

# Prevalence of Running as Aerobic Exercise among Students in a College of Medicine

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## Abstract

**Objective:** To determine the percentage of medical students, physical therapy students, and physician assistant students who run per week and how often and how far, perception of the benefits and barriers to running, percent with body mass index (BMI) <25, percent who drink more than one cup of coffee per day, and preferred brand of running shoe.

**Methods:** An online anonymous survey consisting of 18 questions was e-mailed to all 607 MD only students, 68 MD/PhD students, 134 physical therapy students, and 71 physician assistant students at the University of Iowa Carver College of Medicine (CCOM).

**Results:** 571 (65%) of 880 students answered the survey (44% male, 56% female, median age 25). 59% answered they had run a mile or more in the past 7 days (range: 0 to 75 miles; median: 2 miles), and 88% had run a mile (1.61 km) or more in the last year. 10% had run and finished a marathon, 25% a half marathon, and 70% had run a 5K event. Of those who run, 84% typically run alone and 41%, 22%, and 37% prefer running in the morning, afternoon, and evening, respectively. Running was the most frequent type of exercise (aside from "Other") by 26% of students. Weight loss/maintenance and better mental health were perceived as the top major benefits by 83% of students. Limited time and bad weather were the most common barriers to running. 72%

had a BMI <25 (61% male, 80% female). 65% drank more than one cup of coffee per day (59% male, 70% female), and the top 5 preferred running shoe brands were Nike (27%), Brooks (18%), Asics (17%), Hoka (7.0%), and Adidas (5.6%).

**Conclusions:** The majority of these health professional students engage in running on a regular basis and perceive several benefits of this aerobic exercise.

**Keywords:** Running; Medical; Physician assistant; Physical therapy; Students

## Introduction

Running is associated with improvements in metabolic function, improvements in cardiovascular fitness, improvements in mental health, multisystem gene regulation, and lower risk of all-cause mortality [1-3]. Practicing clinicians and healthcare students can benefit from aerobic exercise as a mechanism to maintain good health, lead patients by example, and manage the stressors of their studies. A 2021 survey of 12,000 physicians found that 10% did not exercise, 20% only exercised once per week, and only 25% of surveyed physicians exercised 4-5 times per week [4]. In order to provide data for assessing the extent of running and the perceived benefits and barriers to running for our particular student population, we investigated the prevalence of and attitudes towards running as aerobic exercise among medical (MD and MD/PhD), physical therapy (PT), and physician assistant (PA) students with a cross-sectional survey sent to all enrolled students. We determined the percentage of students who run, how frequently and how far they run, and what perceptions exist regarding benefits and barriers to running. We additionally determined the percentage of surveyed students with body mass index (BMI, kg/m<sup>2</sup>) of less than 25 (normal weight), percentage of surveyed students who drink more than one cup of coffee per day, and the preferred running shoe of this population. The results of this survey can be used to better encourage and facilitate aerobic exercise among our health care professional students.

## Methods

A survey consisting of 18 questions (Figure 1) was e-mailed on October 7, 2021 to all 880 students (412 men, 468 women: 607

Survey Questions
1. How many days over the past 7 days have you run a mile or more? (includes treadmill, outside, indoor track, etc.)
2. In the last 7 days how many miles do you estimate you have run?
3. In the past year, what is the longest continuous distance you have run?
4. Have you run a mile (continuously) in the past year?
5. How many days ago did you last run a mile?
6. Which of the following events have you run and finished?
7. When do you prefer to run?
8. When you run, do you typically run alone or with another person?
9. What do you see as the benefits of running?
10. What do you see as the barriers that stop you from running?
11. Which is your preferred running shoe?
12. What is your most frequent type of exercise?
13. Age
14. Sex assigned at birth
15. Is your body mass index (BMI) less than 25?
16. In which type of CCOM degree program are you?
17. What year are you in your degree program?
18. On average, do you drink one or more cups of coffee per day?

Figure 1: List of Survey Items.

