Healthy Lifestyles and Attitudes Towards Preventive Counseling: a Survey of Chinese and US Medical Students

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Lijing L. Yan

Thesis submitted in partial fulfillment of
the requirements for the degree of Master of Science
in the Duke Global Health Institute
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ABSTRACT

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Abstract

BACKGROUND: Non-communicable diseases are currently the leading cause of death worldwide. Leading healthy lifestyles as a means of prevention is one of the most important aspects of preventing the occurrence of non-communicable diseases. Working from the premise that physicians globally serve as role models for patients and their health beliefs can influence how they interact and counsel patients, this international study ("MedLife") seeks to examine the self-report of health behaviors and clinical practice attitudes towards preventive counseling of medical students at institutions in China and the US, and identify any associations between these behaviors and students' clinical practice attitudes towards preventive counseling of future patients.

METHODS: From 2012-2013, a total of 860/1,216 (response rate = 71%) medical students from Duke University in the US and Peking University Health Science Center and Xi'an Jiaotong University in China completed culturally-adapted web versions of the 33-item "MedLife" questionnaire. Items from the survey were pulled from previously validated survey tools and included questions on diet, exercise, smoking, and alcohol consumption. Alcohol consumption was divided into heavy drinking and binge drinking. Prevalence estimates of health behaviors and attitudes towards preventive counseling in the domains of diet, exercise, smoking, and alcohol consumption were obtained in addition to measures of association between health behaviors and clinical practice attitudes towards counseling future patients on these issues. Finally, multivariate logistic

regression analyses were performed to assess the associations between personal habits and clinical practice attitudes towards preventive counseling while adjusting for gender.

RESULTS: The median ages of students at Duke University in years 1, 2, 3, and 4 were 23 years, 24 years, 25 years, and 26 years, respectively. The median ages of students at both schools in China among second, fourth, and seventh year students were 19 years, 22 years, and 24 years, respectively. In addition, the percentage of total females at Duke University and in China who completed the survey was 51% and 54%, respectively. Prevalence estimates of a healthy lifestyle, defined as complying with widely recognized recommendations at Duke University in the domains of diet, exercise, smoking, non-binge drinking, and non-heavy drinking were 30%, 42%, 99%, 41%, and 97%, respectively. Prevalence estimates in China of a healthy lifestyle in diet, exercise, smoking, non-binge drinking, and non-heavy drinking were 17%, 33%, 97%, 94%, and 99%, respectively. Overall, approximately 30% of medical students at Duke and 25% of medical students in China had positive clinical practice attitudes towards preventive counseling in terms of diet, exercise, smoking, and alcohol consumption combined. No statistically significant associations between the self-report of health behaviors and clinical practice towards preventive counseling were found among Duke medical students. Second, fourth, and seventh year medical students in China together who complied with all lifestyle recommendations were two times more likely to have a positive clinical practice attitude towards preventive counseling on all healthy lifestyle

domains (diet, exercise, smoking, and alcohol) combined (OR=2.03 95% CI=1.06-3.92; *p*=0.03). When adjusted for gender, this positive association among Chinese medical students was still statistically significant (OR=1.98 95% CI=1.02-3.83; *p*=0.04).

CONCLUSION: Medical students self-reported that they led unhealthy lifestyles in the domains of diet, exercise, and alcohol binge drinking at Duke and in the domains of diet and exercise in China. However, there was little evidence of an association between self-report of health behaviors and clinical practice towards preventive counseling for Duke medical students. But there was evidence among Chinese medical students to support an association between an overall self-reported healthy lifestyle and positive clinical practice attitudes towards preventive counseling on diet, exercise, smoking, and alcohol consumption combined, even after adjusting for gender. If clinicians are going to serve as role models and have their behaviors and lifestyle choices influence patients, medical schools need to ensure students lead healthy lifestyles in these areas and improve positive clinical practice attitudes towards preventive counseling on diet, exercise, smoking, and alcohol consumption to help curb the global cardiovascular disease epidemic. Student health and positive clinical practice attitudes towards preventive counseling should be a top priority for all medical schools, and it seems that policies aimed at improving student health in China are likely to be associated with positive clinical practice attitudes towards preventive counseling.

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Acknowledgements

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1. Background

In 2008, 36 million of the 57 million deaths worldwide were due to non-communicable chronic diseases (NCDs) and this estimate is expected to rise by 15% by the year 2020 [1]. Moreover, nearly 80% of these deaths occurred in low- and middle-income countries. Often, NCDs in these regions are overshadowed by infectious diseases (IDs) such as AIDS, TB, and malaria given the difficulties in curing and identifying universal prevention methods for NCDs. Prevention and treatment for NCDs is complex and requires time. Many NCDs lack immediate treatment methods and eventually lead to lifelong chronic diseases, whereas there are often effective treatments for IDs such as TB and malaria that are curative in most normal circumstances. With tangible treatments, funding agencies can see the results of their contributions through increased treatment successes. With rising death tolls in developing nations caused by NCDs such as cardiovascular disease, diabetes, chronic obstructive pulmonary disease and cancers, the spotlight has begun to shift.

NCDs are often latent predators that claim the lives of thousands both in developed and developing nations. Four main diseases are considered to be the leading causes of death among all NCDs: (1) cardiovascular disease (CVD), (2) cancers, (3) chronic obstructive pulmonary disease (COPD), and (4) diabetes. Cardiovascular disease is the number one single cause of death globally, claiming an estimated 17.5 million lives in 2005 (30% of all deaths worldwide). Of those 17.5 million deaths, more than 80% of the global burden of cardiovascular disease exists in low- and middle-income countries

[2]. Common risk factors of various non-communicable diseases include poor diet, lack of physical activity, smoking, and excessive alcohol consumption.

During 2008, it was estimated that 7.6 million people died from cancer, and this estimate is expected to increase to 13.1 million deaths by 2030. In addition, about 70% of all cancer deaths worldwide occur in low- and middle-income countries [2]. Worldwide, the most common forms of cancer include lung, breast, colorectal, stomach, and prostate [3]. In terms of COPD, the WHO estimates that more than 65 million people are living with moderate to severe COPD and more than 3 million people died from COPD globally in 2005. Furthermore, 90% of COPD deaths occur in low- and middle-income countries and total deaths due to COPD are projected to increase by more than 30% in the next 10 years [4]. Common causes of COPD include indoor and outdoor air pollution, tobacco use, and occupational dusts and chemicals. Low- and middle-income countries may bear the greatest burden of COPD due to the high prevalence of tobacco use and minimal regulations on pollution in some of the world's most populous countries, examples include India and China.

Finally, 346 million people worldwide are living with diabetes and an estimated 3.4 million people died from complications due to high blood sugar in 2004. Fifty percent of people with diabetes die of cardiovascular disease, mainly heart disease and stroke. Of the 3.4 million diabetes deaths, more than 80% occurred in low- and middle-income countries. Moreover, this fatality estimate is expected to double between 2005 and 2030 [5]. Common causes of diabetes include genetic inclination, improper diet, and obesity.

The high prevalence of diabetes in developing nations may be traced to high fat intake, tobacco use, and sedentary lifestyles.

As a result, deaths due to NCDs are not only a global concern, but are also particularly concerning for low- and middle-income countries. China is no exception. NCDs are estimated to account for 83% of all deaths in China [6]. In China, cancer, cardiovascular disease, and cerebrovascular disease ranked in the top three in terms of prevalence among all chronic diseases in 2009. Many of the main causes and risk factors of common NCDs such as poor diets, increasing inactivity, smoking, and alcohol consumption plague countries such as the US and China. A 2002 survey estimated that about 160 million people in China suffer from hypertension and more than 260 million people are overweight or obese [7]. Overall, these are serious, but modifiable risk factors for cardiovascular disease. It is important to understand the preventive measures that can be adopted for NCDs because of the inherent difficulty in treating and curing NCDs after onset. In addition to cardiovascular disease, the 39.8 million cases of diabetes in China as of 2006 are expected to increase by almost one third by 2025, reaching 59.3 million [8]. The increase of diabetes cases in low- to middle-income countries such as China highlights the notion that the condition is not just affecting developed nations, as it is often associated. NCDs also pose a serious economic threat to the global economy. It is estimated that disabilities and deaths related to chronic diseases will result in a US$550 billion loss in productivity over 10 years [6]. As China's population ages, increased strain is placed on the already stressed health system. Some of this strain can be attributed to

the one-child policy that has left the nation with an aging population and a dwindling number of able-working residents.

Furthermore, the one-child policy has been cited as a contributor to the nation's increase in obesity. Given that families are only allowed one child, this restriction enables pampering and over-feeding by parents and grandparents. Food that used to be divided among several children is now served to one child [9]. Child obesity is now considered to be an epidemic in China [10]. In addition to the aging population, deaths in China due to NCDs increased from 53% to 85% during the period from 1973 to 2009, indicating an eminent need for increased prevention efforts for NCDs. Poor lifestyle choices and lack of health policies create an incubator for NCDs, leaving education and prevention as primary resources for aiding in the fight against NCDs.

There is an opportunity to improve the incidence and prevalence of non-communicable diseases. Many modifiable risk factors underlie the most common NCDs, including poor diet, lack of moderate-to-vigorous exercise, smoking, and alcohol consumption, all of which are known to contribute to obesity, hypertension, high blood sugar, dyslipidemia and others. Taking a step back and looking at lifestyle choices of low- and middle-income countries such as China, the statistics show a staggering example: there are more than 300 million smokers in China—nearly the population of the United States. In fact, one of every three cigarettes consumed globally is smoked in China [11]. With such a high population of residents living with one or more NCD in China, it is important to understand the preventive measures that could have and can be taken to lower the risk of NCDs. An essential means of ensuring and maintaining a

healthy lifestyle is by seeking care from a trained healthcare professional. Specifically, physicians play a unique role in the prevention and management of NCDs. It is important for physicians to consult patients on the risk factors and potential outcomes of non-communicable diseases in an effort to reduce the common and modifiable risk factors for NCDs. In other words, the patient-doctor relationship is important in maintaining a healthy lifestyle. As a patient, being counseled and knowledgeable about leading a healthy lifestyle is key for the prevention and management of various chronic diseases.

