Less Experienced but Healthier: Health Behaviors of Medical Students Compared With Practicing Physicians

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Abstract

Background

We examined health behaviors and perceptions among medical students and compared them with the results of a previous survey among residents and senior physicians.

Methods

This cross−sectional study was performed among second-year medical students (2015-2018) and among physicians (2015) using an online questionnaire. Univariate and multivariate analyses were performed.

Results

Significantly more physicians perceived their health as bad, compared with students. Half of the residents, compared with one-third of senior physicians and one-fifth of students, reported high emotional stress. Residents reported the worst, and students - the best, eating habits. Logistic regression models demonstrated that lower emotional stress, healthy eating habits, adequate sleep, lower body mass index and not having a regular physician, explained good perceived health. Female gender, being a resident, bad perceived health, unhealthy eating habits, less sleep and not having a regular physician, were correlated with high emotional stress.

Conclusions

The healthy lifestyle of medical students declines towards residency. Given the workload and emotional stress of their chosen profession, it is advised that medical school curriculum provide students with measures to help them gain more years of healthy life, allowing students and physicians to be better role models and the healthcare system to perform better.

1. Background

Non-communicable diseases, mainly cardiovascular diseases, diabetes, cancer and chronic respiratory diseases, are leading causes of death globally (Collaborators, 2017). Adherence to a healthy lifestyle can dramatically reduce mortality, with risk directly related to the number of unhealthy behaviors (Loef & Walach, 2012; Krokstad et al., 2017).

Physicians are a reliable, confidential and knowledgeable source of advice on diverse health-related topics (Snyder et al., 2012). As such, they hold a unique position for promoting healthy lifestyle habits among their patients (Levine, 1987). Most adults in Western countries meet their primary care physician (PCP) at least once a year. In Israel, 89% of respondents in a national survey reported seeing a PCP in the 12 months prior to the survey (Brammli-Greenberg et al., 2019). Physicians with healthy habits are more likely to discuss them with their patients, to lead an effective dialogue and to motivate their patients to adopt a healthy lifestyle (Frank et al., 2010; Howe et al., 2010). Physicians' advice was perceived as more reliable if the physician disclosed his or her own health behaviors to the patient (Frank et al., 2000). Similar findings were demonstrated among medical students (Frank et al., 2000; Frank et al., 2008; Holtz et al., 2013; Yu et al., 2015).

Physician health and well-being has recently become the focus of international concern. Physician ill-health negatively affects productivity, efficiency, quality of patient care and physician retention (Wallace et al., 2009), resulting in suboptimal functioning of the health system.

The Israeli healthcare system is characterized by a low hospital bed/population ratio and a high occupancy rate. Moreover, the number of practicing physicians per population is lower (with a downward trend over time) than the average of 36 Organization for Economic Co-operation and Development countries (Rosen et al., 2015; Clarfield et al., 2017). As a result, practicing physicians in Israel often experience heavier workloads and difficulties maintaining a work-life balance, especially if they work in hospitals. A national survey among 4,832 Israeli physicians demonstrated unfavorable health behaviors that were worse than those of the general population (Wilf Miron et al., 2019). Residents and hospital-based physicians reported significantly less healthy lifestyles, lower perceived health and higher levels of emotional stress, compared with senior and community-based physicians (Wilf Miron et al., 2019). Similar findings were reported for physicians in other countries (Gupta & Fan, 2009; Stanford et al., 2012; Borgan et al., 2015; Dayoub & Jena, 2015; Wilf Miron et al., 2019).

These disturbing findings have raised the question of whether Israeli physicians have unhealthy lifestyle habits before entering medical school, or whether they adopt such unfavorable health behaviors as their training advances. To that end we examined health-related behaviors and perceptions of medical students at the beginning of their training and compared them to those of residents and senior physicians obtained using a similar survey tool during a previous national study.

2. Materials And Methods

2.1 Study design, setting and participants

This cross–sectional study was performed among students and practicing physicians (residents and senior physicians). The study protocol was approved by the Institutional Ethics Committee (Approval number 0001322-1).

The survey among medical students was conducted every year for 4 consecutive years (2015-2018). Second year (preclinical) medical students studying in a 6-year program were contacted through the class's social network (which included all registered students) during the week before the beginning of the academic year. They were asked to complete an online questionnaire.

Physicians were surveyed online during July-August 2015 as previously reported(Wilf Miron et al., 2019). To avoid duplication, only new findings and interpretations due to additional analyses of the original data are presented.

2.2 Questionnaire

The questionnaire comprised a section on respondent demographics and eight sections on health behaviors: (1) accumulated weekly minutes of physical activity (PA; 4 questions); (2) eating habits and nutrition (7 questions); (3) current smoking status; (4) number of hours of sleep; (5) perceived health; (6) perceived emotional stress; having a regular PCP; (7) height and weight for the calculation of body mass index (BMI); and (8) personal and work characteristics (8 questions). The students' questionnaire was identical to the physicians' questionnaire in all topics except for 2 items: the student questionnaire had a specific question about the intensity of PA, while the physicians' version did not. In addition, the questions on professional characteristics were different (Supplementary file 1).