MD only students, 68 MD/PhD students, 134 PT students, and 71 PA students) enrolled at the University of Iowa Carver College of Medicine (CCOM) with the ability to win a \$1000 scholarship if randomly selected in a lottery for those who filled out the questionnaire. Answering the survey was noted to be optional. Except for the statistician (LW) who emailed the survey, the student identities were delinked from the other investigators (AK, JS, and JBJ) except for the winner of the lottery. Students were informed that they would receive the survey results. The survey was available for completion for 16 days. Survey data were recorded and exported into a dataset via RedCAP. This survey and method to administer were reviewed by the IRB and not considered to be subject to human subjects research requirements, given that the information obtained would unlikely be generalizable and was primarily for internal use. The distances of one mile (1.61 km), 5 km, half marathon, and full marathon were used in the survey because one mile is a standard unit distance in the United States and the 5 km, half marathon, and full marathon are typical organized running events.

Survey data were analyzed using descriptive statistics and bivariate associations were assessed using Fisher's Exact Tests, Chi-Squared Tests for the categorical variables. Continuous variables in this analysis were compared between different groups using a Wilcoxon rank sum test if a Shapiro-Wilk test provides evidence of non-normality, or using a t-test if the hypothesis of normality is retained after the Shapiro-Wilk test. Comparisons with multiple categories used an ANOVA test if they were deemed normally distributed, and a Kruskal Wallis test otherwise. P-values < 0.05 were considered to be statistically significant. Corrections for multiple comparisons were not implemented due to the exploratory nature of this analysis. All analyses were performed using R, version 4.1.1 [5].

## Results

Tables 1 and 2 show that 571 (65%) of 880 students answered the survey (44% male, 56% female, median age 25). The response rates for each degree program student were 65% MD, 52% MD/PhD, 77%

**Table 1: Total Survey Responses and Stratified by Sex.**

Characteristic	Overall, N = 571 <sup>1</sup>	Male, N = 249 <sup>1</sup>	Female, N = 322 <sup>1</sup>	p-value <sup>2</sup>
<b>In which type of degree program are you?</b>				<b>0.004<sup>2</sup></b>
MD	393 (69%)	189 (76%)	204 (63%)	
MD/PhD	35 (6.1%)	16 (6.4%)	19 (5.9%)	
PA	40 (7.0%)	11 (4.4%)	29 (9.0%)	
PT	103 (18%)	33 (13%)	70 (22%)	
<b>Have you run a mile (continuously) in the past year?</b>	501 (88%)	220 (88%)	281 (87%)	0.7 <sup>2</sup>
<b>Over the past 7 days have you run a mile or more at least 3 times?</b>	156 (27%)	71 (29%)	85 (26%)	0.6 <sup>2</sup>
<b>Which of the following events have you run and finished? (choice=Marathon)</b>	58 (10%)	28 (11%)	30 (9.3%)	0.4 <sup>2</sup>
<b>Is your body mass index (BMI) less than 25?</b>	409 (72%)	153 (61%)	256 (80%)	<0.001 <sup>2</sup>
<b>What is your most frequent type of exercise?</b>				<0.001 <sup>3</sup>
Running	150 (26%)	68 (27%)	82 (25%)	
Biking	61 (11%)	30 (12%)	31 (9.6%)	
Hiking/walking	93 (16%)	21 (8.4%)	72 (22%)	
Tennis	12 (2.1%)	6 (2.4%)	6 (1.9%)	
Swimming	11 (1.9%)	2 (0.8%)	9 (2.8%)	
Golf	4 (0.7%)	4 (1.6%)	0 (0%)	
Team sports (soccer, football, baseball, etc.)	30 (5.3%)	22 (8.8%)	8 (2.5%)	
Other	210 (37%)	96 (39%)	114 (35%)	
<b>Shoe Preference</b>				<b>0.004<sup>3</sup></b>
Nike	156 (27%)	84 (34%)	72 (22%)	
Brooks	105 (18%)	29 (12%)	76 (24%)	
Asics	95 (17%)	44 (18%)	51 (16%)	
HOKA	40 (7.0%)	17 (6.8%)	23 (7.1%)	
Adidas	32 (5.6%)	15 (6.0%)	17 (5.3%)	
Other <sup>5</sup>	101 (18%)	46 (18%)	55 (17%)	
I do not run	42 (7.4%)	14 (5.6%)	28 (8.7%)	
<b>On average, do you drink one or more cups of coffee per day?</b>	372 (65%)	147 (59%)	225 (70%)	<b>0.007<sup>2</sup></b>
<b>Age</b>	25 (23, 26)	25 (23, 26)	24 (23, 26)	<b>0.021<sup>4</sup></b>
<b>What do you see as the barriers that stop you from running? (choice=No time)</b>	427 (75%)	182 (73%)	245 (76%)	0.4 <sup>2</sup>
<b>What do you see as the barriers that stop you from running? (choice=No interest in running)</b>	186 (33%)	82 (33%)	104 (32%)	0.9 <sup>2</sup>
<b>What do you see as the barriers that stop you from running? (choice=Medical condition)</b>	88 (15%)	32 (13%)	56 (17%)	0.14 <sup>2</sup>
<b>What do you see as the barriers that stop you from running? (choice=Bad weather)</b>	295 (52%)	122 (49%)	173 (54%)	0.3 <sup>2</sup>
<b>What do you see as the barriers that stop you from running? (choice=Other)</b>	68 (12%)	29 (12%)	39 (12%)	0.9 <sup>2</sup>

