team

The research team consisted of experienced registered nurses who work in academic setting. New graduate nurses work in the clinical environment and we wanted to understand their challenges to healthy eating and engagement in physical activity as formative research toward developing an intervention.

2.4 Data Collection

The semi-structured interview protocol consisted of 24 open-ended questions informed by the SEM. A typical question from each domain is presented in Table 1. The literature and the SEM informed the interview guide (Malik et al., 2011; McLeroy et al., 1988; Torquati, Kolbe-Alexander, Pavely, Persson, & Leveritt, 2016; Zapka et al., 2009); it was developed by the first author and reviewed by the second and fourth authors. The interview guide was piloted with a small group of new graduate nurses. After the piloting the interview guide, no changes were made. Data were collected between November 2016 and January 2017. Interviews lasted between 15 and 30 minutes and were conducted via telephone or face to face at a time and location convenient for the participants. All interviews were audio-recorded by the first author with participants' permission.
2.5 Data Analysis

The interviews were transcribed verbatim by the first author. Transcripts were de-identified and checked for completeness against the audio recordings. Verbal hesitations, such as 'um' or 'ah' were removed. The data were organised and analysed thematically using the approach outlined by Braun and Clarke (2006). Codes were generated by the first author to identify potential patterns. These were then developed into themes by the first and fourth author. The themes and key findings were mapped to the different domains of the SEM (Table 2). Participant quotes were independently chosen by the first and fourth authors and then included based on consensus to illustrate themes. Quotes from 12 of the 24 participants are included in this paper.

2.6 Ethics

The study was approved by the University of Technology Sydney Human Research Ethics Committee (reference number ETH 16-0686). Ethical standards for this study were upheld following the National Statement on Ethical Conduct in Human Research (National Health Medical Research Council, 2007). Each participant was informed of the aims of the study and supplied written consent. The de-identification of participants ensured confidentiality during data entry into a secure electronic database.

3. Findings
The sample consisted of 24 new graduates with a median age of 25 years. The majority (n=21) were completing a new graduate program. Participants interviewed were employed at either a public or private hospital, in New South Wales, Australia; one participant completed part of their graduate year at a rural hospital. Demographics of participants are presented in Table 2. Workplace departments included acute surgical care, intensive care unit, operating theatres, aged care, IVF clinic, day surgery and a drug and alcohol unit. Four themes developed from the analysis, time, shift work, work environment and work culture; the themes were mapped to the SEM (Figure 1).

3.1 Time

A lack of time reduced the capability of new graduates to purchase, prepare and consume healthy foods within and outside the workplace. It also reduced engagement in regular physical activity.

3.1.1 Time as a barrier to healthy eating behaviour

New graduates are required to adapt to the demands of full-time work at a time when many are living independently for the first time. The majority of participants stated that there was not enough time and they discussed the difficulty in finding time after work and on days off to purchase and prepare healthy meals. As a result, they often consumed foods that required minimal preparation such as pre-prepared meals and takeaways, which are usually higher in salts, fats and sugars.

“You’re so tired and run down its really hard to find the energy to make yourself something when you can just grab something from the fridge and put it in the microwave” (P5, RN, 28).
“The cost definitely, I’ve moved out of home at the beginning of my grad (year) and I’ve found it difficult to prioritise money on things like food” (P11, RN, 22).

Unplanned overtime and quick changeover time between shifts further reduced the amount of time available to purchase and prepare healthy meals. Unplanned overtime was associated with high levels of fatigue, which reduced their motivation to cook healthy food and led to the consumption of quick and unhealthy foods. Quick changeover time between shifts left little time to plan and prepare lunches to bring to work the following day meaning that participants were reliant on the food available at the workplace. In contrast, a few participants outlined how positive family role modelling and high internal motivation enabled them to prepare healthy meals for consumption at work.

“…I feel like I never have the time to prepare my own meals, I can come home at 10 pm and it’s like well I have to get up at 430 am, I am too tired and all I want to do is sleep so I just don’t really have the time” (P13, RN, 21).

“My dad always made me eat lots of fruits, so I still enjoy eating fruits and vegetables. I aim to bring fruit to work with me” (P3, 22, RN).