2.3 Definition of variables

The "meeting PA guidelines" variable, which was relevant to the students' questionnaire only, included accumulating at least 150 minutes of moderate-intensity PA or 75 minutes of vigorous-intensity PA, in a typical week. This was calculated by multiplying the times per week that the students reported exercising by the number of minutes per

exercising episode. One minute of vigorous-intensity PA is translated to 2 minutes of medium-intensity PA.(Piercy et al., 2018) Results are presented as the medium intensity equivalent.

A composite "Healthy Nutrition" measure was defined, which included the following parameters: eating breakfast, eating lunch, adhering to a Mediterranean diet (which includes fruit and vegetables, whole wheat, legumes, nuts, fish, poultry and low-fat dairy products) (Bach-Faig et al., 2011), consuming 5 units of fruits and vegetables (*2015-2020 Dietary Guidelines for Americans. 8th Edition* 2016), drinking 8 glasses of water (Bach-Faig et al., 2011) – all of the above every day, or almost every day; consuming processed food or drinking sugar sweetened beverages – never or less than once a week. Respondents with healthy nutrition habits were defined as those who complied with 6 or 7 of these 7 parameters.

Perceived health was examined by the question: "In general, how would you define your health status?" (excellent, very good, good, fair, poor) (Frank & Segura, 2009).

Perceived emotional stress was assessed by the question: "To what extent do you experience emotional stress?" (very low, low, moderate, high, very high) (Thornorarinsdottir et al., 2019).

2.4 Statistical analysis

Continuous variables were summarized as mean and standard deviation. Categorical variables were summarized as number and percentage. Chi-squared test and t-test were employed for univariate analysis and comparisons among subgroups. Logistic regression models were estimated for perceived health status and stress levels, as dependent variables. A binomial variable was defined for the multivariate analysis: for perceived health status, 0=poor or fair and 1=good, very good or excellent. For emotional stress, 0=very low, low or moderate and 1=high or very high.

We further used a receiver operating characteristics (ROC) model to examine the contribution of each category of predictors. Three models were included: demographics (age and gender), professional status (student, resident, senior or "other") and health behaviors (smoking, perceived stress, health status, having a regular PCP, BMI, sleep, and nutrition). Results are presented by C-statistics.

The level of significance for all statistical analysis was 5%. Data analysis was performed using the Statistical Package for Health & Welfare Science for Windows (SPSS, version 25.0, Chicago, IL, USA).

3. Results

Among 4 consecutive classes of second-year registered medical students, 621 of 710 responded (a response rate of 87.5%). Response rates were 93.5%, 86.1%, 83.9% and 86.8% in the years 2015, 2016, 2017 and 2018, respectively. As described previously (Wilf Miron et al., 2019), of 4,832 physicians who responded to the questionnaire, 19.5% were residents or fellows, 72.2% were senior physicians and 8% were general physicians, which is not considered a medical expertise in Israel.

Table 1 summarizes the participants' demographics and lifestyle habits of the respondents. As expected, age was statistically significantly different among the groups of respondents due to the different stages in the physicians' professional life cycle. There was female predominance among the students, unlike in the other groups. Half of the students reported working for more than 10 hours/week in a typical week and 20.8% reported working for 20 weekly hours or more to support themselves.

Among the students, 44.6% achieved the recommended PA target, compared to 28.9% of physicians (Wilf Miron et al., 2019). Among the physicians, residents reported considerably lower rates of achieving the target PA compared with

senior physicians (15.0% vs. 34.1%). It should be noted that due to a different calculation scheme due to the absence of data on PA intensity in the physician group, this variable could not be compared with that of the students, probably representing an underestimation of the real proportion of physicians achieving the target.

Only 6.6% of the students perceived their health status as fair or poor, compared to 19.8% of residents, 20.6% of senior physicians and 29.8% of general physicians (p<0.001).

Residents had the highest stress level: almost half of them (49.8%) reported high or very high perceived emotional stress levels, compared with 33.5% of senior physicians, 29.3% of general physicians, and 20.8% of students.

Eating habits were significantly worse among residents in all 7 items. Students demonstrated the best eating habits among the four professional groups in consuming breakfast, lunch, keeping a Mediterranean diet and drinking water. Residents demonstrated the highest rate of cigarette smoking (15.5%) compared to about 10% or less among the other respondents, and the worst sleeping habits: only 13.1% reported adequate sleep (7+ hours/night) compared to 66.7% of students. Of the senior and general physicians, only 25.9% and 26.2% respectively, reported sleeping adequately. Most students (76.2%) reported having a regular PCP compared to less than half of the physicians.

Multivariate analysis (Table 2) demonstrated that lower emotional stress, healthy eating habits, adequate sleep, lower BMI and not having a regular PCP were predictors for good perceived health.. Being a female, younger age, professional status (with residents being mostly exposed to stress), low perceived health, unhealthy eating habits, less sleep and not having a regular PCP were predictors for high emotional stress.

The ROC curve shows that healthy behaviors were the main contributor to perceived good health status (model 3 in Figure 1) and to high or very high emotional stress (model 3 in Figure 2), while sociodemographic and professional characteristics contributed to these to a lesser degree (model 1 and 2, respectively).

4. Discussion

Our study demonstrates considerable deterioration of health behaviors in the transition from medical school to practice. In particular, a significantly smaller proportion of residents, compared to students, reported favorable eating habits, adequate sleep, and having a regular PCP, while a greater proportion of them reported worse perceived health status and greater stress levels compared to students.

