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Original Research

Health habits of medical students during operating room rotations

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ABSTRACT

Purpose: Healthy lifestyle habits have been linked with enhanced learning during medical school, motivating some schools to institute healthy self-care programs for students. This study examined the health habits of medical students in the USA and Canada during operating room rotations and compared the results with recommended health guidelines. **Methods:** The authors created a survey examining markers of a healthy lifestyle. The questions were derived from scientific guidelines and pertained to getting adequate amounts of exercise and sleep, and abstaining from excessive consumption of junk food, caffeine, and alcohol. Several sociodemographic predictors of compliance with health habits were examined using logistic regression. **Results:** A total of 543 students completed the survey. The proportions of students meeting recommended health guidelines for each health habit were as follows: Alcohol (79.2%), caffeine (51.3%), food (47.6%), sleep (38.2%), and exercise (18.6%). The proportion of students meeting all health guidelines concurrently was 4.1% and the proportion meeting none was 4.8%. Men had a lower risk of not meeting the majority of the health guidelines (odds ratio [OR] = 0.66, $P = 0.018$) and older students (OR = 2.17, $P = 0.012$) were at a higher risk. **Conclusions:** The vast majority of the medical students surveyed were not in compliance with healthy lifestyle guidelines during operating room rotations. This research supports the need for healthy self-care programs for medical students and specifically draws attention to the importance of physical activity.

KEY WORDS: Alcohol, caffeine, diet, exercise, health habits, medical student, sleep

INTRODUCTION

Medical school education is highly demanding and often results in high rates of personal stress [1-4]. The demands of a medical school education have raised the interest of researchers looking into how medical students respond to such demands [5]. Several harmful behavioral responses to the stresses of medical school have been identified, including a lack of sleep, increased substance abuse, and social isolation [6]. Increased levels of student stress have also been associated with reduced academic performance and professionalism during medical school [7-10]. Existing research examining the health habits of medical students structured around health guidelines is dated and was done in schools outside of Canada and the USA making its relevance to contemporary Canadian and American medical school education uncertain [11]. Research has shown that healthy lifestyle programs are well received by students and are effective in improving health and well-being [12,13]. However, there has been a slow and uneven introduction of these programs at North American medical schools [14].

For these programs to be maximally successful, they should be based on research about the specific health challenges that the students encounter. Previous studies have shown that many indicators of student health decline as they enter medical school [15]. It is not clear, however, whether these declines are large enough to make students noncompliant with established guidelines for healthy living. These provide benchmarks for determining if a behavior places an individual at risk of increased morbidity, and in the case of medical students, increased stress and reduced performance [7-10].

The purpose of this study was, therefore, to determine the proportion of medical students in Canada and the USA that are meeting recommended health guidelines during operating room rotations. The results will then be used to identify specific areas of concern and make recommendations where possible.

METHODS

We selected several lifestyle factors to study, which included exercise, sleep, diet, caffeine consumption, and alcohol consumption. These factors were chosen because public health organizations identify them as risk factors for the most common chronic diseases (i.e., cancer, cardiovascular disease, diabetes, and chronic respiratory diseases) [16]. Evidence that each lifestyle factor was being optimized for health was indicated through compliance with a guideline for healthy living related to this factor. Sources for these guidelines came from a number of respected health organizations. The organizations and their associated guidelines are listed in Table 1.

This was a substudy of a larger study examining disruptive behavior in the perioperative setting. The survey received

Table 1: Guidelines for healthy living

Lifestyle factor	Recommended guideline	Our threshold for adequate compliance	Guideline source
Exercise	Get>150 min of moderate aerobic activity per week; and engage in bone and muscle strengthening exercise twice per week	Frequently	CSEP, Canadian Physical Activity Guidelines 2012 [17]
Junk Food	Limit consumption of junk food (high fat, high sugar, high sodium foods)	Frequently	Health Canada, Canada's Food Guide 2011 [18]
Sleep	Get enough sleep to function properly and feel rested during the day	Frequently	Canadian Sleep Society, Normal Sleep and Sleep Hygiene 2004 [19]
Alcohol	Binge drink alcohol (>5 drinks [men] or>4 drinks [women] in a 2 h period)	Very rarely	National Institute of Alcohol Abuse and Alcoholism, NIAAA Council Approves Definition of Binge Drinking 2004 [20]
Caffeine	Consume>400 mg caffeine/day (<1 16oz coffee)	Rarely	Dieticians of Canada, What is caffeine? Is it bad for my health? 2013 [21]

