Exploring the prevalence and correlates of meeting health behaviour guidelines among university students

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ABSTRACT

OBJECTIVE: To examine the prevalence of students meeting physical activity, diet and smoking health recommendations and to examine the correlates of meeting these guidelines.

METHODS: Randomly selected students at the University of Toronto ($N = 2,812$; female = 71.60%, mean age = 22.11 ± 5.24 years, mean body mass index = 22.80 kg/m^2) completed the National College Health Assessment-II survey in spring of 2013.

RESULTS: Only 0.1% of the sample reported meeting physical activity, diet and non-smoking guidelines. Males were more likely than females to meet physical activity and both physical activity and fruit and vegetable guidelines ($\chi^2 [1, 2812] = 7.33, p < 0.05$). Women were more likely than men to be non-smokers ($\chi^2 [1, 2812] = 7.80, p < 0.05$). Being overweight was associated with meeting physical activity guidelines. Being a healthy weight was associated with meeting both physical activity and fruit and vegetable guidelines ($\chi^2 [1, 2812] = 6.29, p < 0.05$). Underweight participants were more likely to be non-smokers ($\chi^2 [2, 2812] = 6.36, p < 0.05$). In the logistic regression, being Caucasian and male and trying to change weight were correlated with meeting moderate-to-vigorous physical activity and strength training guidelines. Being older, Caucasian and trying to change weight were correlates of consuming greater than five fruits and vegetables per day. Being Caucasian, female, and trying to change weight were correlates of being a non-smoker.

CONCLUSION: University health promotion programs should be targeted to specific age, ethnicity and weight status groups, as there are distinct differences among those not meeting physical activity, diet and non-smoking guidelines.

KEY WORDS: Young adults; exercise; dietary guidelines; body mass index; sex

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The university student population is of particular public health interest given the physical, emotional and social developmental changes that are experienced at this time.¹ This is also a time characterized by elevated rates of health risk behaviours, such as unhealthy weight control, decreased physical activity participation and increased substance use.²

The most dramatic declines in physical activity across the life span occur during the transition from late adolescence to early adulthood and have been shown to persist into adulthood.³ Furthermore, only 22% of university students have been shown to engage in the recommended 150 mins a week of moderate-to-vigorous physical activity (MVPA).^{4,5} Tucker and colleagues⁶ demonstrated that the prevalence of individuals meeting these aerobic guidelines of 150 mins per week varied as a function of weight status. Specifically, individuals who were a healthy weight and overweight were among the most active compared with obese individuals.⁶ Often overlooked in practice, the Canadian physical activity guidelines also suggest engaging in eight to ten strength training exercises on at least two days per week.^{5,7} Few researchers have examined the prevalence and correlates of university students meeting these guidelines. There is also a need to address physical activity declines in the university student population given the evidence that initiation of diseases related to physical inactivity, such as obesity, diabetes and atherosclerosis, begin to develop as early as in the second decade of life.^{2,8}

Dietary patterns established during university are likely to be maintained in adulthood.⁹ A poor diet during university years, which is often characterized as low fruit and vegetable consumption, has been shown to result in diet-related chronic diseases.¹⁰ Fruit and vegetable consumption has been demonstrated to decline at age 20, around the age that many Canadian youth are attending university.¹¹ In addition, fruit and vegetable consumption among university students is between two and five servings, which is well below the recommended guidelines of seven to ten servings. Males have consistently been shown to consume fewer fruits and vegetables than women.¹² Although numerous nutrition education programs promote fruit and vegetable consumption, few efforts have targeted university students specifically.¹³

Smoking rates are also of concern in the university student population. According to the Tobacco Use in Canada: Patterns and Trends 2013 report, smoking prevalence rates were highest

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among 25 to 34 year olds (23.8%) and among 20 to 24 year olds (21.5%).¹⁴ Furthermore, smoking prevalence rates are higher among males (19.7%) than females (15%) for both daily and non-daily smokers.¹⁴ Given the smoking prevalence rates in this population, there is a need for university health initiatives to target smoking cessation among students.¹⁵ Guidelines in Canada recommend cutting down on smoking cigarettes, with an ultimate goal of no smoking.¹⁵

The university setting is an opportune context to intervene, since a significant portion of young adults (1 million students in 2011) are enrolled in post-secondary education.⁸ This may also be a critical time during which individuals establish independence and adopt enduring health behaviour patterns.² Given that gender and weight status have strong effects on health behaviours, the purpose of the current research was threefold: 1) to examine the prevalence of university students meeting MVPA, strength training and both MVPA and strength training guidelines, as well as consuming greater than five servings per day of fruits and vegetables and not smoking; 2) to examine gender and weight status differences among students meeting these recommendations; and 3) to assess personal characteristics (age, ethnicity, gender, body mass index [BMI], weight perception and weight action) as correlates of meeting these guidelines.