Remarkably, there is existing evidence to demonstrate that there is an association between US physicians' and medical students' self-report of personal health habits and their counseling practices of patients [12, 13]. In fact, existing evidence suggests that doctors who practice healthy lifestyle habits are more likely to advise their patients to also make healthier choices and live healthier lives [14]. It is interesting to note that after the 1962 report *Smoking and Health* by the Royal College of Physicians [15], smoking has declined in the UK and the US as a result of physician-lead initiatives by about 1% each year over the last 50 years [16]. This relationship is an important aspect to consider when looking for ways to decrease the prevalence of NCDs in developing nations such as China. Despite the existing literature on physician and medical students' personal health habits and how this affects their attitudes towards patient counseling in the US, there is little investigation into medical students' personal health, specifically in low- and middle-income countries. In reviewing the current literature, only one study has in fact shown that there is a positive association between certain personal health habits of medical students in Colombia and their attitudes towards preventive counseling [17]. Since low-

and middle-income countries bear over 80% of the world's NCD burden, it is important to further explore other developing nations such as China. China is appropriate in this study because it is not only the most populous country in the world, but it also suffers from some of the highest prevalence and increasing incidence of NCDs compared to any other developing country. With many risk factors for NCDs in abundance in China, it is an appealing choice when deciding where to begin implementing a study regarding medical students' health habits and their attitudes towards patient-centered prevention. One previous large-scale study representative of US medical schools showed students' personal health habits are indeed associated with attitudes towards preventive counseling [18]. It has also been shown in a study of US physicians that attitudes towards preventive counseling are associated with the actual counseling of patients [13]. As a result, it seems appropriate to target medical students (future physicians) to define their health habits and clinical practice attitudes towards preventive counseling.

As a result, we undertook a simultaneous survey study in the US and China to focus on medical students' personal health behaviors and clinical practice attitudes towards preventive counseling because they will have direct contact with patients and can provide patients with preventive counseling and health education when they become health professionals in the future. From this information, our results could provide further insights into curriculum and policy recommendations to medical school administrators with regards to the students' overall healthy lifestyles and prevention promotion in order to influence the population-level NCD burden.

Overall, through international descriptive comparisons, this study seeks to identify themes among medical students in the US and China as well as differences in healthy lifestyles among medical students. Additionally, aims from this investigation build on previous studies which conclude a positive association between self-report of health behavior and lifestyle choices and clinical practice attitudes towards preventive counseling. By performing these international comparisons and building on existing knowledge, lessons learned will hopefully shed light on the issue of disease prevention and provide a powerful tool to engage policy makers and medical schools to adopt policies for medical education reforms and impact the behaviors of future physicians and patients.

2. Research Question and Hypothesis

In addition to a descriptive analysis of health behaviors and attitudes towards preventive counseling among Duke and Chinese medical students, the main question this study attempts to answer is, “Is there an association between medical students’ self-report of health behaviors and clinical practice attitudes towards preventive counseling?” As a result, the study hypothesis is that there is in fact no association between medical students’ self-reports of health behaviors and clinical practice attitudes towards preventive counseling. Likewise, the alternate hypothesis would then be that there is an association between medical students’ self-reports of health behaviors and their clinical practice attitudes towards preventive counseling.

3. Specific Aims

Working from the premise that physicians globally serve as role models for patients, this study, coined "MedLife", seeks to explore the health behaviors of medical students at Duke and at two institutions in China, and identify associations between self-report of health behaviors and lifestyle choices and their clinical practice attitudes towards preventive counseling of future patients. In addition to examining the prevalence of health behaviors among students in China and at Duke, this study also seeks to determine if current health behaviors influence medical students' attitudes of patient counseling. This analysis will also offer a descriptive estimation of the differences and similarities between medical students' self-report of health behaviors and lifestyle choices and their clinical practice attitudes towards preventive counseling across the developed and developing country divide. The following are specific project aims, audiences, impacts, and action steps for this study:

1. Examine the prevalence of medical students' health behaviors in China and at Duke (main exposure variables: diet, exercise, smoking, and alcohol consumption) and clinical practice attitudes towards counseling future patients on these domains.
    a. Audience and Impact: Findings can be disseminated to a wide audience of key stakeholders and interested parties including the medical student community as well as medical school administrators in order to give them a clearer picture of the health status and attitudes of the student body.

b. Action steps: Findings will hopefully reach medical students and encourage them to adopt healthier lifestyles as well as encourage medical school administrators to adopt policies promoting healthier lifestyles through a proactive curriculum emphasizing prevention in addition to creating a positive school environment through academic and personal support.

2. Investigate any association between medical students' health behaviors and their clinical practice attitudes towards preventive counseling in China and at Duke (main outcome measure).
    a. Audience and Impact: Discoveries in this area can be fed back into medical schools to illustrate the current attitudes towards preventive counseling among medical students.
    b. Action steps: Results from this study may support recommendations for increased emphasis on prevention of non-communicable diseases in the medical school curriculum globally.
3. Describe the differences in health behaviors and clinical practice attitudes towards preventive counseling between Chinese and Duke medical students.
    a. Audience and Impact: Audiences from medical schools internationally may be interested to know the differences in lifestyles and attitudes across cultures, particularly in light of the rapid urbanization China is experiencing.
    b. Action steps: Studies such as this may prompt further research into the

similarities and differences of healthy lifestyles and particularly when their associated attitudes towards prevention differ across borders. In addition, similar studies may build on this study and be conducted in other countries to better understand these issues on a broader international scale.

4. Methods

4.1 Study Sample

Study subjects were recruited at one US-based institution and two Chinese-based institutions. In order to participate in the study, participants must have been current students as of October 2012, enrolled in the Doctor of Medicine (MD) or Doctor of Medicine/Doctor of Philosophy (MD/PhD) degree programs at Duke University School of Medicine in Durham, North Carolina, USA, or students with a declared clinical medicine major who are enrolled in years 2, 4, and 7 at Peking University Health Science Center (PUHSC) in Beijing, China, and Xi'an Jiaotong University (XJTU) in Xi'an China. Given the feasibility via email lists at Duke, all 425 medical students were considered eligible. As a result of logistical feasibility, students were considered eligible as 2nd, 4th, and 7th year students so as to represent students from pre-clinical, new-clinical, and post-clinical studies.

Based on a sample size calculation informed by a pilot study while considering the scope of the larger MedLife study, the target sample size was 150 students each from year two, four, and seven at these two universities. Overall, the target sample was 425 students at Duke and 791 students at the two schools in China.

4.2 Survey Tool and Distribution

This study examined the prevalence of health habits and their associations with opinions and clinical practice attitudes towards patient counseling and prevention of NCDs via a 33-item, self-reported online survey of medical students. The questionnaire

distributed to Chinese medical students was translated into Mandarin and back-translated into English by a third party to ensure an accurate translation. All students at Duke and the China schools were emailed an internet link to complete the questionnaire and allowed to complete it within two weeks. Students at both Duke and the schools in China received nominal, appropriate monetary compensation for taking the time to complete the survey. The total survey was designed to be completed in either language in 15 minutes.

The web-based, self-administered survey (see Appendices A and B for the English versions of both surveys used at Duke and in China) consisted of sections on personal health behaviors (diet, exercise, smoking, and alcohol consumption), attitudes towards preventive counseling in these domains, and demographic information. Many questions were extracted from validated sources including the US Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS), CDC National Health Interview Survey, International Physical Activity Questionnaire (IPAQ), and the Healthy Doctor = Healthy Patient Questionnaire [12, 18-24]. All questions that were included were based on consultations with our research team at The George Institute for Global Health in Beijing, China, and leading authorities in global health, Professor Stephen Leeder of The University of Sydney, and Professor Erica Frank of The University of British Columbia and co-developer of the Healthy Doctor = Healthy Patient Questionnaire.

Researchers administered the culturally-adapted, web-based version of the survey in China via Survey Star, and via Duke's subscription to Qualtrics Survey Software for administering the survey to Duke medical students. A cultural adaptation of the survey

included the appropriate wording of questions and examples of food in the diet section, given the notable differences in diets between the US and China. The decision to administer the survey online as opposed to on paper was driven largely by prior research which has shown that web-based surveys are likely to get a similar response rate as paper-based surveys in the US [25-27]. Additionally, distribution of a web-based questionnaire is time- and cost-effective, and it maintains greater confidentiality than in-person group surveys [28], thus we chose the electronic method for administering the survey both at Duke University and in China. Due to logistical feasibility, the target sample was all four classes of Duke medical students, which allowed for a sound descriptive comparison against medical students in China as well as inter-class comparisons at Duke.

In an effort to maximize the response rate at Duke, the Duke University School of Medicine administration supported the research by reaching out to all students via email, and subsequently by four reminder emails each approximately two weeks apart from October 2012 to November 2012. A similar distribution method was implemented at the Chinese medical schools from December 2012 through February 2013.