CSEP: Canadian Society for Exercise Physiology

research ethics board approval. It was distributed to medical students in their 3rd and 4th years of medical school at institutions in Canada and the USA, in the years 2013 and 2014. In Canada, it was distributed by the Canadian Federation of Medical Students to the students at eight medical schools. In the USA, it was distributed locally at the medical schools from the University of Michigan and the Washington University in St. Louis. These two schools were selected out of convenience, due to access that was provided by several of the research group members. The survey (Appendix 1) used a Likert scale to measure a series of health guideline questions. Respondents were asked to report on how frequently they met the specific health guidelines during their most recent surgical rotation. Over a period, people vary in whether they comply with a guideline. It was, therefore, necessary to set a threshold for how often an individual would need to follow a guideline in order for them to be considered to be compliant with that guideline. While the guidelines themselves recommend compliance all of the time, we recognize that even the most health conscious individuals may deviate from a guideline occasionally. Therefore, we defaulted to using "frequently" as a threshold for positive behaviors, and "rarely" for negative behaviors. The only exception to this was with binge drinking, where a single instance of the behavior was thought to have greater acute consequences to well-being and performance.

Statistical analysis was done using SPSS (version 23, SPSS Inc., Chicago, USA). The proportions of students meeting the health guidelines individually and concurrently on at least a frequent basis were determined. Confidence limits for the proportions were calculated using the binomial method (Clopper-Pearson).

We used a logistic regression model to identify the demographic predictors of being especially noncompliant with health guidelines (i.e., not meeting the majority of guidelines). Candidate predictors included country, sex, age, and minority status.

To test for a possible sampling bias resulting from low response rates we conducted a wave and institutional analysis. The wave analysis places all individuals in the sampling frame on a continuum based on the time it takes them to complete the survey. If bias is present, the primary outcome should be either positively or negatively associated with the time it takes to respond to the survey. By extrapolation, if a bias is present, the nonresponders should also have different scores from the responders. The institution analysis analyzed response rates by institution to determine if institutions with a greater response rate had significantly different health habits than institutions with lower response rates. This would indicate if responders had different health habits than nonresponders.

RESULTS

A total of 543 students completed the survey [Table 2].

The overall response rate was 20%. The wave analysis revealed that there was no statistically significant correlation between time to respond and health habits scores ($P = 0.15$). There was no statistically significant correlation between the response rate by institution and the overall health habit scores at each institution ($P = 0.39$), further indicating a lack of response bias.

The percentage of respondents meeting recommended guidelines for each health habit were calculated [Figure 1].

A total of 22 students (4.1%) concurrently met all health guidelines. Conversely, number of students meeting none of the recommended guidelines was 26 (4.8%). Students were least compliant with the healthy guidelines related to exercise ($P < 0.01$)[Table 3].

Sex and age were both identified as predictors of poor health habits. Male students had a lower risk of not meeting the majority of guidelines (odds ratio [OR] = 0.66, $P = 0.018$), and students above the age of 30 (OR = 2.17, $P = 0.012$) were at a greater risk.

DISCUSSION

In the institutions we examined, 95.9% of medical students were not meeting recommended health guidelines on a frequent basis. Exercise and sleep habits were shown to be the most problematic. At some point a lack of healthy habits will negatively influence performance. Learning has been associated with diet, sleep, and exercise behaviors, with known mechanisms of action [22-25].

Table 2: Respondent demographics

Respondent characteristic	Respondents (%)
Country	
United states	141 (26.0)
Canada	422 (74.0)
Age	
<30	507 (90.0)
>30	56 (10.0)
Sex	
Female	328 (58.3)
Male	235 (41.7)
Visible ethnic and/or cultural minority	
Yes	174 (30.9)
No	389 (69.1)

Table 3: Demographic predictors of poor health habits

Sociodemographic category	B	SE	Wald	Significant	Odds ratio (+95% CI)
Country (USA)	0.23	0.20	1.37	0.242	1.26 (0.85-1.87)
Minority (yes)	−0.20	0.19	1.12	0.291	0.82 (0.57-1.18)
Age (>30)	0.78	0.31	6.31	0.012	2.17 (1.19-3.98)
Sex (males)	−0.41	0.17	5.58	0.018	0.66 (0.47-0.93)
Constant	0.38	0.18	4.57	0.033	