<sup>1</sup>n (%); Median (IQR)

<sup>2</sup>Pearson's Chi-squared test

<sup>3</sup>Fisher's Test - Simulated P-Value

<sup>4</sup>Wilcoxon rank sum test

<sup>5</sup>Note: Nine other brands were available for selection, but were classified into the Other category for ease of reading

**Table 2:** Survey Responses Stratified by Degree Program.

Characteristic	MD, N = 393 <sup>1</sup>	MD/PhD, N = 35 <sup>1</sup>	PA, N = 40 <sup>1</sup>	PT, N = 103 <sup>1</sup>	p-value
<b>Sex assigned at birth</b>					<b>0.004<sup>2</sup></b>
Male	189 (48%)	16 (46%)	11 (28%)	33 (32%)	
Female	204 (52%)	19 (54%)	29 (72%)	70 (68%)	
<b>Have you run a mile (continuously) in the past year?</b>	338 (86%)	27 (77%)	37 (92%)	99 (96%)	0.003 <sup>2</sup>
<b>Over the past 7 days have you run a mile or more at least 3 times?</b>	99 (25%)	10 (29%)	10 (25%)	37 (36%)	0.2 <sup>2</sup>
<b>Which of the following events have you run and finished? (choice=Marathon)</b>	43 (11%)	2 (5.7%)	6 (15%)	7 (6.8%)	0.4 <sup>3</sup>
<b>Is your body mass index (BMI) less than 25?</b>	273 (69%)	22 (63%)	36 (90%)	78 (76%)	0.021 <sup>2</sup>
<b>What is your most frequent type of exercise?</b>					0.6 <sup>4</sup>
Running	103 (26%)	8 (23%)	8 (20%)	31 (30%)	
Biking	44 (11%)	7 (20%)	4 (10%)	6 (5.8%)	
Hiking/walking	69 (18%)	4 (11%)	6 (15%)	14 (14%)	
Tennis	10 (2.5%)	0 (0%)	1 (2.5%)	1 (1.0%)	
Swimming	8 (2.0%)	1 (2.9%)	2 (5.0%)	0 (0%)	
Golf	4 (1.0%)	0 (0%)	0 (0%)	0 (0%)	
Team sports (soccer, football, baseball, etc.)	20 (5.1%)	2 (5.7%)	1 (2.5%)	7 (6.8%)	
Other	135 (34%)	13 (37%)	18 (45%)	44 (43%)	
<b>Shoe Preference</b>					<b>0.039<sup>4</sup></b>
Nike	106 (27%)	5 (14%)	13 (32%)	32 (31%)	
Brooks	67 (17%)	6 (17%)	5 (12%)	27 (26%)	
Asics	64 (16%)	10 (29%)	5 (12%)	16 (16%)	
HOKA	33 (8.4%)	1 (2.9%)	1 (2.5%)	5 (4.9%)	
Adidas	24 (6.1%)	1 (2.9%)	1 (2.5%)	6 (5.8%)	
Other	69 (18%)	5 (14%)	13 (32%)	14 (14%)	
I do not run	30 (7.6%)	7 (20%)	2 (5.0%)	3 (2.9%)	
<b>On average, do you drink one or more cups of coffee per day?</b>	261 (66%)	27 (77%)	28 (70%)	56 (54%)	<b>0.042<sup>2</sup></b>
<b>Age</b>	25 (24, 26)	27 (25, 28)	24 (23, 26)	23 (23, 24)	<b>&lt;0.001<sup>5</sup></b>
<b>What do you see as the barriers that stop you from running? (choice=No time)</b>	304 (77%)	26 (74%)	27 (68%)	70 (68%)	0.2 <sup>2</sup>
<b>What do you see as the barriers that stop you from running? (choice=No interest in running)</b>	116 (30%)	14 (40%)	10 (25%)	46 (45%)	<b>0.015<sup>2</sup></b>
<b>What do you see as the barriers that stop you from running? (choice=Medical condition)</b>	56 (14%)	5 (14%)	6 (15%)	21 (20%)	0.5 <sup>2</sup>
<b>What do you see as the barriers that stop you from running? (choice=Bad weather)</b>	209 (53%)	11 (31%)	22 (55%)	53 (51%)	0.10 <sup>2</sup>
<b>What do you see as the barriers that stop you from running? (choice=Other)</b>	45 (11%)	8 (23%)	1 (2.5%)	14 (14%)	<b>0.048<sup>2</sup></b>