“I eat lots of fruit and vegetables so I will literally bring carrots for morning tea and at lunch I always have an apple” (P6, RN, 22).

A lack of time to have an adequate meal break also influenced the eating behaviours of participants. They described eating on the run as they felt there was no time to take a meal
Decisions about the type of food purchased and consumption were informed by what was quick or convenient, not nutritional content, which further increased their consumption of unhealthy foods.

“It is honestly just a grab and go situation literally just whatever I can get quickly and have a quick break I just want to like eat… I'm just too exhausted to think of the healthy options I just get whatever is quickly available at the time” (P11, RN, 22).

3.1.2 Time as a barrier to engagement in regular physical activity

Similarly, a lack of time also influenced engagement in physical activity, with participants preferring to spend their limited free time sleeping or with friends rather than being physically active. The lack of engagement occurred despite their awareness of the health benefits associated with regular physical activity.

“Honestly I don’t have any time and when I do have time, I want to be at home spending it with my family and I don’t want to be out doing exercise when I’m already wrecked from the day anyway” (P10, 24, EN).

“When I’m on three (12hr) shifts in a row I won’t do any exercise throughout that time because the whole day is taken up with work and I find it hard to do things on my days off as well, exercise wise. I just don’t want to waste my time on my day off doing physical stuff like going to the gym” (P11, 22 RN).
Alternatively, others discussed how an understanding of the health benefits of physical activity increased their motivation to overcome feelings of fatigue and participate in physical activity.

“Going to the gym technically helps you relieve your stress…even though I’m tired it keeps me going because sometimes you need to release all that energy, that stress, and it keeps you healthy” (P7, 22, RN).

3.2 Shift Work

Inconsistent rosters and changes to allocated shifts or unplanned overtime were associated with an inability to prepare healthy meals and reduced engagement in regular physical activity.

3.2.1 Shift work as a barrier and enabler to healthy eating behaviours

The participants discussed how shift work had impacted on their eating behaviours, including meal skipping, using food as a reward and eating to combat fatigue. Meal skipping was frequently associated with the allocation of an AM (0630 start). They discussed how they had difficulty consuming food very early in the morning, and they would not eat breakfast. By lunchtime, they were starving and would consume a large amount of unhealthy food. Meal skipping also increased snacking behaviours during a shift. Participants reported that they frequently used snacking as a strategy to maintain energy to get them through the shift.

Alternatively, PM shifts (1300 start), were associated with an increased ability to not only consume breakfast but also prepare healthy meals for consumption at work. Moreover, some
participants discussed that despite working a rotating roster, their eating behaviours had
improved, as they were no longer juggling part-time employment, study and clinical
placements.

“I find that I am leaving so early that I don’t want to eat anything but then by the time it’s my
break I just want something really sugary” (P11, 22 RN).

“The way shift work is also because of the snacks and food that are always around…I’ll go
for hours and hours without eating and then someone puts sugar in front of me I just eat it I’m
so hungry” (P19, 22, RN).

Participants described eating unhealthy food as a reward because for a difficult shift or
completing night duty. The types of food consumed included sweets and high-fat foods. Food
was also described as “real” or “unhealthy” by new graduates. The participants contrasted
real food (homemade meals or fresh food purchased from supermarkets) with unhealthy food
(takeaway or discretionary food such as chocolates and chips). They suggested that if they
brought real food from home they would probably eat better, but that takeaway food was the
convenient alternative.

“Starting work and the difficulty I found is I tend to go for the quick ones, easy to prepare
(foods) like noodles or sometimes I just go to Maccas (McDonalds) to grab something but it’s
not very healthy” (P17, 29, RN) Sometimes I feel like if I have worked very hard or come off
night shift, I will have Weetbix (a breakfast cereal) and milk with Nutella (a chocolate and
hazelnut spread) because I deserve this I have had a hard shift” (P20, 21, RN).
Fatigue associated with shift work also influenced participants eating behaviours. High levels of fatigue reduced their motivation and energy to prepare healthy meals after work and resulted in increased consumption of takeaways to satisfy hunger.