CI: Confidence interval, SE: Standard error

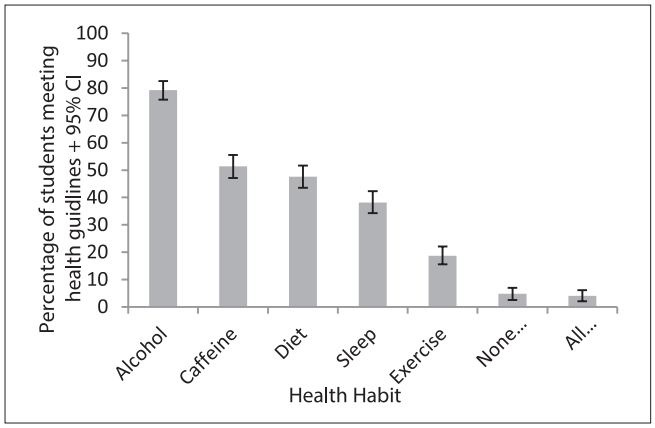

Figure 1: The proportion of students meeting health guidelines

A lack of sleep has also been shown to be associated with an increased incidence of self-perceived medical errors among residents [26]. The stress that is associated with a lack of healthy lifestyle habits is also shown to be associated with a number of negative outcomes, including medical errors, [27] and reduced resilience [28]. The effects of poor health habits also are known to extend beyond medical school into professional practice [29].

There is also an argument to be made that physicians ought to have the best health habits they can because they are educators and role models for the health habits of their patients. Physician with poor health habits may be less effective ambassadors for wellness. Research has shown that the physical activity habits of physicians influence if and how they counsel their patients on the benefits of physical activity [30].

Attention in the literature has been previously focused on the alcohol consumption patterns of medical students [31]. Alcohol use in this study was, however, identified to be the least prevalent health habit problem, though not necessarily the least important. Instead, medical students showed much lower adherence to health guidelines in the domains of sleep and especially exercise.

Our study examined the health habits of medical clerks specifically during OR rotations but given the high temporal stability of health behaviors the results should be generalizable to the entire clerk population. The similar schedules for residents mean that our results may also be applicable to that population as well.

This study had notable limitations. The response rate for this questionnaire was low, possibly leading to some nonresponse bias. The wave and institution analyses both indicate that there is no such bias present. We concede that these efforts will not convince all readers. However, previous research has found that those who do not respond to health related surveys tend to have poorer exercise habits [32]. Surveying nonresponders would, therefore, only reinforce our conclusion that the exercise habits of medical students are poor. This in turn would further support our primary finding that almost none of the students concurrently met all of the guidelines. The use of a self-report survey is also inherently subjective, as it relies on respondents to estimate their health habit compliance, leading to the risk of reporting bias. It is known for example that respondents tend to overestimate their physical activity levels [33] and underestimate their alcohol consumption [34]. Anonymization of the survey was one effort to prevent this bias. If however this bias was present, it would result in a greater number of people not meeting the guidelines. In that case, we would be again be underestimating the magnitude of the problem, making it even more important to address. Another limitation is that we used single measures for each health habit. This means that our outcomes are imperfect indicators of the lifestyle factors that we aimed to measure. However, our summary measure of each lifestyle factor is justified by its basis in consensus expert opinion. Finally, because medical students undergo OR related rotations at different times within our sample, we relied on medical students recalling their health habits during their most recent OR rotations. This may introduce a recall bias.

Medical schools interested in improving student learning should consider the evidence that their medical students, particularly mature women students, may not be living by scientifically recommended guidelines for healthy living. To make progress on reducing student distress and improving academic performance, medical schools may need to take more responsibility for the health habits of their medical students. This is a difficult challenge as leading a healthy lifestyle cannot easily be mandated by medical schools, and there are limited resources available for student wellness programs. Nonetheless, many schools have already begun to institute a diverse array of healthy-lifestyle programs, including mindfulness based stress reduction programs [35]. While these programs may reduce stress and be helpful overall, our results suggest that the basic underlying health habits must also be addressed. Medical schools must move to a new ethics of taking care of medical student well-being, rather than idealizing self-sacrifice

and mental toughness [36]. Medical schools that already have instituted healthy self-care programs should note the especially low exercise and sleep levels among the student population and provide particular support in those areas.

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Appendix 1: The survey

Each of the following was ordinal variables:
1. What country is your medical school in? (Canada and USA)
2. What is your age? (<30, ≥30)
3. What is your sex? (male, female)
4. Are you a member of a visible ethnic and/or cultural minority? (yes, no).

Each of the following questions allowed for seven answers ranging from never, very rarely, rarely, sometimes, often, very often, and always:
1. How often do you consume junk food?
2. How often do you sleep enough to feel well-rested throughout the day?
3. How often do you get >150 min of moderate aerobic activity (e.g., walking fast or vigorous activities) in a week?
4. How often do you engage in binge drinking of alcohol (>5 drinks [men] or >4 drinks [women] in a 2 h period)?

How often do you consume more than 400 mg of caffeine (>1, 16 ounce coffee or energy drink) per day?