In order to understand when health behaviors begin to decline during physicians' professional life, it is important to understand how our sample of second-year medical students compares with medical students worldwide and with the general population. Compared with medical students from 5 schools in China, Australia and the US, our sample had a greater proportion of students who smoke, have normal BMI, and achieve target PA, but a smaller proportion of students who eat 5 servings of fruit and/or vegetables (Yu et al., 2015). Compared with a large sample of Dutch preclinical medical students, less Israeli medical students achieved the recommended PA target, and a larger proportion smoke cigarettes (Van der Veer et al., 2011). Compared with second clinical-year students from the US, less Israeli students had adequate sleep (7+ hours at night) (Collaborators, 2019).

In comparison to similar age groups in the general Israeli population, a greater proportion of students achieved the recommended PA target (30.0% vs. 44.6%).(*A Survey of Physical Activity Habits among Israeli Adults, 21 and Older*, 2012) Similarly, Canadian and US medical students reported higher PA levels compared with young adults from the general population (Holtz et al., 2013). Fewer medical students (13.5%) reported BMI values that are defined as overweight or obese compared 34.4% of 25-34 year-olds belonging to the upper socioeconomic quartile of the general Israeli population (*The National Program for Quality Indicators in Community Healthcare. Report for the Years 2016-*

2018, 2019). Fewer students smoke cigarettes compared with the general population with more than 12 years of education (10.7% and 17.1% respectively) (*Health Minister's Report on Smoking in Israel 2018*, 2019). More medical students reported adequate sleep compared with 20-44 year-olds in the general Israeli population (66.7% vs. 55.0%) (Frank et al., 2008; *Selected Data on Sleep from the 2017 Social Survey*, 2018). This comparison suggests that Israeli medical students have better health habits compared to the same age group in the general population.

Transition from the preclinical to the clinical years of medical school might be challenging. Examination of the health behaviors of medical students during their postgraduate or clinical years, might provide a clue as to when the decline in healthy habits begins. Increased stress, weight gain, more fast food consumption and less exercise were noted at the end of the academic year, compared with its beginning, among a small sample of Israeli medical students during the first year of their graduate (clinical) program. This was documented despite participation of the students in a 24-hour intensive lifestyle curriculum delivered over 3 days (Malatskey et al., 2019). In contrast, in a study conducted in the Netherlands, the health behaviors of Dutch students did not change significantly between the preclinical and clinical years of medical school (Van der Veer et al., 2011).

The transition from medical school to residency is even more challenging. Only 6 years separate the beginning of the second (preclinical) year of medical school and the beginning of residency. The residency period is extremely demanding with long shifts, emotional burden and constant pressure on the resident to be prepared for the various activities on the ward. Consequently, many residents experience significant emotional stressors (Cohen & Patten, 2005). Our findings showed that a significantly smaller proportion of residents, compared to students, reported favorable eating habits, adequate sleep, and having a regular PCP, while a greater proportion of them reported worse perceived health status and greater stress levels compared to students. Our findings are not unique to Israeli residents. The percentage of Internal medicine residents in Minnesota who exercised daily decreased dramatically during residency as compared to the time before starting it (4% vs. 35%), with those meeting PA guidelines reporting considerably less burnout (Weight et al., 2013; Olson et al., 2014). Similarly, high stress levels among Swiss residents were associated with worse health and life satisfaction (Buddeberg-Fischer et al., 2008).

For many Israeli residents, who are 2-4 years older than their counterparts abroad (due to compulsory military service at the age of 18, after graduating from high school), residency is also the time for starting a family, which increases the pressure on maintaining a work-life balance. On the other hand, lack of time might not explain the huge gap between the two groups, since medical students are also exposed to intense pressure, imposed by long hours of a strict curriculum with tremendous academic demands. In addition, half of all responding students reported working for more than 10 weekly hours and 20.8% of respondents reported working 20 weekly hours or more, to support themselves.

High stress levels may lead to burnout (Cohen & Patten, 2005). The stress levels measured among practicing physicians, especially residents, were in accordance with the findings of the National Burnout Survey carried out in 2018, which showed that physicians had the greatest burnout from among healthcare professionals. Within the medical profession, residents were the sub-group with the highest burnout score (*The National Program for Strengthening Healthcare System Workers and Preventing Burnout. Finding of the 2019 Survey - Medical Sector*, 2019).

Our study showed that being female, a younger age, resident status, unhealthy eating habits, less sleep and not having a regular PCP are predictors for high stress levels. In addition, we found that healthy behaviors were the main contributor to perceived good health and to high emotional stress, even more than gender or professional status. These findings might help to enact preventive measures among medical students. Medical schools and residency programs should provide students at the earliest possible stage with a deep understanding of the importance of leading healthy lifestyles and especially with tools on how to incorporate such habits in their tight schedule. This knowledge and practical tools should be refreshed on a yearly basis.