“I work 12-hour shifts, so it has a massive impact. My diet has definitely been really bad this year. Going home at 8 p.m., sometimes it's easier to get something take away or go through a drive-thru or something like that so yeah definitely been a massive issue for me.” (P6, RN, 22).

“I could be more proactive in preparing healthier food but it’s just the tiredness from shift work, there is a big jump between being a student and then having to work AM and PM shifts 5-6 days per week” (P20, 22, RN).

3.2.1 Shift work as a barrier and enabler to physical activity behaviours

Shift work impacted on the engagement in regular physical activity. Participants reported that rotating rosters reduced their ability to engage in individual and group activities or team sports as they were unsure if they would be required to work. Similarly, sudden changes to shifts or unplanned overtime further reduced their ability to participate in physical activity which further undermined motivation. Additionally, participants discussed that a lack of support from front-line nurse unit managers was a barrier to participation in team sports, as some NUMS stated they should focus on the needs of the department. However, others found that a rotating roster increased their ability to engage in physical activity because they could go to the gym outside of peak times.
“At the gym there are set class time and with changing shifts that was hard because it was often too early to make the early class or I finished too late to make the late class” (P18, 26, RN).

“It’s so hard with the shift work, it’s really hard to go to training every week because your shifts aren’t the same every week it really annoying especially when you are trying to go to training and to games…so I can’t go because my shifts are all over the shop that makes it difficult” (P19, RN, 22).

"Flexibility in shifts and people - the management - encouraging team sports, encouraging a work-life balance outside of work instead of just nursing” (P2, RN, 23).

3.3. Work Culture

The frequent availability of food at the nurses’ station and the culture of eating on night duty increased the consumption of discretionary foods by new graduates.

3.3.1 Work culture as a barrier to healthy eating

Work culture influenced the eating behaviours of participants, who discussed that eating discretionary food was an integral part of their routine. They described how a desire to “fit in” and be accepted by the team, led to overconsumption because everyone was indulging, and they “didn’t want to be the odd one out.” Further, experienced nurses influenced participants encouraging them to consume more food at celebrations and afternoon teas. They also discussed the frequent availability of food at the nurses’ station led to mindless eating.
Bringing unhealthy food to eat on night duty further increased consumption of unhealthy foods as it was a social activity to sit and eat all night, helping them to get through the night shift.

"Oh, it's just chips. You are walking past the nurses' station, and it's like if there are chips and you're eating them because they are there" (P7, RN, 22).

"It does become a group activity to all sit around and eat food, and I guess on night shift too you know people usually bring things, or everyone brings something, and you are sitting around eating Tim Tams [a brand of chocolate biscuits] or cake at 2 am. It's just ridiculous, but everyone else is doing it, so you're just like 'yeah sure and I have to find something to keep me awake' so you find a way to justify it" (P6, RN, 22).

Others discussed how their department changed the eating culture to be more focused on healthy foods. This change was associated with nursing leadership and highlighted how experienced nurses might positively influence new graduates.

“Our NUM is quite a fit person and if she bakes its healthy things and we don’t bring in food like the other pods (who) bring in chips…. we are all healthy eating so instead of the usual night shift snacks we are bringing in carrot and celery and things like that” (P8, RN, 23).

3.3.2 Work culture as a barrier and enabler for physical activity

Work culture also influenced the physical activity behaviours. Participants discussed that the expectation to work long hours diminished their energy for physical activity after work or on...
days off. Others discussed how internal factors rather than the work culture influenced their continued engagement in physical activity, citing high internal motivation and a desire to ‘still fit into the same size scrubs’ (P22, EN, 31)

“Because of the culture of that we usually work long hours. It has an impact because you won’t have time for your physical activity” (P15, RN, 29).

“I definitely do it for myself not for them, I’m not influenced by them (work colleagues) in anyway” (P19, RN, 22).

### 3.4 Work environment

The frequent or limited availability of healthy food options in the work environment encouraged the consumption of unhealthy food choices.