METHODS

Design and sample

A total of 13,500 students from the University of Toronto, Ontario, were randomly selected to receive an e-mail invitation to participate in the survey. This number of students was selected on the basis of the approximately 20%–25% response rate typically seen in administration of the National College Health Assessment. The sample was stratified to be representative of the proportion of students enrolled in undergraduate and graduate studies at the university. The majority of the students enrolled at the University of Toronto were undergraduate students (72.52%), and 27.48% were graduate students. Of the students enrolled at the university, 57% were female; the mean age of undergraduate and graduate students was 20.9 and 27.5 years respectively; and 20.3% were international students, according to a 2013 university report.¹⁶ Over a span of one month, each potential participant received three similar invitations, which directed him or her to a secure website to complete the self-report survey. As an incentive to complete the questionnaire, participants were entered into a draw to receive prizes. Approval for the research protocol was granted by appropriate research ethics boards.

Data were collected in the spring of 2013 using the National College Health Assessment-II, a national research survey organized by the American College Health Association (ACHA–NCHA II; for further information, see American College Health Association¹⁷). The NCHA-II survey contains items assessing student health behaviours and health status, access to health information, barriers to academic performance and perceived norms across a range of health areas such as tobacco, alcohol and other drug use as well as sexual health.¹⁷ The items from the ACHA–NCHA-II have been evaluated in depth for reliability and validity in a university student sample.^{18,19}

Measures

Demographic Information

Participants provided the following demographic information: age, sex, current residence, ethnicity, relationship status, and year in school.

Weight Status, Perceptions and Action

BMI was determined from self-reported weight (kg) and height (m). Individuals who had a BMI below 18.50 kg/m² were classified as underweight, a BMI between 18.50 and 24.99 kg/m² as a healthy weight and individuals with a BMI over 25 kg/m² were classified as overweight.²⁰ Furthermore, participants were asked to describe their weight. Response options ranged from “very underweight” and “slightly underweight”, which were combined and coded as underweight, “about the right weight”, which was classified as healthy weight and “slightly overweight” and “very overweight”, which were coded as overweight. In addition, participants were asked if they were trying to do any of the following about their weight: I am not trying to do anything about my weight, stay the same weight, lose weight or gain weight. Individuals who responded not trying to do anything about their weight and staying the same weight were coded as not trying to do anything about weight, and those who reported losing or gaining weight were classified as trying to change their weight.

Physical Activity

MVPA participation was assessed using the question: Over the past seven days, how many total minutes of MVPA did you do in at least 10-minute bouts? Individuals who participated in 150 mins a week or more of MVPA were classified as meeting MVPA activity guidelines.⁵ Participation in strength training activity was also assessed, using the question: In the past seven days, how many days did you exercise to strengthen muscles doing eight to ten repetitions? Individuals who engaged in strength training two or more times per week were classified as meeting strength training guidelines.⁵

Nutrition

Fruit and vegetable consumption was assessed using the question: How many servings of fruits and vegetables do you usually have per day? One serving was defined as a medium piece of fruit, half a cup of fresh, frozen or canned fruits or vegetables, three quarters of a cup of fruit or vegetable juice, one cup of salad greens, or one quarter of a cup of dried fruit. Response options were zero servings per day, one to two, three to four, or five or more servings per day. Individuals who reported consuming five or more portions of fruit and vegetables per day were coded as meeting dietary guidelines.¹²

Smoking

The percentage of non-smokers was assessed using the question: Within the last 30 days, on how many days did you use cigarettes? Response options were: never used, have used but not in the last 30 days, 1–2 days, 3–5 days, 6–9 days, 10–19 days, 20–29 days, and used daily; individuals who reported never using and those who had used but not in the previous 30 days were

Table 1. Percentage of individuals meeting guidelines, by sex and weight status ($N = 2,812$)

	MVPA guidelines (%)	Strength training guidelines (%)	MVPA and strength training guidelines (%)	Fruits and vegetables (>5/day) (%)	Non-smokers (%)	MVPA and strength training and fruit and vegetables (%)	Meeting all guidelines (%)
Sex							
Male	18.6	36.4	13	10	86.7	3.8	0.1
Female	10.1	19.9	5.6	10.3	91.1	1.9	0.1
Weight status							
Underweight	5.6	14	3.1	5.2	93.7	0.4	0
Healthy weight	13	24.9	7.9	10.7	89.6	2.8	0.1
Overweight	14.1	29.3	9.4	11.8	88	2.6	0.2

Bold font represents significant relationships ($p \leq 0.05$).