4.3 Outcome Measures

The primary outcomes (dependent variables) of this study are the attitudes of medical students towards preventive counseling. These outcome variables were measured by asking the students how relevant they felt counseling on diet, exercise, smoking, and alcohol consumption each were in their intended practices. Students who reported that

counseling on each these four domains was highly relevant were categorized as having a positive clinical practice attitude towards preventive counseling. However, those reporting that counseling on any one of these behaviors was somewhat or not at all relevant were categorized as having a negative clinical practice attitude towards preventive counseling.

4.4 Exposure Variables

The four main domains of exposure variables were diet, exercise, smoking, and alcohol consumption. Alcohol consumption was broken down into two sub-categories: non-binge drinking and non-heavy drinking [29]. Those complying with dietary recommendations in the United States had to report consuming on average ≥ 5 servings of vegetables and/or fruits per day [30]. Given the differences between diets among the Chinese and those in the United States, participants in China who reported consuming at least 200 grams per day of fruits *and* 300 grams per day of vegetables were considered to be in compliance with Chinese dietary recommendations [31]. Those meeting exercise recommendations included those subjects who reported engaging in 150 minutes or more of moderate-to-vigorous physical activity in the last week [32]. Participants were categorized as smokers if they reported having smoked at least 100 cigarettes in their lives and currently smoke cigarettes [19]. Heavy drinkers were those students who had on average > 1 alcoholic drink daily for women and > 2 alcoholic drinks daily for men in an average month. Binge drinkers were those who reported drinking ≥ 4 drinks for women and ≥ 5 drinks for men in one sitting at any time during the past month [29, 33]. Those

respondents who reported to meet dietary and exercise recommendations, reported being non-smokers, non-heavy drinkers, and non-binge drinkers were considered to be leading an overall healthy lifestyle.

4.5 Analysis

The two medical universities in China were selected because of feasibility and accessibility due mainly to the researchers' relationships with these schools. The subjects consisted of three classes of clinical medical students who had entered these five medical schools in 2006, 2009 and 2011. The study focused on the medical students who will have direct contact with patients and can provide patients with preventive counseling. Students enrolled in 2006 were representative of senior clinical medical students who will have finished their medical education and started their clinical rotations. Students who matriculated into medical school in 2009 and 2011 were representative of junior medical students, who have already gone through a part of their medical education training, but have not yet had substantial, or any, contact with patients. Thus, the selected samples in these three grades provided an overall picture of the medical student population at a Chinese medical school. Furthermore, due to the selection of students from different grades and thus at different stages in their medical training, several aspects of the study content could be compared across levels of medical training.

It was expected beforehand that there may be some differences due to education level and professional development in health behaviors and attitudes among different years of students. Consequently, data from each year were kept separate to avoid any

effect modification that might have been present or influenced the analysis due to experience and training as students advance in their medical school careers. Self-reported prevalence estimates were obtained for years 1-4 at Duke and years 2, 4, and 7 in China on body mass index, health behaviors (diet, exercise, smoking, and alcohol), and clinical practice attitudes towards preventive counseling on each of these four domains (see Tables 4 and 5). Subsequent to the prevalence analysis, univariate logistic regression analyses were performed to obtain odds ratios (ORs), 95% confidence intervals (CIs) and *p*-values (α=0.05) to assess the association between self-report of health behaviors and lifestyle choices and clinical practice attitudes towards preventive counseling in each of these domains at both Duke and in China (see Tables 6 and 7). In addition, data were subsequently pooled to include all years by country to better understand the student bodies as a whole in each country (see Tables 6 and 7). Next, multivariate logistic regression analyses were completed, adjusted for gender to further evaluate the association between self-report of health behaviors and lifestyle choices, and clinical practice attitudes towards preventative counseling for both Duke and the universities in China (see Tables 8 and 9). Due to sample size and the desire to assess countries as a whole while adjusting for gender, these multivariate results were not stratified by years of the students. Collinearity between the domain variables was tested by identifying unusually large CIs and by assessing the two-by-two tables to recognize individual strata with values less than a commonly recognized standard of five in one stratum. All analyses were performed using Stata/IC 12.1 (StataCorp) [34].

Institutional Review Board (IRB) approval for this study was obtained from the Peking University Health Science Center IRB and Duke University Health System IRB. Confidentiality of the survey participants was ensured by maintaining survey anonymity and separately storing any identifiable information from that of the survey data. Data security was safeguarded by storing information on a password-protected computer. It was made clear to the study subjects in the informed consent process that participation in the study was completely voluntary and they could choose to end the survey at any point. The information obtained in the study was used strictly for research purposes and it is expected that the results will be disseminated to the public via this thesis and relevant peer-reviewed publications.

5. Results

A total of 860/1,216 (response rate = 71%) medical students from the United States and China completed culturally-adapted versions of the MedLife questionnaire. Of those participants, 630/791 (response rate = 80%) were from students at Peking University Health Science Center and Xi'an Jiaotong University together, while 230/425 (response rate = 54%) were from Duke University. The median ages of students at Duke in years one, two, three, and four were 23 years, 24 years, 25 years, and 26 years, respectively. The median ages of students at both schools in China among second, fourth, and seventh year students were 19 years, 22 years, and 24 years, respectively. In addition, the proportions of female students among survey participants were 51% and 54% at Duke and in China, respectively. See Tables 1 and 2 for a detailed breakdown of respondent demographics at Duke and in China.

5.1 Prevalence Estimates of Positive Clinical Practice Attitudes towards Preventive Counseling among Medical Students' Self-Reports of Healthy Lifestyles

Table 3 illustrates those students who had a positive clinical practice attitude towards counseling on diet among those who ate a healthy diet, those who had a positive clinical practice attitude towards counseling on exercise among those who complied with exercise recommendations, and so on. Given a healthy lifestyle in any particular domain, no more than 61% of students in both China and at Duke had a positive attitude towards counseling on that given domain. Furthermore, 51% of Chinese medical students and

36% of Duke medical students who reported being non-heavy drinkers had a positive attitude towards counseling on alcohol consumption. Finally, given an overall healthy lifestyle, 39% and 17% of Chinese and Duke medical students, respectively, reported a positive clinical practice attitude towards counseling on all domains of health behaviors.

5.2 Prevalence Estimates of Self-Reported Health Behaviors

The prevalence of self-reported health lifestyle domains of BMI, diet, exercise, smoking, and alcohol, stratified by year at Duke is shown in Table 4. Twenty-four percent of medical students at Duke were categorized as overweight (BMI $\geq$ 25). Duke medical students reported adhering the least to lifestyle recommendations in the domains of diet, exercise, and non-binge drinking with compliance rates of 30%, 42%, and 41%, respectively. On the other hand, Duke medical students had a higher compliance with non-smoking and non-heavy drink with prevalence rates of 99% and 77%, respectively. Students at Duke reported an overall compliance of 5% with diet, exercise, non-smoking, non-binge, and non-heavy drinking combined. Differences between years of students among all individual lifestyle domains were determined not to be statistically significant via a chi-square analysis (*p*-values not shown).

Similar estimates for Chinese medical students were also calculated and are shown in Table 5, stratified by year. Nine percent of respondents in China were considered overweight (BMI $\geq$ 25) and had compliance rates of 17% and 33% for diet and exercise, respectively. Chinese medical students also reported a compliance with non-smoking and non-heavy drinking of 97% and 99%, respectively. Medical students in

China also reported a 94% compliance with non-binge drinking and an overall 6% compliance with diet, exercise, non-smoking, non-binge, and non-heavy drinking combined. The difference of diet compliance between years of students in China were statistically significant via a chi-square analysis (p=0.01, not shown). Differences between years of students among all other individual health domains were determined not to be statistically significant via a chi-square analysis (p-values not shown).

5.3 Prevalence Estimates of Positive Clinical Practice Attitudes towards Preventive Counseling

Table 4 shows the prevalence of positive clinical practice attitudes towards preventive counseling among each health lifestyle domain as well as all domains combined, stratified by year at Duke. Students at Duke had a more positive clinical practice attitude towards counseling patients on diet, exercise, and smoking (51%, 56%, and 55% respectively) than they did towards counseling on alcohol consumption (37%). Furthermore, 30% of Duke medical students had a positive clinical practice attitude towards preventive counseling on all four lifestyle domains combined. Finally, 41% of Duke medical students had an overall perception that their school environment encouraged leading healthy lifestyles, with the highest percentage of students with a positive attitude being in their first year (51%) and the lowest among second years (31%).

Table 5 shows the prevalence of positive clinical practice attitudes towards preventive counseling among each self-reported health lifestyle domain as well as all domains combined, stratified by year in China. Forty-nine percent of medical students in

China had a positive clinical practice attitude towards counseling patients on a healthy diet, while 45% had a positive clinical practice attitude towards counseling on exercise. Furthermore, 60% of medical students had a positive clinical practice attitude towards counseling on smoking and 51% had a positive clinical practice attitude towards counseling on alcohol consumption. Additionally, 25% of Chinese medical students had a positive clinical practice attitude towards preventive counseling on all four lifestyle domains combined. Finally, 76% of Chinese medical students had an overall perception that their school environment encourages leading healthy lifestyles, with the highest percentage of students having a positive attitude being in their second and seventh years (78%) and the lowest among fourth years (73%).

5.4 Associations between Self-Reported Health Behaviors and Clinical Practice Attitudes towards Preventive Counseling

The likelihood of having a positive clinical practice attitude towards each health lifestyle domain for each year of medical students at Duke is shown in Table 6. In terms of an association between health behaviors and clinical practice attitudes towards preventive counseling, third year Duke medical students who complied with exercise recommendations were 1.65 times less likely to have a positive clinical practice attitude towards preventive counseling on exercise (OR=0.35; 95% CI=0.12-0.99; p=0.05) than those who were non-compliant to exercise guidelines.