#### 3.3.1 Work environment as a barrier to healthy eating

The availability of food within the work environment directly influenced eating behaviour. Long distances to retail food outlets limited the participants’ ability to purchase and consume healthy foods which led to reliance on vending machines as a quick source of food. However, the majority of vending machines contained unhealthy foods, and when healthy foods were available, the cost was substantially higher. Similarly, the majority of food available at retail food outlets was unhealthy. It included options such as “Indian curries, roast vegetables and roast beef, bacon and eggs, croissants at breakfast time.” When healthier options were
available, the higher cost and appearance of the food were not appealing, such as salads covered in oily dressings which reduced participants’ inclination to purchase them.

“Just not enough time to prepare or think about the healthier choice. I’m pretty much eating out of the vending machine” (P14, EN, 26).

The absence of tea or staff rooms influenced eating behaviour, as there was no appropriate facility to store healthy meals, further increasing participants’ usage of retail food outlets and vending machines.

“We don't actually have a tea room or a lunchroom at work, so it is difficult to organise things to take things with you…you could bring leftovers from the night before, but you don’t really have anywhere to go to heat it up” (P22, EN, 31).

3.5 Workplace health promotion and new graduate nurses

The majority of participants agreed that they would actively engage with workplace health promotion programs if offered, although six participants requested more information before committing. None said they would not take part. Factors that would encourage participation included programs which were fun, conveniently located, low-cost, involved team building and had organisational support. However, participants discussed cost, time constraints and rosters changes are potential barriers to participation.

“I think it’s a good idea to start having organisations implement it (workplace health promotion) as part of orientation… because if we start to change the culture now with new grads, we can have healthier nurses for the future” (P15, RN, 29).
4. Discussion

This study explored the barriers and enablers which influence new graduates’ eating and physical activity behaviours during their first year of clinical practice and their attitudes towards workplace health promotion programs. Using the socio-ecological model, the researchers made connections between individuals’ experiences as new graduates, and how the work community and wider organisation impacted on their decision making and health behaviours. Time influenced the eating and physical activity behaviours at an individual level. Consumption of discretionary foods was influenced by interpersonal and community (cultural) factors, with role modelling of this behaviour by experienced nurses. The degree of managerial support at an organisational level influenced engagement in physical activity. Finally, long distances to food outlets and lack of appropriate staff tearooms influenced eating behaviours at an organisational and policy level.

A lack of time before or after a shift, limited free time on days off and quick changeover shifts were barriers to healthy eating. Participants experienced diminished capacity to plan, purchase and prepare healthy meals resulting in higher consumption of unhealthy food. Engagement in physical activity was similarly impacted; limited free time was spent sleeping or socialising rather than going to the gym. The findings of this study are consistent with previous research (Phiri, Draper, Lambert, & Kolbe-Alexander, 2014; Power, Kiezebrink, Allan, & Campbell, 2017; Torquati et al., 2016), that a lack of time negatively influenced the diet and physical activity behaviours of nurses.

Shift work has been linked with low participation in physical activity among nurses (Caruso, 2014; Nea, Kearney, Livingstone, Pourshahidi, & Corish, 2015). This is also evident among new graduate nurses. Inconsistent rosters, sudden shift changes and unplanned overtime were
all barriers to engagement in physical activity as participants were unable to attend group
fitness or team training or regular games. The lack of managerial support undermined
motivation to attend training for games which led to poor engagement in regular physical
activity despite its known health benefits.

Skipping meals by new graduates was closely related to shift allocation with breakfast the
most frequently missed meal. They also missed lunch and dinner due to inadequate meal
breaks at work. This finding is supported by O’Brien et al. (2020); Shafi, Arif, and Nasir
(2020), who reported meal skipping among nurses was associated with working long hours
and rotating rosters. In contrast, Gifkins et al. (2018) discussed that more experienced nurses
reported that they skipped meals after encouraging inexperienced nurses to take breaks. Other
reasons cited were that being in senior positions or being a team leader increased the
difficulty to take a break (Gifkins et al. 2018).