Policy makers and healthcare administrators are urged to invest in creating a health-promoting work environment for healthcare staff, and particularly medical residents. The work environment should be shaped to encourage a healthy lifestyle, such as facilitating active transportation to work, encouraging stair climbing or turning at least some of the staff meetings into "walking meetings". Residents and senior physicians should be allowed enough time for having a meal break during a workday. Healthy nutritional options should be offered at staff meeting, hospital cafeterias and in vending machines. Additionally, PA and interventions for reducing stress and increasing quality of life should be encouraged. A team-based voluntary exercise program increased the quality of life and decreased burnout rates among residents and fellows, while self-care workshops and meditation interventions reduced stress and burnout (Weight et al., 2013; Busireddy et al., 2017). Internal medicine residents who achieved PA targets reported considerably less burnout (Weight et al., 2013; Olson et al., 2014).

Designing a work environment and culture that promote health and wellness during all stages of professional training – from medical school, into residency and onto senior physician life - would benefit not only physicians, but also other health professionals who work in the same environment, as well as patients, their families and the healthcare system at large. However, offering health-promoting programs is not sufficient since physicians must move forward to utilize them. According to a 2017 National Physician Health Survey, carried out by the Canadian Medical Association, 81% of physicians and residents said they were aware of physician health program services available to them, yet only 15% had accessed them (*CMA National Physician Health Survey. A National Snapshot*, 2018).

This study has several limitations: First, because the student and physician surveys had a different definition to achieving the target of recommended PA, it was not possible to compare this important health behavior between the students and the physicians, and therefore it was not included in the multivariate analysis. It may be assumed that achieving the PA target would have been found to be protective against emotional stress, as was demonstrated among practicing physicians (Holtz et al., 2013). Second, medical students' behaviors were collected by a cross-sectional survey during 4 consecutive years. Since health behaviors seems to decline between the beginning of medical school and residency, it is important to understand when this decline starts. A longitudinal cohort study among medical students, with the survey taken at various times during the preclinical and clinical years could provide a clue and help in planning appropriate interventions. Despite this limitation, our study is unique in the fact that it uses the same survey tool, in a similar time period and in the same, relatively small country, to compare health behaviors of students and practicing physicians.

5. Conclusions

This study demonstrated that at the beginning of medical school, students lead a healthy lifestyle, which declines over time and is less healthy during their residency. Given the workload and emotional stress of their chosen profession, medical school curriculum should provide students with tools and skills to help maintain health habits throughout their professional life, to protect them from work-related health risks and allow them to gain more years of healthy life. In addition to the invaluable contribution to students' and practicing physicians' health, such efforts would allow the healthcare system to perform better and for physicians to be better role models for their patients.

Abbreviations

PA- Physical activity

PCP- Primary care physician

BMI- Body mass index

Declarations

Ethics approval and consent to participate- The study protocol was approved by the Institutional Ethics Committee (Approval number 0001322-1).

Consent for publication- All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Availability of data and materials- The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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Authors' Contribution- Dr Wilf-Miron conceptualized and designed the study, drafted the initial manuscript and reviewed and revised the manuscript.

Dr Saban designed the methods section, analyzed the data and reviewed and revised the manuscript

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Tables

Table 1: Participants' demographics and lifestyle habits

Variable	Students N=621 (%)	Residents N=931 (%)	Seniors N=3,447 (%)	Other[a] N=396 (%)	P Value
Age, years	99.8	57.3	1.0	8.1	<0.001
<35	0.2	38.2	21.8	8.3	
35-44	-	2.6	27.0	19.7	
45-54	-	1.4	32.0	39.9	
55-64	-	0.4	16.9	22.7	
65+	-	0.1	1.2	1.3	
Unknown					
Gender	39.6	61.7	59.4	57.1	<0.001
Male					
Physical activity in a typical week ≥150 minutes	44.6	15.0	34.1	33.0	b
Perceived health Status					
Excellent	20.8	11.4	11.7	6.9	<0.001
Very good	50.7	37	34	25.2	
Good	21.8	31.9	33.7	38.2	
Fair	6.1	17.5	18.5	26.5	
Poor	0.5	2.3	2.1	3.3	
Perceived level of emotional stress					
Very low	6.8	4	8.1	12.8	<0.001
Low	27.4	14.3	20.9	20	
Moderate	45.1	31.9	37.6	37.9	
High	16.7	35.1	26.1	20.8	
Very high	4.1	14.7	7.4	8.5	
Body mass index (BMI)[c]					
Underweight (<18.5 kg/m^2)	7.4	3.6	1.2	1.1	<0.001
Normal weight (≥18.5 to <25 kg/m^2)	79.1	53.7	41.5	29	

Variable	Students N=621 (%)	Residents N=931 (%)	Seniors N=3,447 (%)	Other[a] N=396 (%)	P Value
Overweight (≥25 to <30 kg/m^2)	11.5	33.5	41.5	45.8	
Obese (≥30kg/m^2)	2.0	9.2	15.8	24.1	
Nutrition & eating habits (every day or almost every day)					
Breakfast	64.1	38.6	55.4	61.2	<0.001
Lunch	73.0	46.5	48.9	51.8	<0.001
Mediterranean Diet	40.7	25.9	35.3	40.3	<0.001
Drinking 8 cups of water	50.1	33.7	36.1	44.1	<0.001
Processed food	19.3	27.6	15.7	13.6	<0.001
Sweetened beverages	11.5	18.5	9.0	12.1	<0.001
5 units of fruits & vegetables	25.8	20.6	35.7	41.8	<0.001
Cigarette smoking Currently	10.7	15.5	6.5	10.9	<0.001
Average hours of night sleep					
≤5 Hours	8.1	43.3	20.5	22.8	<0.001
6 Hours	25.2	43.6	53.6	51.0	
7 Hours	44.4	12.3	23.3	21.5	
≥8 Hours	22.3	0.8	2.6	4.7	
Has a regular primary care physician	76.2	42.2	42.2	48.7	<0.001

[a] This entity refers to physicians who do not hold a specialty, yet they are not residents or fellows. In Israel they are referred to as "general physicians".