<sup>1</sup>n (%); Median (IQR)<sup>2</sup>Pearson's Chi-squared test<sup>3</sup>Fisher's exact test<sup>4</sup>Fisher's Test - Simulated P-Value<sup>5</sup>Kruskal-Wallis rank sum test<sup>6</sup>Note: Nine other brands were available for selection, but were classified into the Other category for ease of reading

PT, and 56% PA. 59% answered they had run a mile or more in the past 7 days (range: 0 to 75 miles; median: 2 miles), and 88% had run a mile or more in the last year. 10% had run and finished a marathon, 25% a half marathon, and 70% had run a 5 km event. Of those who run, 84% typically run alone and 41%, 22%, and 37% prefer running in the morning, afternoon, and evening, respectively. Weight loss/maintenance and better mental health were perceived as the major benefits by 83% of students. Limited time and bad weather were the most common barriers to running. Running was the most frequent type of exercise by 26% of students (aside from "Other"). 72% had a BMI <25 (61% male, 80% female). 65% drank more than one cup of coffee per day (59% male, 70% female), but coffee drinking was not significantly associated with BMI <25 ( $p=0.081$ ), running frequency of at least 3 times/week ( $p=0.248$ ), or miles run ( $p=0.051$ ). The top 5 preferred running shoe brands were Nike (27%), Brooks (18%), Asics (17%), Hoka (7.0%), and Adidas (5.6%).

Degree programs were shown to differ by sex, with the MD and MD/PhD programs having roughly equal representation from the two sexes (52% and 54% female, respectively), while PA and PT students were strongly majority female (72% and 68% female, respectively). Other statistically significant sex-based differences were that female students reported having a BMI below 25 at a greater rate (80% vs. 61%,  $p < 0.001$ ), hiking/walking as a more frequent type of exercise (22% vs. 8.4%,  $p < 0.001$ ), being younger (median 24 years vs. median 25 years,  $p = 0.021$ ), and drinking a cup of coffee each day at a greater rate (70% vs. 59%,  $p = 0.007$ ) than their male counterparts. There were also differences observed based on the degree program in which the students were enrolled. PT students had run a mile in the last year at a greater rate than other students ( $p = 0.003$ ), and PA students had BMI values less than 25 at a greater rate than other students ( $p = 0.021$ ).

## Discussion

Nearly 60% had run at least a mile in the last week and nearly 90% in the last year, with running stated as the most frequent exercise (aside from “Other”) by 26% of respondents. Weight loss/maintenance and better mental health were perceived as the major benefits by 83% of students. Limited time and bad weather were the most common barriers to running. The majority typically run alone, and running in the morning was preferred to afternoon and evening. Nearly three quarters had a BMI<25, 65% drank coffee daily, and Nike, Brooks, and Asics were the top 3 preferred running shoes.