The limited availability of healthy options at food outlets and from vending machines was a
barrier to the consumption of healthy food at the workplace. Participants discussed the higher
cost of healthier food, and its unappetising appearance such as salads covered in an oily or
creamy dressing not only reduced their motivation to consume healthy foods. It also limited
their opportunity because salads were no longer a healthy option as the dressings used were
high in calories, sodium, sugar, and saturated fats. Higher cost of healthier food reduced
their motivation to select healthy foods. Power et al. (2017) support this finding stating that
the limited food availability after hours increased consumption of high-calorie foods.

Furthermore, Pechey, Jenkins, Cartwright, and Marteau (2019) reported increased availability
of healthy food in vending machines may reduce consumption of discretionary foods.
Mindless eating of discretionary food available at the nurses’ station was another barrier identified by participants who discussed the regular availability of treats led to overconsumption of chocolates and chips during a shift. Additionally, snacking behaviours during night duty also increased consumption of unhealthy foods. They discussed how role-modelling of snacking behaviours by experienced nurses reinforced this behaviour, and it was part of the workplace culture. This finding is supported by Torquati et al. (2016) and Horton Dias and Dawson (2020) and Wong, Wong, Wong, and Lee (2010) who discussed that the presence of treats at nurses’ stations led to increased consumption and is a barrier to healthy eating behaviours.

Fatigue associated with shiftwork is another barrier to both healthy eating and physical activity. High levels of fatigue reduced participants’ motivation to prepare and consume healthy foods, preferring quick and convenient options. Fatigue also reduced energy levels and resulted in decreased participation in physical activity. This finding is supported by Nea et al. (2015), who found that fatigue is a universal barrier for healthy lifestyle behaviours such as healthy eating and participation in regular physical activity.

The lack of appropriate space to store and prepare food was an infrastructure barrier that limited participants’ ability to consume healthy food at work. A recent study of Queensland paramedics who work similar rotating rosters to nurses reported that reduced access to a dedicated staff space led to altered eating behaviours with paramedics bringing food from home or purchasing foods that required no preparation (Anstey, Tweedie, & Lord, 2016).
The poor health behaviours reported by participants are representative of the overall health behaviours of nurses. A study of NSW nurses found that 10.8% of respondents consumed the recommended serves of vegetables, while only 5.6% of the youngest group (18-24 years) did so. The youngest nurses reported lower consumption of core foods (like fruit) than the overall group (42.4% versus 50.7%) and higher consumption of junk food and sugar-sweetened drinks (Perry, Gallagher, & Duffield, 2015). These findings are consistent with the results of this study, as participants reported regularly consuming foods, which are high in calories and low in nutritional value. Furthermore, the eating habits of young adults such as this study sample have been well described by Hebden, Chey, and Allman-Farinelli (2012); Kimmons, Gillespie, Seymour, Serdula, and Blanck (2009); Larson, Neumark-Sztainer, Laska, and Story (2011).

Recent evidence suggests that nurses are meeting the recommended physical activity levels during regular work hours (Chappel, Verswijveren, Aisbett, Considine, & Ridgers, 2017). This finding was supported by study participants who reported they are busy at work and consider this as meeting their physical activity requirements. However, an Australian study found that nurses who identify as being 'busy-at-work' have a higher body mass index (Henwood, Tuckett, & Turner, 2012). They are also more prone to sick leave and have poor sleep-rest experiences due to inadequate physical activity during non-rostered workdays (Henwood, Tuckett, & Turner, 2012).

Workplace health promotion programs which target diet and physical activity behaviours may be an effective strategy to improve nurses’ lifestyle behaviours. A systematic review by Torquati et al. (2015) included nine studies which examined programs which targeted nurses' diet and physical activity behaviours. Improvements to diet and physical activity behaviours were reported. However, the overall evidence is inconsistent due to the heterogeneity of study
designs and outcome measures used (Torquati et al., 2015). Despite the inconsistent
evidence, workplace programs which target nurses’ diet and physical activity behaviours
have the potential to improve the health behaviours of this cohort.

Participants reported they would actively embrace workplace health promotion programs.
Motivation to participate was influenced by social inclusion with peers and rosters that
enabled active participation. Similar findings are reported elsewhere, confirming that support
from management is an important element for a successful health promotion program
(Bardus, Blake, Lloyd, & Suggs, 2014; Loitz, Potter, Walker, McLeod, & Johnston, 2015).