Data on professional status were missing for 65 (1.3% of practicing physicians)

[b] Values of students cannot be compared between students and practicing physicians due to a different calculation

[c] Height and/or weight data for the calculation of BMI were available for 608 (99.7%) of the students; for 890 (95.6%) of the residents; for 3209 (93.1%) of the seniors and 369 (93.2%) of the "others".

Table 2: Results of logistic regression models for the dependent variables: health and stress perceptions
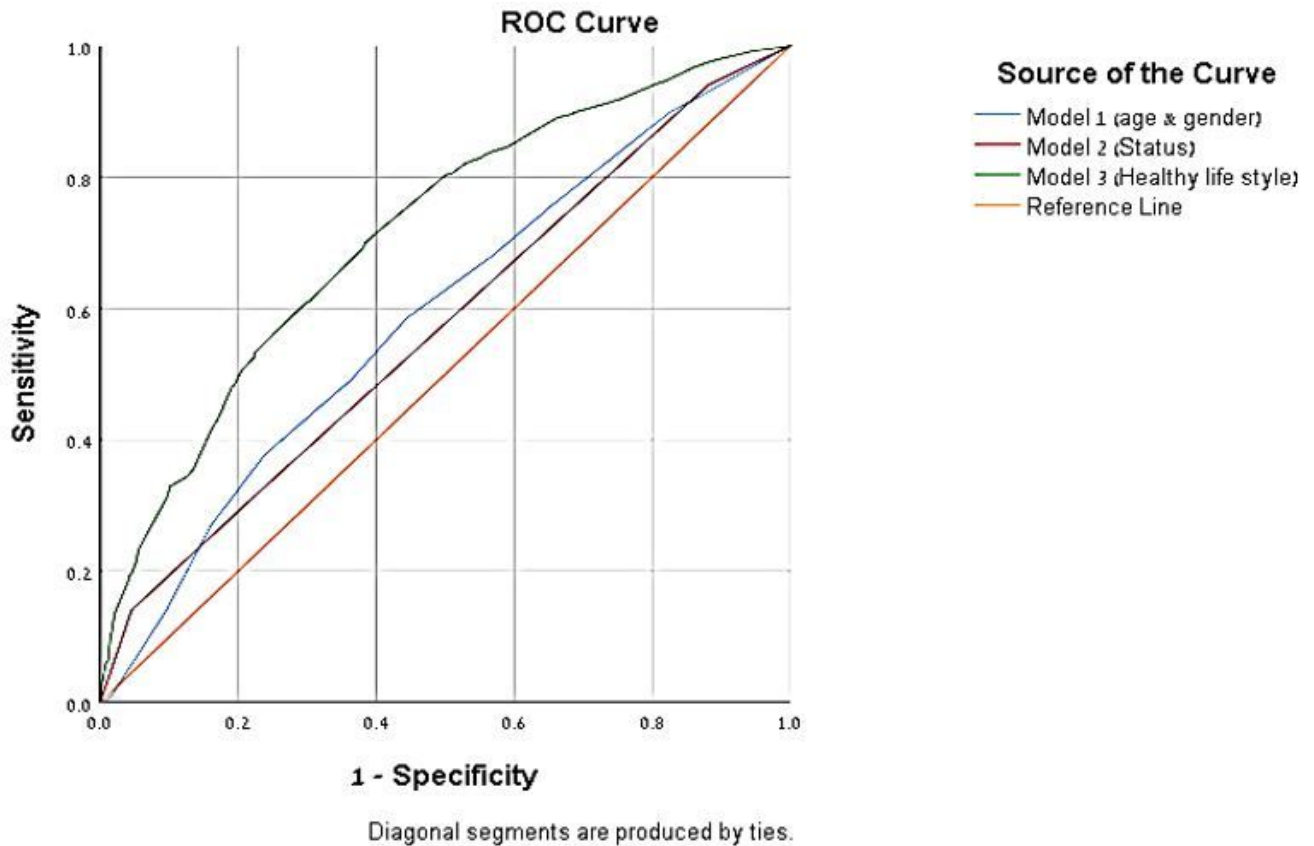
95% CI	OR	P Value	SE	B	Variable*
Perceived health status					
0.970-1.356	1.147	0.109	0.086	-0.137	**Gender**
0.699-0.828	0.760	>0.001	0.043	-0.274	**Age**
					Status
-	1	-	-	Ref group	Student
0.533-1.184	0.794	0.259	0.204	-0.230	Resident
0.704-1.627	0.752	0.100	0.214	-0.068	Senior
0.391-1.033	0.635	0.067	0.248	-0.454	Other
0.407-0.564	0.479	>0.001	0.083	-0.736	**Emotional Stress**
1.172-1.288	1.229	>0.001	0.024	0.206	**Nutrition**
0.680-1.146	0.883	0.350	0.133	-0.125	**Smoking**
0.877-0.909	0.893	>0.001	0.009	-0.113	**BMI**
1.207-1.818	1.481	>0.001	0.105	0.393	**Sleep**
0.604-0.833	0.710	>0.001	0.082	-0.343	**Primary care physician**
Perceived level of emotional stress					
0.578-0.755	0.661	>0.001	0.068	-0.414	**Gender**
0.713-0.814	0.762	>0.001	0.034	-0.272	**Age**
					Status
-	1	-	-	Ref group	Student
2.267-3.862	2.959	>0.001	0.136	1.085	Resident
2.151-3.751	2.840	>0.001	0.142	1.044	Senior
1.583-3.300	2.285	>0.001	0.187	0.826	Other
0.413-0.572	0.486	>0.001	0.083	-0.721	**General health**
0.859-0.927	0.892	>0.001	0.019	-0.114	**Nutrition**
0.844-1.305	1.049	0.664	0.111	0.048	**Smoking**
0.985-1.014	1.000	0.949	0.008	0.000	**BMI**
0.489-0.672	0.573	>0.001	0.081	-0.556	**Sleep**
0.699-0.908	0.797	0.001	0.067	-0.227	**Primary care physician**