MVPA, moderate-to-vigorous physical activity.

classified as non-smokers (meeting guidelines), the rest were coded as smokers (not meeting guidelines).

Analysis

The data were analyzed using SPSS 22 statistics software. There were very few missing data points: 3.26% for BMI and less than 1.7% for the other study variables. All missing continuous data were addressed by group mean replacement,²¹ and all missing dichotomous variables were deleted. Frequencies were run to determine the percentage of students who met MVPA, strength training, and both MVPA and strength training guidelines; those who consumed five or more servings of fruit and vegetables per day; non-smokers; those meeting physical activity and fruit and vegetable consumption guidelines; and the percentage of students meeting all guidelines according to sex and weight status (see Table 1). Chi-square analysis was used to determine whether there were statistically significant gender and weight status. Logistic regression models were run to examine the correlates of meeting MVPA and strength training guidelines, fruit and vegetable consumption and the guideline to not smoke (see Table 2). All independent variables were entered

simultaneously into block 1 of the regression model for each combination of health behaviours.

RESULTS

The sample consisted of 2,812 respondents, which represents a response rate of 20.8%. This response rate is consistent with the 20.4% to 27.4% response rate described in other university studies that have used the NCHA-II assessment.^{17,19} The mean age of the sample was 22.11 (± 5.24) years, which is similar to the mean age of students enrolled at the university. In total, 12% of the students reported that they were international students, which is lower than the percentage enrolled (20%) according to a 2013 university report.¹⁶ Furthermore, the participants were primarily female (71.1%), which is slightly higher than the university proportion (57% female students). The majority (87%) reported living off campus, identified themselves as Caucasian (61.5%), were not in a relationship (58.7%), reported being in the first year of their undergraduate degree (22.6%) and had a mean BMI of 22.8 kg/m², which is classified as a healthy body weight. The percentage of students trying to lose weight was 52.6% (33.1% males and 52.2% females); 10.5% (22.7% males and 5.1%

Table 2. Logistic regression correlates of meeting guidelines among males and females attending the University of Toronto ($N = 2,812$)

	MVPA and strength training guidelines, OR (95% CI)	Fruits and vegetables OR (95% CI)	Non smokers OR (95% CI)	Meeting all guidelines OR (95% CI)
Age	1.01 (0.98–1.03)	1.05 (1.03–1.07)	0.99 (0.97–1.01)	0.51 (0.19–1.31)
Caucasian	2.34 (1.64–3.24)	2.37 (1.74–3.27)	0.75 (0.57–0.99)	1.34 (0.12–15.02)
Not Caucasian = 1 Caucasian = 2				
Sex	2.48 (1.82–3.3)	0.89 (0.67–1.2)	0.67 (0.50–0.88)	1.43 (0.13–16.37)
Female = 1 Male = 2				
BMI	1.02 (0.98–1.06)	1.03 (0.99–1.07)	0.99 (0.96–1.03)	1.08 (0.86–1.35)
Underweight = 1 Healthy weight = 2 Overweight = 3				
Weight perception	0.82 (0.62–1.09)	0.82 (0.63–1.07)	0.98 (0.76–1.28)	0.70 (0.09–4.21)
Underweight = 1 Healthy weight = 2 Overweight = 3				
Weight action	1.55 (1.14–2.12)	0.69 (0.52–0.90)	0.72 (0.54–0.95)	0.34 (0.03–4.21)
Not trying to change weight = 1 Trying to change weight = 2				

Bold font represents significant relationships ($p \leq 0.05$); variables: 1 is the reference category.

MVPA, moderate-to-physical activity; OR, odds ratio; CI, confidence interval; BMI, body mass index.

females) wanted to gain weight, and 31.6% (44.1% males and 42.7% females) wanted to maintain their weight.