Similarly, the likelihood of having a positive clinical practice attitude towards each health lifestyle domain for each year of medical students at both universities in

China is shown in Table 7. Collectively, Chinese medical students who complied with all lifestyle recommendations were more likely to have a positive clinical practice attitude regarding counseling on all health lifestyle domains (diet, exercise, smoking, and alcohol) combined (OR=2.03 95% CI=1.06-3.92; p=0.03). Similarly, Table 7 reveals that second year medical students in China who complied with all health lifestyle recommendations were 4.92 times more likely to have a positive clinical practice attitude regarding counseling on all health lifestyle domains combined (95% CI=1.68-14.41; p<0.01). Finally, Chinese medical students were collectively more likely to have a positive clinical practice attitude towards smoking if they reported being a non-smoker (OR=2.72; 95% CI=1.12-6.58; p=0.03).

Similar analyses not part of the original study hypothesis were performed among each lifestyle and attitude domain (see Appendices D and E) which resulted in few additional associations than what was presented in the main text.

5.4 Multivariate Models Adjusted for Gender of Associations between Self-Reported Health Behaviors and Clinical Practice Attitudes towards Preventive Counseling

Table 8 shows the likelihood of having a positive clinical practice attitude towards each health lifestyle domain adjusted for gender for all medical students at Duke. When adjusted for gender, all predicted associations between self-reported health behaviors and clinical practice attitudes towards preventive counseling, as shown in Table 8, were still not statistically significant (determined by a p-value ≤ 0.05). According to the results

presented in Tables 8, there were numerous significant associations between gender and clinical practice attitudes towards preventive counseling among Duke medical students.

Table 9 shows the likelihood of having a positive clinical practice attitude towards each health lifestyle domain adjusted for gender for all medical students in China. When adjusted for gender, all Chinese medical students together who comply with all lifestyle recommendations were more likely to have a positive clinical practice attitude regarding counseling on all health lifestyle domains combined (OR=1.98 95% CI=1.02-3.83; p=0.04). Finally, the association between non-smoking and clinical practice attitudes towards counseling on smoking among medical students in China was no longer statistically significant (determined by a p-value ≤ 0.05) when adjusted for gender (OR=2.32 95% CI=0.94-5.70; p=0.07).

6. Discussion

Our study found that medical students at Duke engaged in unhealthy lifestyle behaviors in the domains of diet, exercise, and non-binge drinking, while they seem to have led healthy lifestyles in the domains of non-smoking and non-heavy drinking. Furthermore, medical students in China appear to have led unhealthy lifestyles in the areas of diet and exercise, while they seem to have engaged in healthy lifestyle behaviors in the areas of non-smoking, non-binge drinking, and non-heavy drinking. Our findings also suggest that the majority of students have negative clinical practice attitudes towards preventive counseling at both Duke and in China, and that these attitudes appear to only be associated with health behaviors among Chinese medical students. Duke medical students have higher rates of compliance with diet and exercise than Chinese medical students, while Chinese medical students have higher rates of compliance with non-binge drinking than those at Duke. Finally, we found that Duke medical students have a higher overall positive attitude towards preventive counseling on all domains combined.

Based on self-reported data, this study found that nearly one in four medical students at Duke could be classified as overweight based on a body mass index of 25 or greater. In contrast, this study found that less than one in ten medical students in China could be classified as overweight, also based on a body mass index of 25 or greater. Prevalence data of health behaviors show that Duke medical students complied the least with diet and exercise recommendations and a majority self-reported that they engaged in binge drinking in the last month. On the other hand, there appeared to be an overall high compliance with non-smoking and non-heavy drinking among Duke medical students.

Similar to Duke, Chinese medical students' adherence to a healthy lifestyle seemed to be the lowest in the areas of diet and exercise. However, medical students in China seem to have led healthy lifestyles in the domains of non-smoking, non-heavy drinking, and non-binge drinking. It seems that the prevalence estimates of non-smoking and heavy drinking are not as concerning as diet and exercise for both Duke and China, and binge drinking at Duke. Overall, these three health domains of diet, exercise, and non-binge drinking highlight the areas in which students at Duke can focus their greatest efforts on improving their healthy lifestyles. Students in China also have an opportunity to improve their health behaviors in these domains, excluding non-binge drinking.

To put the results of Duke medical students into context, one can make comparisons to other US medical students. A 2006 study of over 2,300 US medical students by Frank et al. revealed the following average lifestyle behaviors: 2.7 servings of fruits and/or vegetables per day; 150 minutes of moderate-to-vigorous exercise per week; 7% smokers; 34% binge drinkers [35]. It appears that Duke medical students were healthier compared to students in Frank's study in all domains except binge drinking. Despite this comparison, prevalence estimates for the domains of diet, exercise, and binge drinking were at levels that were concerning and should be addressed by both medical schools and the students themselves. However, it should be emphasized that these data were only from one particular US-based medical school and findings should not necessarily be generalized to all medical schools.

At the time of our study, no published reports of lifestyle choices of medical students in China were known to us. However, to put the results of the Chinese students

into context, one can make comparisons to the broader general public. Overall, the Chinese students in our sample had a lower smoking prevalence [36] and a higher consumption of fruit than the general Chinese population [37]. On the other hand, medical students in China did not perform as well as the general Chinese population in the areas of vegetable consumption and exercise. These findings also indicate that Chinese medical students reported, on average, consuming fewer vegetables [37] and engaged in less time of moderate-to-vigorous exercise compared to the general Chinese population [38]. These comparisons are consistent with this study's recommendations that the domains of diet and exercise should be addressed by both medical schools and by the students themselves.

The low prevalence estimates of positive clinical practice attitudes given a healthy lifestyle appear to provide little evidence of an association between self-report of health behaviors and clinical practice attitudes towards preventive counseling among medical students at Duke and in China. Based on the prevalence estimates of positive clinical practice attitudes towards preventive counseling, we found that no greater than one in three students at Duke and in China had positive clinical practice attitudes towards preventive counseling on all four lifestyles domains (diet, exercise, smoking, and alcohol consumption) combined. From this finding, it seems that schools have an opportunity to improve students' clinical practice attitudes towards counseling future patients on all four of these domains. While the majority of students in China felt that their medical schools promoted healthy lifestyles, less than half of Duke medical students reported feeling the

same way. This difference suggests that there are perhaps policies in China that may be adapted at Duke to enhance the students' perceptions of the overall school environment.

Based on our results, it appears that there was a negative association among Duke medical students in terms of third years' exercise behaviors and their clinical practice attitudes towards counseling on exercise. That is, those who performed moderate-to-vigorous physical activity for at least 150 minutes per weak were actually less likely to have a positive clinical practice attitude towards counseling on exercise and similarly, those who did not follow exercise recommendations were more likely to have a positive clinical practice attitude towards preventive counseling on exercise. This finding contradicts what has previously been found in a large representative survey of medical students at 16 medical schools throughout the United States [39]. Due to the sample size, this finding could have been due to chance. If, however, this finding was not due to chance, this suggests that there was a gap between students' personal health behaviors and their clinical practice attitudes towards preventive counseling. In other words, solely because students complied with exercise recommendations does not necessarily indicate that they had positive clinical practice attitudes towards counseling their future patients on maintaining a healthy lifestyle by exercising. It should be emphasized that inferences from this finding should be interpreted with caution and this association only appeared among third year medical students at Duke, and did not appear in the overall school analysis. Overall, this study revealed little statistically significant evidence among Duke medical students that their personal self-reported health behaviors were associated with positive clinical practice attitudes towards preventive counseling.

In contrast to Duke medical students, there were a small number of statistically significant associations between students' self-reported health behaviors and clinical practice attitudes towards preventive counseling among Chinese medical students. It appears there were associations between health behaviors and clinical practice attitudes towards preventive counseling when examined collectively as second, fourth, and seventh year students combined. For example, Chinese medical students were collectively more likely to have a positive clinical practice attitude towards smoking if they reported being a non-smoker. This finding should be interpreted while keeping in mind that there were a small number of smokers in the Chinese medical school study population. In addition, students who adhered to all lifestyle recommendations (diet, exercise, non-smoking, non-binge drinking, and non-heavy drinking) were more likely to have a positive clinical practice attitude towards preventive counseling on all domains together. Given that this association was not found in fourth and seventh year students, it may have been true that this association among all students collectively was largely driven by second year students in China who were healthy in all domains and nearly five times more likely to have an overall positive clinical practice attitude towards counseling on these domains collectively. Nonetheless, the data indicated that there was indeed an association between living an overall healthy lifestyle and having a positive clinical practice attitude towards counseling on all four lifestyle domains. This finding implies that medical school policies aimed at improving students' lifestyle behaviors in China may have an impact on their clinical practice attitudes towards preventive counseling, and thus positively impact counseling practices of their future patients on prevention.

Even when adjusting for gender in the logistic regression models, there appeared to be a lack of evidence for any associations between health behaviors and clinical practice attitudes towards preventive counseling among medical students at Duke. Despite this finding, the multivariate logistic regression models did reveal a relatively strong association between being female and having a positive clinical practice attitude towards each health behavior domain. This association is not a new finding, as being female was shown in previous literature as strongly associated with a positive clinical practice attitude towards preventive counseling on these behaviors [18]. Finally, upon adjusting for gender, students were still more likely to have a positive clinical practice attitude towards preventive counseling on all four domains collectively if they adhered to an overall healthy lifestyle. Independent of gender, this supports the idea that medical school policies aimed at improving students' lifestyle behaviors in China may have an impact on counseling their future patients on prevention in these four domains.