B=unstandardized regression coefficient

BMI=body mass index; CI=confidence interval; OR=odds ratio; PA=physical activity; SE standard error; OR=odds ratio

Gender: male=1, female = 0; Residency: resident = 1 senior = 0; Nutrition: six to seven items of healthy nutrition, every day or almost every day= 1; others =0; PA: met PA guidelines =1, others =0; Health status: excellent, very good and good = 1; fair or poor = 0; Emotional stress: very low, low or, moderate =0; high or very high =1.
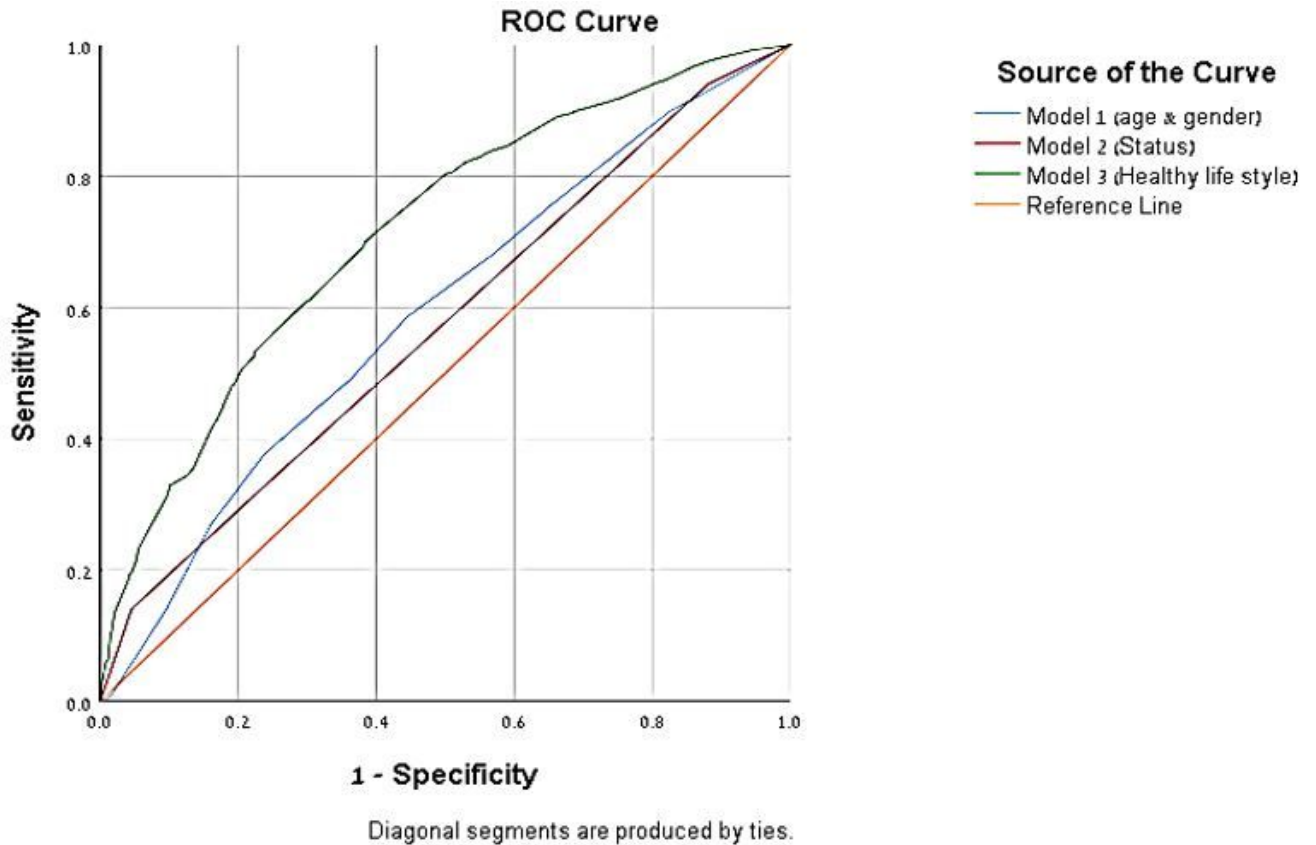
Figures

ROC Curve

Source of the Curve
— Model 1 (age & gender)
— Model 2 (Status)
— Model 3 (Healthy life style)
— Reference Line

Diagonal segments are produced by ties.