The prevalence of students meeting all guidelines – MVPA and strength training guidelines, consuming five or more servings of fruit and vegetables per day and non-smoking – was 0.1% (see Table 1). Males were significantly ($p < 0.05$) more likely than females to meet MVPA ($X^2 [1, 2812] = 36.70$), strength training ($X^2 [1, 2812] = 80.43$) and both MVPA and strength training guidelines ($X^2 [1, 2812] = 41.7$), as well as these two physical activity measures together with fruit and vegetable guidelines ($X^2 [1, 2812] = 7.33$). Women were significantly ($p < 0.05$) more likely than men to be non-smokers ($X^2 [1, 2812] = 7.8$). Being overweight as compared with a healthy weight or underweight was associated with meeting MVPA ($X^2 [2, 2812] = 14.07$), strength training ($X^2 [2, 2812] = 26.28$) and both MVPA and strength training guidelines ($X^2 [2, 2812] = 11.00$). Being a healthy weight compared with over- or underweight was associated with meeting MVPA, strength training, and fruit and vegetable guidelines ($X^2 [1, 2812] = 6.29$). Being underweight was suggestive of being a non-smoker ($X^2 [2, 2812] = 6.36$). There were no significant differences in sex or weight status among those who met only the fruit and vegetable consumption guidelines or among those who met all guidelines.

The results of the logistic models are presented in Table 2. Identifying as Caucasian and male as well as trying to change weight were correlated with meeting MVPA and strength training guidelines. Being older, identifying as Caucasian and trying to change weight were correlates of consuming greater than five fruit and vegetables per day. Identifying as Caucasian and female as well as trying to change weight were correlates of being a non-smoker. Given that the prevalence of meeting all guidelines was so low (0.1%), we were unable to examine the correlates of meeting all guidelines.

DISCUSSION

The purpose of the study was to examine the prevalence among students of meeting MVPA, strength training and both MVPA and strength training guidelines, as well as consuming greater than five servings per day of fruits and vegetables and not smoking; as well, differences in sex and weight status in meeting these recommendations were investigated. A subsequent aim was to assess common personal characteristics as correlates of meeting the guidelines. This study demonstrated that there are differences in sex and weight status among individuals who meet physical activity, dietary and smoking guidelines. In addition, there are various correlates of meeting these health behaviour guidelines. On the basis of these findings, university health promotion strategies may be most beneficial if targeted to the subgroups most in need of prioritized approaches.

This study was the first to examine strength training guidelines specifically in the university student population. A greater percentage of males reported meeting MVPA, strength training, and MVPA and strength training guidelines. Males have consistently been shown to be more physically active than women.²² The low prevalence of students in this sample attaining both MVPA and strength training guidelines (13% of males and 5.6% of females) is lower than previously reported³ and highlights the need to consider the complete guideline

when reporting physical activity prevalence. Furthermore, partly consistent with Tucker and colleagues,⁶ a greater percentage of students who were classified as overweight reported attaining physical activity guidelines compared with underweight and healthy weight individuals. Individuals with a higher BMI may be trying to lose weight and therefore may report engaging in more physical activity than their underweight and healthy weight peers.²³ This proposition is somewhat confirmed by the finding that students trying to change or do something about their weight were more likely to meet MVPA and strength training guidelines. This therefore highlights the need to consider promoting both MVPA and strength training guidelines. Alternatively, the use of BMI as a measurement of weight status may be inaccurate, especially among males who tend to have higher mass due to muscle bulk and size, and this could have affected the results.²⁴ For instance, it may be that students who met MVPA as well as strength training guidelines were mostly males with well-developed musculature who were trying to change their weight by increasing their muscle mass through strength training.

Being older, identifying as Caucasian and trying to change weight were significant correlates of consuming greater than five servings of fruit and vegetables per day. A report by Statistics Canada²⁵ confirms that age is a significant positive correlate of fruit and vegetable consumption. Although the results in that report pertained to individuals aged 12 years and older, they were consistent with the current study findings based on a more restricted age group of university students. Fruit and vegetable consumption has also been shown to differ by ethnicity.²⁶ Contrary to previous reports, sex was not a significant correlate of meeting dietary guidelines in the final model. This may be a result of the measure used to assess fruit and vegetable consumption.