The fact that 39% of male students and 21% of female students met the definition of being overweight or obese is a concern especially given the median age of 25 years. However, some of these students, more likely male, may have been more apt to be muscular from activities such as weightlifting as one study of university students in a gym found that a significantly greater percentage of males were weightlifters compared to females (73% vs 53%) [6], and therefore muscle weighing more than fat per kg would increase BMI, but not necessarily be less healthy.

The majority of students drank coffee daily which is consistent for this aged student population [7], but no association between coffee drinking and BMI, running frequency, or miles run was detected. The finding that female respondents consume coffee on a daily basis more often than male respondents (70% vs 59%) is consistent with the data on coffee consumption by college students which reported that 78% females consumed coffee vs 61% of male students [7].

Each degree program had more female respondents than male respondents. While the MD and MD/PhD programs had nearly equal numbers of males and females, the PA and PT programs were strongly majority female and had the highest percentage of runners.

To our knowledge this study is the first to survey the students of a United States medical school on their habits and preferences regarding running. Other studies surveying physical activity among international preclinical and first year medical students in Lebanon and Cyprus, found that 40-60% of students self-reported high levels of physical activity [8,9], but the data were not broken out by running.

Limitations of our survey results are that they may have overestimated the percent who run since the 35% who did not fill out the survey may more likely have been non-runners. In addition, the survey was conducted in mid-October so that it may have been more likely that students ran recently during this time as opposed to cold winter or hot summer months. The cross-sectional nature of the survey limited our ability to know how consistently students run over time, and may not represent a similar population in medical schools in other parts of the country

Nevertheless, the data show that the majority of surveyed students ran a mile or more at least once in the past week and that running is their most frequent type of exercise (aside from “Other”). The results are consistent with reports of aerobic activity levels in similar populations, where approximately 71% of undergraduate health science students were found to meet aerobic physical activity recommendations [10]. The barriers to running noted most frequently by students were limited time and bad weather. In order to encourage running or other forms of aerobic exercise, providing access at a significant discount to the university’s next door recreation center with an indoor track and aerobic exercise equipment could be one option that would save time and lessen the barrier of bad weather. Providing small scholarships for participating in running events could also be an incentive. Given the health benefits of aerobic exercise, it is reassuring to see that the majority of these students are running on a regular basis.

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## References

1. Pedisic Z, Shrestha N, Kovalchik S, Stamatakis E, Liangruenrom N, Grgic J, et al. Is running associated with a lower risk of all-cause, cardiovascular and cancer mortality, and is the more the better? A systematic review and meta-analysis. *Br J Sports Med.* 2020; 54:898-905.
2. Vidacek NŠ, Nanic L, Ravlic S, Sopta M, Gerić M, Gajski G, et al. Telomeres, Nutrition, and Longevity: Can We Really Navigate Our Aging?. *J Gerontol A Biol Sci Med Sci.* 2017; 73:39-47.
3. Shields RK. Turning Over the Hourglass. *Phys Ther.* 2017; 97:949-963.
4. Martin KL. *Medscape Physician Lifestyle and Happiness Report 2021.* Medscape.
5. R Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. 2021.
6. Norris C. Gender discrepancy in the weight room. Bryant University Honors thesis. April 2019.
7. Mahoney CR, Giles GE, Marriott BP et al. Intake of caffeine from all sources and reasons for use by college students. *Clinical Nutrition.* 2019; 38:668-675.
8. Fisher JJ, Kaitelidou D, Samoutis G. Happiness and physical activity levels of first year medical students studying in Cyprus: a cross-sectional survey. *BMC Med Educ.* 2019; 19:475.
9. Fares J, Saadeddin Z, Al Tabosh H, Aridia H, El Mouhayyara C, Koleilat MK, et al. Extracurricular activities associated with stress and burnout in preclinical medical students. *J Epidemiol Glob Health.* 2016; 6:177-185.
10. Wilson OWA, Papalia Z, Duffey M, Bopp M. Differences in college students’ aerobic physical activity and muscle-strengthening activities based on gender, race, and sexual orientation. *Prev Med Rep.* 2019; 16:100984.