It is also interesting to provide a descriptive comparison between lifestyle choices and clinical practice attitudes towards preventive counseling of Duke and Chinese medical students. Compared to each other, Duke medical students seem to have been more compliant with dietary and exercise recommendations than Chinese medical students, but less compliant when it comes to binge drinking. This suggests that there may be policies in China that could improve binge drinking at Duke. Similarly, there may also be policies at Duke that could improve diet and exercise compliance in China. Further investigation into these particular policies that can be adapted across nations needs to be done in order to better understand the feasibility of such suggestions.

However, in terms of attitudes, there appeared to be only a small difference in the prevalence estimates of overall attitudes towards preventive counseling among both Duke and Chinese medical students. This small difference together with an overall low prevalence of positive clinical practice attitudes towards preventive counseling among Duke and Chinese students suggests that there is room for improvement of attitudes among both populations.

In terms of health behaviors, there appears to be opportunities to improve. Namely, there appears to be opportunities for Duke medical students to reduce their alcohol binge drinking practices. Furthermore, there also seems to be room for improvement in following diet and exercise guidelines among both Duke and Chinese students. As a result of these self-reported prevalence estimates among medical students at Duke and in China, medical school policies can be scaled up to encourage students to lead healthier lifestyles, particularly in the domains mentioned above which raise concern. The medical schools surveyed in this study need to ensure that they are emphasizing prevention and encouraging positive clinical practice attitudes towards all domains of NCD prevention so that these attitudes have a positive impact on their future patients. According to findings from this study at Duke, analyses suggest that perhaps students were able to separate their personal behaviors from their clinical practice attitudes towards prevention. Particularly at Duke, there appeared to be limited evidence to demonstrate an association between self-reported lifestyle choices and clinical practice attitudes towards preventive counseling. However, schools should not discount the overall health of their students. Simply because students' self-reported personal health

behaviors did not seem to be significantly associated with their clinical practice attitudes towards prevention does not suggest that medical schools should not focus on the health of their students. As a result, healthy lifestyles among students should be a top priority for medical schools.

A plausible medical school policy recommendation is to formulate a means that ensures that medical schools are recruiting students who demonstrate a desire to commit to a healthy lifestyle and convey the importance of prevention to their future patients. Perhaps students' positive clinical practice attitudes towards preventive counseling and desires to lead by example affect their opinions and practices throughout medical school and into their medical practices and the professional advice and guidance they provide to patients.

The results from this international study shed light on the current prevalence of self-reported health behaviors across countries and provide evidence-based recommendations for medical school policies to enhance the promotion of healthy lifestyles and clinical practice attitudes towards preventive counseling among students. It also demonstrates that there is still work to be done in terms of making students feel encouraged about healthy lifestyles as well as actually leading healthy lifestyles. In addition to using the findings as a tool for comparison between Chinese and Duke medical students, findings from this study are useful for medical schools in both the United States and internationally in terms of understanding that there is progress to be made in getting students to lead by example and encouraging healthy lifestyle choices among their future patients.

7. Conclusion

Medical students at Duke have opportunities to improve their diet, exercise, and non-binge drinking behaviors, while students in China have opportunities to improve their diet and exercise habits. In addition, it seems that there is room for improvement in terms of a positive clinical practice attitude towards preventive counseling on all four health behavior domains.

The results found at Duke provided little evidence to support the idea of an association between self-report of health behaviors and clinical practice attitudes towards preventive counseling, even when adjusting for gender, a known predictor of positive clinical practice attitudes towards preventive counseling. However, this study did reveal evidence of an association between those students who reported to adhere to an all-around healthy lifestyle and positive clinical practice attitude towards all lifestyle domains, even after adjusting for gender. This finding from China of a positive association between the self-report of health behaviors and clinical practice towards preventive counseling supports one previous study conducted in a developing nation.

The importance for students to live healthy lifestyles should continue to be stressed in medical schools worldwide. As a result of schools' increase in promoting healthy lifestyles and positive clinical practice attitudes towards preventive counseling, there lies the potential for significant alleviations in the global burden of non-communicable diseases.

8. Future Directions

Led by a team of scholars at The George Institute for Global Health in Beijing, China, this study is expected to be conducted at three additional medical schools in China: China Medical University, Changzhi Medical College, and Ningxia Medical University in order to obtain a broader picture of the situation across northern China. Given that a significant association exists between gender and attitudes, future studies might involve further investigation into the role that gender plays in terms of clinical practice attitudes towards counseling patients on prevention, particularly in developing nations.

In the context of behaviors and attitudes, scholars and interested parties should begin to think about a common variable that might be influencing these health behaviors, such as stress. It may be that stress impacts a poor diet, lack of exercise, smoking, and increased alcohol consumption. Given the impact and importance of other healthcare workers in the field such as nurses, medical assistants, physician assistants, and others, it may be beneficial to carry out this study in the United States and internationally among these student populations. Like doctors, healthcare professionals such as these provide direct patient care and often times interact with patients more frequently than physicians, and so by investigating the health behaviors and clinical practice attitudes of these populations, researchers may be able to paint a more complete picture of healthcare staff in general.

Finally, it may be insightful to consider how students' perceived training on these domains is associated with their clinical practice attitudes towards preventive counseling.

Perhaps the training students believe they receive in the area of health behaviors and chronic disease prevention is associated with their clinical practice attitudes towards these lifestyle domains as well. Needless to say, there are numerous studies to be done in the investigation of medical students' lifestyles and their clinical practice attitudes towards preventive counseling worldwide.

9. Limitations

Limitations of this study include the possibility that the survey may be prone to self-report bias. Specifically, students may have been concerned with their privacy, and thus may have reported what they felt as more socially desirable. In addition, given that medical school tuition is subsidized for students in China, perhaps respondents were more reluctant to provide honest answers for fear that their answers would not remain confidential. However, it was anticipated that by informing participants that all information will be kept confidential and no identifiers will be directly associated with the data maximized honest answers. Previous examination has shown that in fact self-reports of students are useful and relatively accurate [21]. In addition, as a result of the cross-sectional nature of the survey, it is difficult to establish cause and effect relationships. One must also consider the unique curriculum at Duke University, which may limit the generalizability to other US-based medical schools. Consequently, there may be concern for the strength of this study's external validity. However, by utilizing survey questions gathered from validated survey tools in combination with targeting multiple class levels of students, these limitations were mitigated. Finally, certain stratified analyses by school year deemed significant should be interpreted with caution while considering sample size as there were certain associations that appeared in a particular year but did not appear in the school's pooled estimates.

Table 1. Median ages at survey completion and gender distribution of medical student respondents at Duke University School of Medicine

	1st year (n=57)	2nd year (n=48)	3rd year (n=65)	4th year† (n=60)	Total (n=230)
Age (median)	23	24	25	26	25
Female - n (%)	27 (47)	31 (65)	31 (48)	29 (48)	118 (51)

†4th year includes nine MD/PhD students.

Table 2. Median ages at survey completion and gender distribution of medical student respondents at Peking University Health Science Center (PUHSC) and Xi'an Jiaotong University (XJTU)

	2nd year (n=263)		4th year (n=224)		7th year (n=143)		
	PUHSC (n=115)	XJTU (n=148)	PUHSC (n=49)	XJTU (n=175)	PUHSC (n=26)	XJTU (n=117)	Total (n=630)
Age (median)	19		22		24		21
Female - n (%)	129 (49)		132 (59)		77 (54)		338 (54)

Table 3. Positive clinical practice attitudes towards preventive counseling among medical students at Duke and at both schools in China who live a healthy lifestyle as defined in each respective domain

Healthy Lifestyle Domain	Positive Attitude†			
	Duke		China	
	No.	%	No.	%
Diet				
Consuming ≥ 5 daily servings of fruits and/or vegetables (Duke) Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily (China)	37/70	53%	54/109	50%
Exercise				
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	49/96	51%	101/210	48%
Smoking				
Non-smoking[a]	125/227	55%	370/608	61%
Alcohol				
Non-binge drinking[b]	37/94	39%	307/592	52%
Non-heavy drinking[c]	63/176	36%	321/626	51%
All habits				
Overall health behaviors[d]	2/12	17%	16/41	39%

†Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) are highly relevant to their intended practices.
[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.
[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.
[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.
[d]Overall health behaviors are those who report ≥ 5 daily servings of fruits and/or vegetables daily (Duke) or ≥ 200g of fruits *and* ≥ 300g vegetables daily (China), ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking who believe that talking to patients about diet, exercise, smoking, and alcohol are all highly relevant to their intended practices.

Table 4. Self-reported health behaviors and clinical practice attitudes towards preventive counseling among medical students at Duke University

Attributes	1st year (n=57) %	2nd year (n=48) %	3rd year (n=65) %	4th year† (n=60) %	Total (n=230) %
Body mass index (kg/m^2)					
<18.5	7	8	2	3	5
18.5-24.9	68	73	71	73	71
25-30	23	17	26	23	23
>30	2	2	2	0	1
Students' reported health habits					
≥5 daily servings of fruits and/or vegetables	35	23	37	25	30
≥150 min/week of moderate-to-vigorous physical exercise	47	38	38	43	42
Non-smoking[a]	98	96	100	100	99
Non-binge drinking[b]	42	42	42	38	41
Non-heavy drinking[c]	84	71	80	70	97
Overall health behaviors[d]	9	0	5	7	5
Students with positive clinical practice attitude towards counseling patients on healthy lifestyles regarding[e]:					
Diet	54	44	48	57	51
Exercise	65	50	48	60	56
Smoking	51	48	57	63	55
Alcohol consumption	32	42	42	32	37
All habits[f]	28	29	34	28	30
Students' overall perception of the school environment encouraging leading healthy lives[g]	51	31	37	43	41

†4th year includes nine MD/PhD students.