Identifying as Caucasian, being female and trying to change weight were significant correlates of non-smoking. This is consistent with the literature: individuals identifying as Caucasian and female have been shown to have lower prevalence rates of smoking compared with other ethnicities (i.e., Hispanics and Aboriginals) as well as with males.^{14,27} Contrary to Kaufman and colleagues' findings that a lower BMI was associated with being a smoker,²⁸ a greater percentage of students classified as underweight were non-smokers. This may be the case because of the way non-smokers and smokers were classified in this study, which differed from the criterion of amount of cigarettes smoked, used in other studies, such as Kauffman and colleagues.²⁸

The limitations of this analysis include the utilization of self-report measures for MVPA, smoking, fruit and vegetable consumption and BMI, which may have resulted in misclassification of study participants. The low response rate (20.8%) and the under-representation of ethnic groups and international students may be further limitations. The way in which smokers and non-smokers were categorized may have also led to imprecise categorization. The response options for fruit and vegetable consumption did not capture Canada's current fruit and vegetable consumption guidelines of 7 to 10 servings per day, and this may have contributed to an overestimation of individuals meeting the guidelines.¹²

Moreover, the operationalization of the weight action variable may have limited the association between this variable and strength training guidelines, as men are more likely to report wanting to gain weight²⁹ and women more likely to report wanting to lose weight.³⁰ Given that the prevalence of meeting all guidelines was low (0.1%), we did not examine the correlates of meeting all health behaviour guidelines.

In summary, this paper highlights the prevalence of individuals at one Canadian post-secondary institution who met physical activity guidelines, consumed greater than five servings of fruit and vegetables per day and were non-smokers; as well, it offers some insight into the correlates of meeting these guidelines. This evidence will assist in better informing university health professionals which health behaviours and characteristics should be prioritized for the development of future university-wide interventions. Given the varying correlates, specific health promotion programs should therefore target particular age, ethnicity and weight status groups, as there are discrete differences among those not attaining physical activity, dietary and non-smoking guidelines. This study also highlights the need for health professionals to address the low prevalence of healthy behaviours such as physical activity participation, rather than the traditional focus on risk behaviours such as binge drinking, among university students.³¹

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RÉSUMÉ

OBJECTIF : Examiner la prévalence des étudiants qui respectent les recommandations sanitaires sur l'activité physique, le régime alimentaire et le non-tabagisme et examiner les corrélats du respect de ces lignes directrices.

MÉTHODE : Des étudiants de l'Université de Toronto sélectionnés au hasard ($N = 2\,812$; femmes = 71,60 %, âge moyen = $22,11 \pm 5,24$ ans, indice de masse corporelle moyen = $22,80 \text{ kg/m}^2$) ont rempli le questionnaire National College Health Assessment-II au printemps 2013.

RÉSULTATS : À peine 0,1 % de l'échantillon ont donné des réponses conformes aux lignes directrices sur l'activité physique, le régime et le non-tabagisme. Les hommes étaient plus susceptibles que les femmes de respecter les lignes directrices sur l'activité physique, et à la fois celles sur l'activité physique et la consommation de fruits et légumes ($\chi^2 [1, 2812] = 7,33, p < 0,05$). Les femmes étaient plus susceptibles que les hommes de ne pas fumer ($\chi^2 [1, 2812] = 7,80, p < 0,05$). Le surpoids était associé au respect des lignes directrices sur l'activité physique. Le poids-santé était associé au respect des lignes directrices sur l'activité physique et sur la consommation de fruits et légumes ($\chi^2 [1, 2812] = 6,29, p < 0,05$). Les participants de poids insuffisant étaient plus susceptibles d'être non-fumeurs ($\chi^2 [2, 2812] = 6,36, p < 0,05$). Selon l'analyse de régression

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logistique, les faits d'être un homme, d'être blanc et d'essayer de modifier son poids étaient corrélés avec le respect des consignes d'activité physique modérée à vigoureuse et d'entraînement musculaire. Les faits d'être plus âgé, d'être blanc et d'essayer de modifier son poids étaient corrélés avec la consommation de plus de cinq fruits et légumes par jour. Les faits d'être blanc, d'être une femme et d'essayer de modifier son poids étaient corrélés avec le statut de non-fumeur.

CONCLUSION : Les programmes de promotion de la santé à l'université devraient cibler des groupes d'âge, d'ethnicité et de statut pondéral particuliers, car il y a de nettes différences entre les personnes qui ne respectent pas les lignes directrices sur l'activité physique, le régime et le non-tabagisme.

MOTS CLÉS : jeune adulte; exercice physique; directives nutritionnelles; indice de masse corporelle; sexe