Strengths and Limitations
This study’s strengths include its focus on an under-studied group of nurses – new graduates
who are at the start of their nursing careers and whose personal and professional habits are
being formed. The use of semi-structured interviews permitted insights into the barriers and
enablers which affect the daily routines of this specific cohort. The utilisation of the SEM to
guide data collection and analysis facilitated an exploration of the multi-faceted influences on
health behaviour, beyond the individual level of behaviour and decision-making. The study's
limitations include its small scale and the use of snowball sampling rather than purposeful
sampling. Researchers were reliant on their networks and then on making contact through
previous interviewees (snowballing). The use of snowball sampling may have led to personal
or social similarities between participants, which may limit the generalisability of the results.
The sample was limited to young adults aged between 21 and 35 years. However, there was
some diversity in the characteristics of the sample and where they worked. New graduate
nurses, while predominantly young adults are not exclusively so. Some are mature-aged
students or enrolled nurses who have undertaken an undergraduate nursing degree. These
individuals are joining the profession with different life experiences and health promotion needs than those who studied nursing as school-leavers. Despite these limitations, this study has furthered the research into the barriers and enablers experienced by nurses concerning healthy eating and physical activity.

Conclusions

The inherent barriers within the work environment and its culture in combination with individual factors acted as barriers to new graduates forming healthy eating and physical activity behaviours at career commencement. Personal motivation and positive family role models were associated with healthy lifestyle behaviours. However, if the identified barriers experienced by participants are not addressed, future new graduates may continue to develop or reinforce unhealthy dietary and physical activity behaviours. This may lead to reduced workforce supply, an inability to meet the increased healthcare demands of an ageing community, early attrition and reduced productivity. Therefore, the development of a specific workplace health promotion program for new graduates may assist them in navigating the numerous barriers they face as they commence their nursing careers.

List of abbreviations

EN- Enrolled Nurse
NUM- Nurse Unit Manager
RN- Registered Nurse
SEM- Socio-ecological model
SMS- Short Messaging Service
Authors' contributions

The first author conducted interviews. The first and fourth author analysed the data. All authors were major contributors in writing the manuscript. All authors read and approved the final manuscript.

Acknowledgements

The authors thank the new graduates who participated in the study and helped contribute to the sample.

This research is supported by an Australian Government Research Training Program Scholarship.

Funding

This study was funded by a University of Technology Sydney Health Futures Grant.
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### Table 1. Sample Interview Questions by Domain

<table>
<thead>
<tr>
<th>Socio-ecological Model Domain</th>
<th>Interview Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Do you feel that your diet or level of physical activity has changed since you were a student? Could you describe how it has changed?</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>Since starting work, what are some of the challenges you have found in selecting healthy foods and beverages?</td>
</tr>
<tr>
<td>Community</td>
<td>Do you feel that your food/beverage choices are influenced by your colleagues or work culture?</td>
</tr>
<tr>
<td>Organisational</td>
<td>What type of support could the work community provide to enable you to participate in regular physical activity?</td>
</tr>
<tr>
<td>Policy</td>
<td>Do you think your employer has a role in helping you maintain (develop) healthy eating habits?</td>
</tr>
</tbody>
</table>
Table 2. Participant Demographics

<table>
<thead>
<tr>
<th>Category</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td>21</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-24</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>25-29</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>30-35</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Designation</td>
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<td></td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Enrolled Nurse</td>
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<td></td>
</tr>
<tr>
<td>New graduate program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Enrolled Nurse</td>
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<td></td>
</tr>
<tr>
<td>No new graduate program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registered Nurse</td>
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<td></td>
</tr>
<tr>
<td>Enrolled Nurse</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public hospital</td>
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<td></td>
</tr>
<tr>
<td>Private hospital</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Clinic /Age care facility</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total participants</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1. The Social Ecological Model (left side) and Interview Themes (right side) Adapted from McLeroy, Bibeau, Steckler, & Glanz (1988).