[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.

[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.

[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.

[d]Overall health behaviors are those who report ≥ 5 daily servings of fruits and/or vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking.

[e]Positive clinical practice attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) is highly relevant to their intended practices.

[f]All habits are those who believe that talking to patients about diet, exercise, smoking, and alcohol consumption are all highly relevant to their intended practices.

[g]Students' overall perceptions of the school environment encouraging leading healthy lives were students who strongly agreed or agreed that overall, their medical school has encouraged them to lead healthy lives.

Table 5. Self-reported health behaviors and clinical practice attitudes towards preventive counseling among medical students in China

Attributes	2nd year (n=263) %	4th year (n=224) %	7th year (n=143) %	Total (n=630) %
Body mass index (kg/m^2)				
<18.5	13	14	12	13
18.5-24.9	78	79	74	78
25-30	4	5	8	5
>30	5	2	5	4
Students' reported health habits				
≥ 200g of fruits *and* ≥ 300g vegetables daily (Chinese Nutrition Society Guidelines)	15	23	12	17
≥150 min/week of moderate-to-vigorous physical exercise	35	33	32	33
Non-smoking[a]	96	97	96	97
Non-binge drinking[b]	95	95	91	94
Non-heavy drinking[c]	99	99	99	99
Overall health behaviors[d]	6	8	5	6
Students with positive clinical practice attitude towards counseling patients on healthy lifestyles regarding[e]:				
Diet	53	50	41	49
Exercise	49	44	38	45
Smoking	59	62	58	60
Alcohol consumption	50	53	50	51
All habits[f]	25	27	21	25
Students' overall perception of the school environment encouraging leading healthy lives[g]	78	73	78	76

[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.
[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.
[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.
[d]Overall health behaviors are those who report ≥ 200g of fruits *and* ≥ 300g vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking.
[e]Positive clinical practice attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) is highly relevant to their intended practices.
[f]All habits are those who believe that talking to patients about diet, exercise, smoking, and alcohol consumption are all highly relevant to their intended practices.
[g]Students' overall perceptions of the school environment encouraging leading healthy lives were students who strongly agreed or agreed that overall, their medical school has encouraged them to lead healthy lives.

Note that throughout Tables 6-9, a predicted odds of zero likely indicates there is a likely a collinearity concern due to a small sample size in that particular stratum. Thus, no statistical inferences can be made in these areas.

Table 6. Association between self-reported health behaviors and positive clinical practice attitudes[†] towards preventive counseling on each individual health behavior among medical students at Duke University

	OR	95% CI	*p*-value
1st year students (n=57)			
Diet			
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.04	0.35-3.10	0.95
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.85	0.29-2.53	0.77
Smoking			
Non-smoking[a]	0.	0.	0.
Alcohol			
Non-binge drinking[b]	1.15	0.37-3.55	0.81
Non-heavy drinking[c]	4.39	0.51-38.09	0.18
All habits			
Overall health behaviors[d]	0.	0.	0.
2nd year students (n=48)			
Diet			
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.76	0.45-6.83	0.82
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.70	0.22-2.26	0.55
Smoking			
Non-smoking[a]	0.92	0.05-15.56	0.95
Alcohol			
Non-binge drinking[b]	2.58	0.79-8.44	0.12
Non-heavy drinking[c]	0.62	0.18-2.17	0.45
All habits			
Overall health behaviors[d]	0.	0.	0.
3rd year students (n=65)			
Diet			
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.16	0.42-3.17	0.78
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	**0.35**	**0.12-0.99**	**0.05**
Smoking			
Non-smoking[a]	0.	0.	0.
Alcohol			
Non-binge drinking[b]	1.23	0.45-3.33	0.69
Non-heavy drinking[c]	0.54	0.16-1.82	0.32

All habits			
Overall health behaviors[d]	0.98	0.08-11.40	0.99
4th year students (n=60)			
Diet			
Consuming ≥ 5 daily servings of fruits and/or vegetables	0.84	0.26-2.70	0.76
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.12	0.39-3.18	0.83
Smoking			
Non-smoking[a]	0.	0.	0.
Alcohol			
Non-binge drinking[b]	0.65	0.21-2.06	0.47
Non-heavy drinking[c]	0.90	0.28-2.91	0.86
All habits			
Overall health behaviors[d]	0.83	0.08-8.62	0.88
All students (n=230)			
Diet			
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.12	0.64-1.97	0.69
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.73	0.43-1.23	0.23
Smoking			
Non-smoking[a]	0.61	0.05-6.85	0.69
Alcohol			
Non-binge drinking[b]	1.23	0.71-2.12	0.46
Non-heavy drinking[c]	0.88	0.47-1.64	0.68
All habits			
Overall health behaviors[d]	0.45	0.10-2.11	0.31

[†]Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) are highly relevant to their intended practices.
[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.
[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.
[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.
[d]Overall health behaviors are those who report ≥ 5 daily servings of fruits and/or vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking who believe that talking to patients about diet, exercise, smoking, and alcohol are all highly relevant to their intended practices.
Bold = Statistically significant value (*p*-value ≤ 0.05)

Table 7. Association between self-reported health behaviors and positive clinical practice attitudes[†] towards preventive counseling on each individual health behavior among medical students in China

	OR	95% CI	*p*-value
2nd year students (n=263)			
Diet			
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.16	0.58-2.30	0.67
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.63	0.98-2.74	0.06
Smoking			
Non-smoking[a]	1.52	0.43-5.37	0.52
Alcohol			
Non-binge drinking[b]	1.87	0.61-5.76	0.27
Non-heavy drinking[c]	0.	0.	0.
All habits			
Overall health behaviors[d]	**4.92**	**1.68-14.41**	**<0.01**
4th year students (n=224)			
Diet			
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	0.85	0.45-1.59	0.61
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.08	0.61-1.89	0.79
Smoking			
Non-smoking[a]	**8.56**[§]	**0.98-74.59**	**0.05**
Alcohol			
Non-binge drinking[b]	2.00	0.57-7.03	0.28
Non-heavy drinking[c]	0.	0.	0.
All habits			
Overall health behaviors[d]	0.97	0.33-2.81	0.95
7th year students (n=143)			
Diet			
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.07	0.38-3.00	0.90
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.81	0.39-1.68	0.57
Smoking			
Non-smoking[a]	2.91	0.51-16.44	0.23
Alcohol			
Non-binge drinking[b]	1.70	0.53-5.49	0.37
Non-heavy drinking[c]	0.	0.	0.
All habits			
Overall health behaviors[d]	1.51	0.28-8.22	0.63
All students (n=630)			
Diet			
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.02	0.67-1.54	0.94
Exercise			
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.21	0.87-1.69	0.26
Smoking			
Non-smoking[a]	**2.72**	**1.12-6.58**	**0.03**

Alcohol			
Non-binge drinking[b]	1.85	0.94-3.64	0.08
Non-heavy drinking[c]	0.	0.	0.
All habits			
Overall health behaviors[d]	**2.03**	**1.06-3.92**	**0.03**

[†]Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) is highly relevant to their intended practices.
[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.
[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.
[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.
[d]Overall health behaviors are those who report ≥ 200g of fruits *and* ≥ 300g vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking who believe that talking to patients about diet, exercise, smoking, and alcohol are all highly relevant to their intended practices.
[§]Indicates significant value with collinearity concern.
Bold = Statistically significant value (*p*-value ≤ 0.05)

Table 8. Model of positive clinical practice attitudes[†] towards preventive counseling among medical students adjusted for gender at Duke University

	OR	95% CI	*p*-value
All students (n=230)			
Diet			
Female[a]	**1.87**	**1.10-3.16**	**0.02**
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.05	0.59-1.86	0.86
Exercise			
Female[a]	**2.02**	**1.18-3.45**	**0.01**
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.81	0.47-1.39	0.44
Smoking			
Female[a]	**1.74**	**1.03-2.94**	**0.04**
Non-smoking[b]	0.66	0.06-7.57	0.74
Alcohol			
Female[a]	**1.94**	**1.11-3.37**	**0.02**
Non-binge drinking[c]	1.11	0.64-1.94	0.71
Alcohol			
Female[a]	**1.97**	**1.14-3.40**	**0.02**
Non-heavy drinking[d]	0.89	0.47-1.69	0.73
All habits			
Female[a]	1.72	0.97-3.06	0.06
Overall health behaviors[e]	0.47	0.10-2.23	0.34

[†]Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) is highly relevant to their intended practices.
[a]Model adjusted for gender, male gender is referent category.
[b]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.
[c]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.
[d]Heavy drinkers are men who drink on average > 2 drinks daily and women who drink on average > 1 drink daily.
[e]Overall health behaviors are those who report ≥ 5 daily servings of fruits and/or vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking who believe that talking to patients about diet, exercise, smoking, and alcohol are all highly relevant to their intended practices.
Bold = Statistically significant value (*p*-value ≤ 0.05)

Table 9. Model of positive clinical practice attitudes[†] towards preventive counseling among medical students adjusted for gender in China

	OR	95% CI	*p*-value
All student (n=630)			
Diet			
Female[a]	**1.39**	**1.02-1.92**	**0.04**
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	0.93	0.61-1.43	0.75
Exercise			
Female[a]	1.21	0.88-1.67	0.24
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.25	0.89-1.75	0.20
Smoking			
Female[a]	**1.38**	**0.99-1.91**	**0.05**
Non-smoking[b]	2.32	0.94-5.70	0.07
Alcohol			
Female[a]	**1.64**	**1.18-2.27**	**<0.01**
Non-binge drinking[c]	1.44	0.72-2.89	0.31
Alcohol			
Female[a]	**1.66**	**0.21-2.28**	**<0.01**
Non-heavy drinking[d]	0.	0.	0.
All habits			
Female[a]	**1.54**	**1.06-2.23**	**0.02**
Overall health behaviors[e]	**1.98**	**1.02-3.83**	**0.04**

[†]Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) is highly relevant to their intended practices.
[a]Model adjusted for gender, male gender is referent category.
[b]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.
[c]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.
[d]Heavy drinkers are men who drink on average > 2 drinks daily and women who drink on average > 1 drink daily.
[e]Overall health behaviors are those who report ≥ 200g of fruits *and* ≥ 300g vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking who believe that talking to patients about diet, exercise, smoking, and alcohol are all highly relevant to their intended practices.
Bold = Statistically significant value (*p*-value ≤ 0.05)

Appendix A

DUKE MEDICAL STUDENT QUESTIONNAIRE
Medical Students' Lifestyles and Attitudes towards Preventive Counseling ("MedLife")

Q2.1 Would you say that in general your health is:

- ☐ Excellent
- ☐ Very Good
- ☐ Good
- ☐ Fair
- ☐ Poor

Q2.2 On average, how many hours of sleep do you get in a 24-hour period? Think about the time you actually spend sleeping or napping, not just the amount of sleep you think you should get.