Model	Characteristics included	C statistic	SE	95% CI
1	Age & gender	0.590	0.011	0.569-0.610
2	Professional status (Student, Resident, Senior, Other)	0.571	0.010	0.551-0.592
3	Smoking, nutrition, BMI, sleep, stress, primary care physician	0.715	0.009	0.697-0.734

Figure 1

Receiver operating characteristic curves for perceived good health status. ROC was used to examine the contribution of each category of predictors. Three models were included: demographics (age and gender), professional status (student, resident, senior or "other") and health behaviors (smoking, perceived stress, health status, having a regular PCP, BMI,
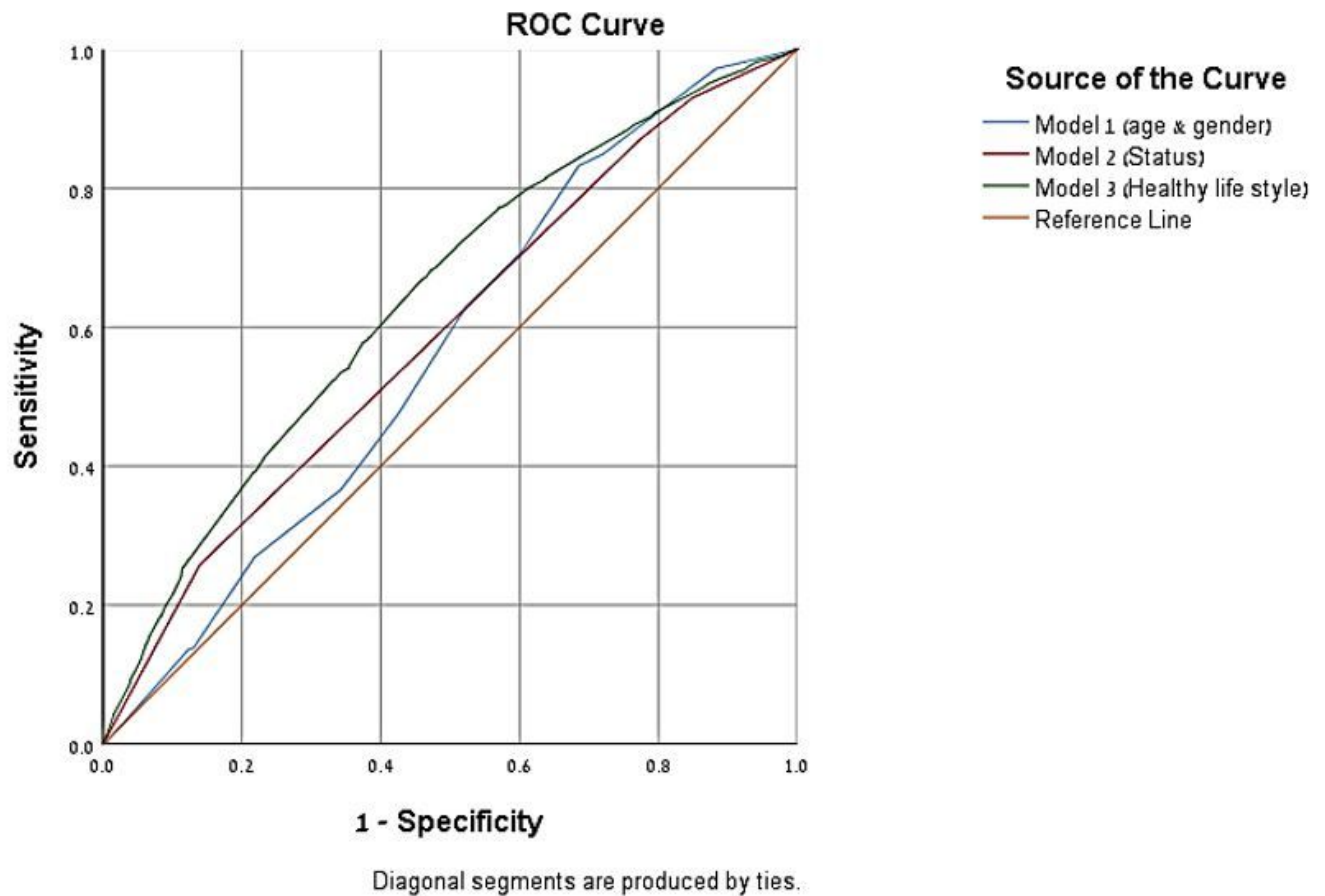
sleep, and nutrition). Respondents who perceived their health status as good, very good or excellent were included in the model.