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10
- ☐ 11
- ☐ 12
- ☐ 13
- ☐ 14
- ☐ 15
- ☐ 16
- ☐ 17
- ☐ 18
- ☐ 19
- ☐ 20
- ☐ 21
- ☐ 22
- ☐ 23
- ☐ 24

Q2.3 During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling? Think about only those physical activities that you did for at least 10 minutes at a time.

- ☐ 0 (skip to Q2.5)
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7

Q2.4 How much time in total did you usually spend on one of those days doing vigorous physical activities?
Minutes per day: _ _ _

Q2.5 Again, think only about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

- ☐ 0 (skip to Q2.7)
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7

Q2.6 How much time in total did you usually spend on one of those days doing moderate physical activities?
Minutes per day: _ _ _

Q2.7 During the last 7 days, on how many days did you walk for at least 10 minutes at a time? (This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.)

- ☐ 0 (skip to Q2.9)
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7

Q2.8 How much time in total did you usually spend walking on one of those days?
Minutes per day: _ _ _

Q2.9 During the last 7 days, on how many days did you eat breakfast?

- ☐ 0 days
- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days
- ☐ 6 days
- ☐ 7 days

Q2.10 How often do you usually consume the following? Please mark any item you essentially never eat as "0" (mark one number and frequency for each item).	Number of times							Frequency		
	0	1	2	3	4	5	6	Per day	Per week	Per month
Fruit juice (e.g., orange, grapefruit, tomato)										
Fruit, other than as juice										
Green salad										
Potatoes (not french fries, fried potatoes or potato chips)										
Carrots										
Servings of other vegetables than carrots, potatoes or salad										
Foods high in fat (e.g., french fries, potato chips, sausages, bacon, fried chicken)										
Foods high in sodium (e.g., pickles, preserved vegetables, salted fish, cured ham, canned soup, other processed foods)										

Q2.11 According to the most recent data from the US Centers for Disease Control and Prevention, current dietary guidelines for Americans recommend that sodium intake for adults in general should not exceed:

- ☐ 1,000 mg/day
- ☐ 1,800 mg/day
- ☐ 2,300 mg/day
- ☐ 2,500 mg/day
- ☐ 3,000 mg/day
- ☐ Don't know

Q2.12 During the past month, on about how many days did you drink any alcoholic beverage?

- ☐ 0 days (skip to Q2.15)
- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days
- ☐ 6 days
- ☐ 7 days
- ☐ 8 days
- ☐ 9 days
- ☐ 10 days
- ☐ 11 days
- ☐ 12 days
- ☐ 13 days
- ☐ 14 days
- ☐ 15 days
- ☐ 16 days
- ☐ 17 days
- ☐ 18 days
- ☐ 19 days
- ☐ 20 days
- ☐ 21 days
- ☐ 22 days
- ☐ 23 days
- ☐ 24 days
- ☐ 25 days
- ☐ 26 days
- ☐ 27 days
- ☐ 28 days
- ☐ 29 days
- ☐ 30 days
- ☐ 31 days

Q2.13 During the past month, on the days when you drank, about how many drinks did you have, on average? (One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor.)

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ ≥ 5

Q2.14 During the past month, considering all types of alcoholic beverages, how many times did you have ≥ 5 drinks (males) or ≥ 4 drinks (females) on one occasion?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ ≥ 5

Q2.15 Have you smoked at least 100 cigarettes in your entire life?
NOTE: 5 packs = 100 cigarettes

- ☐ Yes
- ☐ No

Q2.16 Do you now smoke cigarettes every day, some days, or not at all?

- ☐ Every day
- ☐ Some days
- ☐ Not at all (skip to Q2.18)

Q2.17 On average, when you smoked during the PAST 30 DAYS, about how many cigarettes did you smoke a day?
Cigarettes per day: _ _ _

Q2.18 How much stress would you say that you experienced:	A lot	Moderate	Relatively little	Almost none
During the past 2 weeks				
During the past 12 months				

Q2.19 During the past 12 months, did you for any personal or emotional problems seek help from:	Often	Occasionally	Never	N/A: I did not experience any personal or emotional problems. (click all four buttons below if this is the case)
family or friends				
a therapist, counselor, or self-help group				
a religious counselor				
a faculty member				

Q2.20 Are you currently trying to:	No, not applicable (i.e. I am already eating a balanced diet, get enough exercise, have control of my weight, etc.)	No, not trying	Yes, low priority	Yes, high priority
Eat a more balanced diet				
Reduce sodium intake				
Get more exercise				
Control your weight				
Limit alcohol consumption				
Smoke less				

Q2.21 Please fill out both columns in regards to talking to patients about:	How confident are you in talking to patients about this topic?			How relevant do you think talking to patients about this topic will be your intended practice?		
	Not at all	Somewh at	Highly	Not at all	Somewh at	Highly
Nutrition						
Exercise						
Weight						
Alcohol						
Smoking cessation (among smokers)						
Stress management						

Q2.22 Please indicate the extent to which you agree with the following statements.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
If an individual is predisposed to cardiovascular disease, then little can be done to prevent its occurrence.					
If an individual is predisposed to cancer, then little can be done to prevent its occurrence.					
Prevention is less interesting to me than treatment.					
Patients are not interested in prevention.					
To effectively encourage patient adherence to a healthy lifestyle, a physician must adhere to one him/herself.					
Medical school faculty members should set a good example for medical students by practicing a healthy lifestyle.					
Physicians have a responsibility to					

promote prevention with their patients.					
Clinical medical students need more training in prevention and health education counseling.					

Q2.23 Please fill out the column below in regards to talking to patients about:	How much training have you received on this topic?		
	None	Some	Extensive
Nutrition			
Exercise			
Weight			
Alcohol			
Smoking cessation (among smokers)			
Stress management			

2.24 Please indicate the extent to which you agree with the following statements.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Overall, my medical school has encouraged me to lead a healthy life.					
My medical school's curriculum emphasizes preventive medicine in medical practice.					
My medical school tries to minimize student stress.					
My medical school has a good system to help students cope with stress.					
Our faculty are good role models for a healthy lifestyle.					

Q2.25 My medical school:	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
encourages students' healthy eating.					
encourages students to exercise.					
discourages students from smoking					

Q2.26 My classmates:	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
encourage each other to eat healthy.					
encourage each other to exercise.					
discourage each other from smoking.					

Q3.2 Your birth month and year (mm/yyyy): _ _ / _ _ _ _

Q3.3 Your gender:
- ☐ Male
- ☐ Female

Q3.4 Your height: _ ft. _ _ in.

Q3.5 Your weight: _ _ _ lbs.

Q3.6 Your year in the Duke MD program:
- ☐ 1st year
- ☐ 2nd year
- ☐ 3rd year
- ☐ 4th year
- ☐ Other (please specify): _____

Appendix B

CHINESE MEDICAL STUDENT QUESTIONNAIRE
Medical Students' Lifestyles and Attitudes towards Preventive Counseling ("MedLife")

1. Would you say that in general your health is:
   □Excellent □Very Good □Good □Fair □Poor

2. On average, how many hours of sleep do you get in a 24-hour period? Think about the time you actually spend sleeping or napping, not just the amount of sleep you think you should get.
   __ __ hours

3. During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling? Think about *only* those physical activities that you did for at least 10 minutes at a time.
   □0 □1 □2 □3 □4 □5 □6 □7

4. How much time in total did you usually spend on one of those days doing **vigorous** physical activities?
   __ __ __ minutes per day

5. Again, think about *only* those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
   □0 □1 □2 □3 □4 □5 □6 □7

6. How much time in total did you usually spend on one of those days doing **moderate** physical activities?
   __ __ __ minutes per day

7. During the last 7 days, on how many days did you **walk** for at least 10 minutes at a time? (This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.)
   □0 □1 □2 □3 □4 □5 □6 □7

8. How much time in total did you usually spend **walking** on one of those days?
   __ __ __ minutes per day

9. During the last 7 days, how many days did you eat breakfast?
□0 days □1 day □2 days □3 days □4 days □5 days □6 days □7 days

10. How many servings do you typically consume per day of the below foods?
(Please mark any item you essentially never eat as "0")

	Number of servings						
	0	1	2	3	4	5	≥6
Vegetables (including 100% vegetable juice) Assume 1 serving=100 grams							
Fruits (including 100% fruit juice) Assume 1 serving= 100 grams							
Whole grains (e.g., oats, millet, barley, corn, etc.) Assume 1 serving = 100 grams							
Beans/bean products (including soybean milk) and nuts (e.g., peanuts, almonds, cashews, walnuts, melon seeds, etc.） Assume 1 serving = **10 grams**							

11. How many days in a week do you typically consume the following?

	Number of days							
	0	1	2	3	4	5	6	7
Foods high in fat (e.g., french fries, potato chips, twisted dough-strips, fried instant noodles, sausages, bacon, fried chicken, cream cakes, etc.)								
Foods high in salt (e.g. pickles, preserved vegetables, fermented bean curd, salted fish, cured ham, and other cured products)								

12. According to the Chinese Nutrition Society, China's individual daily salt intake should not exceed:
□3 g/day □6 g/day □9 g/day □12 g/day □15 g/day □Don't know

13. During the past month, on about how many days did you drink any alcoholic beverage?
__ __ days

For questions 12-13 regarding alcohol use, consider one alcoholic drink as equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot (1.5oz) of liquor.