ROC Curve

Source of the Curve
— Model 1 (age & gender)
— Model 2 (Status)
— Model 3 (Healthy life style)
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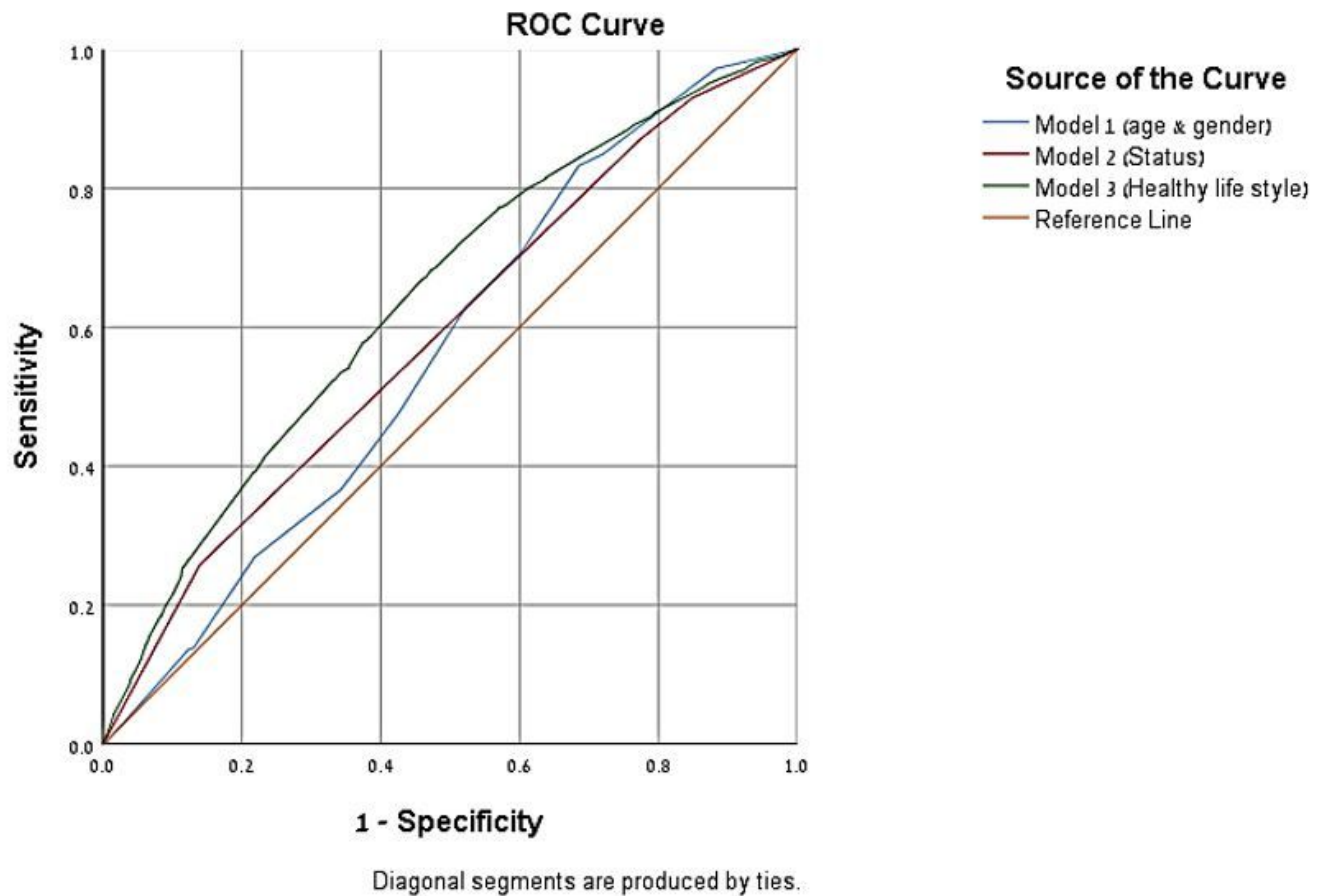| Model	Characteristics included	C statistic	SE	95% CI
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ROC Curve

Diagonal segments are produced by ties.

Model	Characteristics included	C statistic	SE	95% CI
1	Age & gender	0.565	0.008	0.549-0.582
2	Status (Student, Resident, Senior, Other)	0.589	0.009	0.572-0.606
3	Smoking, nutrition, BMI, sleep, general health, primary care physician	0.642	0.008	0.626-0.658

Figure 2

Receiver operating characteristic curves for high stress levels. ROC was used to examine the contribution of each category of predictors. Three models were included: demographics (age and gender), professional status (student, resident, senior or "other") and health behaviors (smoking, perceived stress, health status, having a regular PCP, BMI, sleep, and nutrition). Respondents who reported perceived high or very high emotional stress were included in the model.

ROC Curve

Diagonal segments are produced by ties.

Model	Characteristics included	C statistic	SE	95% CI
1	Age & gender	0.565	0.008	0.549-0.582
2	Status (Student, Resident, Senior, Other)	0.589	0.009	0.572-0.606
3	Smoking, nutrition, BMI, sleep, general health, primary care physician	0.642	0.008	0.626-0.658

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Receiver operating characteristic curves for high stress levels. ROC was used to examine the contribution of each category of predictors. Three models were included: demographics (age and gender), professional status (student, resident, senior or "other") and health behaviors (smoking, perceived stress, health status, having a regular PCP, BMI, sleep, and nutrition). Respondents who reported perceived high or very high emotional stress were included in the model.