14. During the past month, on the days when you drank, about how many alcoholic drinks did you have, on average?
    □0 (Skip to Q.16) □1 □2 □3 □4 □≥5

15. During the past month, considering all types of alcoholic beverages, how many times did you have ≥ 5drinks (males) or ≥ 4 drinks (females) on one occasion?
    □0 □1 □2 □3 □4 □≥5

16. Have you smoked at least 100 cigarettes in your entire life?
Note: 5 packs = 100 cigarettes
    □Yes □No

17. Do you NOW smoke cigarettes every day, some days, or not at all?
    □Every day □Some days □Not at all (Skip to Q.19)

18. On average, when you smoked during the PAST 30 DAYS, about how many cigarettes did you smoke a day?
    __ __ __ cigarettes

19. How much stress would you say that you experienced:

	A lot	Moderate	Relatively little	Almost none
During the past 2 weeks				
During the past 12 months				

20. During the past 12 months, did you for any personal or emotional problems seek help from?

	Often	Occasionally	Never
Family or friends			
A therapist, counselor, or self-help group			
A religious counselor			
A faculty member			

21. Are you currently trying to:

	No, not applicable	No, not trying	Yes, low priority	Yes, high priority
Eat a more balanced diet				
Reduce salt intake				
Get more exercise				
Control your weight				
Limit alcohol consumption				
Smoke less				

22. Please fill out both columns:

	How confident are you in talking to patients about this topic?			How relevant do you think talking to patients about this topic will be your intended practice?		
	Not at all	Somewhat	Highly	Not at all	Somewhat	Highly
Nutrition						
Exercise						
Weight						
Alcohol						
Smoking cessation						
Stress management						

23. Please indicate the extent to which you agree with the following statements:

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
If an individual is predisposed to cardiovascular disease, then little can be done to prevent its occurrence.					
If an individual is predisposed to cancer, then little can be done to prevent its occurrence.					
Prevention is less interesting to me than treatment.					
Patients are not interested in prevention					
To effectively encourage patient adherence to a healthy lifestyle, a physician must adhere to one him/herself.					
Medical school faculty members should set a good example for medical students by practicing a healthy lifestyle.					
Physicians have a responsibility to promote prevention with their patients.					

Clinical medical students need more training in prevention and health education counseling.					

24. Please fill out the column:

	How much training have you received on this topic?		
	None	Some	Extensive
Nutrition			
Exercise			
Weight			
Alcohol			
Smoking cessation			
Stress management			

25. Please indicate the extent to which you agree with the following statements:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Overall, my medical school has encouraged me to lead a healthy life.					
My medical schools' curriculum emphasizes preventive medicine in medical practice.					
My medical school tries to minimize student stress.					
My medical school has a good system to help students cope with stress.					

Our faculty are good role models for a healthy lifestyle.					

26. Please indicate the extent to which you agree with the following statements:

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
My medical school:	Encourages students to eat healthily					
	Encourages students to exercises					
	Discourages students from smoking					
My classmates:	Encourage each other to eat healthily					
	Encourage each other to exercise					
	Discourage each other from smoking					

<u>Personal Information</u> (all information will be kept private and confidential)

27. Birth year/month: 19__ __/__ __
28. Gender: □Male □Female
29. Your height :__ __ __cm □ Don't know
30. Your weight :__ __ __kg □ Don't know
31. School Year: □1 □2 □3 □ 4 □ 5 □ 6 □ 7 □ 8
32. Email:
33. QQ#:

Appendix C

Self-reported health behaviors and clinical practice attitudes towards preventive counseling among medical students at stratified by year and school: Peking University Health Science Center (PUHSC) and Xi'an Jiaotong University (XJTU)

Attributes	PUHSC			XJTU		
	2nd year (n=115) %	4th year (n=49) %	7th year (n=26) %	2nd year (n=148) %	4th year (n=175) %	7th year (n=117) %
Body mass index (kg/m^2)						
<18.5	12	8	4	13	16	14
18.5-24.9	77	83	80	80	78	73
25-30	6	6	12	2	5	8
>30	5	2	4	6	2	5
Students' reported health habits						
≥ 200g of fruits *and* ≥ 300g vegetables daily (Chinese Nutrition Society Guidelines)	17	15	8	14	25	12
≥150 min/week of moderate-to-vigorous physical exercise	19	54	44	47	26	30
Non-smoking[a]	97	98	96	95	97	96
Non-binge drinking[b]	96	98	96	94	94	90
Non-heavy drinking[c]	100	100	100	99	99	99
Overall health behaviors[d]	4	10	4	8	7	5
Students with positive attitude towards counseling patients on healthy lifestyles regarding[e]:						
Diet	47	52	24	58	50	44
Exercise	43	54	36	55	41	40
Smoking	55	65	44	64	61	61
Alcohol consumption	47	63	32	53	50	54
All habits[f]	24	38	12	26	24	23
Students' overall perception of the school environment encouraging leading healthy lives[g]	73	73	60	83	74	82

[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.
[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.
[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.
[d]Overall health behaviors are those who report ≥ 200g of fruits *and* ≥ 300g vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking.
[e]Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) is highly relevant to their intended practices.
[f]All habits are those who believe that talking to patients about diet, exercise, smoking, and alcohol consumption are all highly relevant to their intended practices.
[g]Students' overall perception of the school environment encouraging leading healthy lives were students who strongly agreed or agreed that overall, their medical school has encouraged them to lead healthy lives.

Appendix D

Association between self-reported health behaviors and a positive clinical practice attitude towards preventive counseling on each individual health behavior among medical students at Duke University

Health behaviors	Reporting having a positive attitude[†] regarding:								
	Diet			**Exercise**			**Smoking**		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value	OR	95% CI	*p*-value
1st year students (n=57)									
Diet									
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.04	0.35-3.10	0.95	1.01	0.32-3.15	0.99	1.29	0.43-3.84	0.65
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.09	0.38-3.11	0.87	0.85	0.29-2.53	0.77	0.81	0.29-2.30	0.70
Smoking									
Non-smoking[a]	0.	0.	0.	0.	0.	0.	0.	0.	0.
Alcohol									
Non-binge drinking[b]	0.98	0.34-2.83	0.98	0.83	0.28-2.50	0.75	0.71	0.25-2.02	0.52
Non-heavy drinking[c]	1.61	0.38-6.74	0.52	1.60	0.38-6.79	0.52	0.80	0.19-3.35	0.76
All habits									
Overall health behaviors[d]	0.18	0.02-1.76	0.14	0.11	0.01-1.07	0.06	0.	0.	0.
2nd year students (n=48)									
Diet									
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.76	0.45-6.83	0.82	2.06	0.51-8.25	0.31	2.30	0.57-9.22	0.24
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.73	0.22-2.39	0.60	0.70	0.22-2.26	0.55	0.80	0.25-2.59	0.71
Smoking									
Non-smoking[a]	0.77	0.05-13.07	0.86	1.00	0.06-16.97	1.00	0.92	0.05-15.56	0.95
Alcohol									

Non-binge drinking[b]	1.09	0.34-3.47	0.88	2.00	0.62-6.42	0.24	2.32	0.72-7.49	0.16
Non-heavy drinking[c]	0.46	0.13-1.64	0.23	0.67	0.19-2.34	0.53	0.89	0.26-3.09	0.85
All habits									
Overall health behaviors[d]	0.	0.	0.	0.	0.	0.	0.	0.	0.
3rd year students (n=65)									
Diet									
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.16	0.42-3.17	0.78	1.16	0.42-3.17	0.78	1.10	0.40-3.04	0.86
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	**0.35**	**0.12-0.99**	**0.05**	**0.35**	**0.12-0.99**	**0.05**	0.42	0.15-1.18	0.10
Smoking									
Non-smoking[a]	0.	0.	0.	0.	0.	0.	0.	0.	0.
Alcohol									
Non-binge drinking[b]	2.23	0.82-6.10	0.12	1.72	0.64-4.65	0.29	2.64	0.93-4.79	0.07
Non-heavy drinking[c]	0.50	0.14-1.72	0.27	0.50	0.14-1.72	0.27	1.17	0.34-3.96	0.80
All habits									
Overall health behaviors[d]	0.53	0.05-6.19	0.62	0.53	0.05-6.19	0.62	1.54	0.13-17.92	0.73
4th year students (n=60)									
Diet									
Consuming ≥ 5 daily servings of fruits and/or vegetables	0.84	0.26-2.70	0.76	1.00	0.30-3.30	1.00	0.83	0.25-2.75	0.76
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.42	0.50-4.02	0.51	1.12	0.39-3.18	0.83	0.65	0.23-1.88	0.43
Smoking									
Non-smoking[a]	0.	0.	0.	0.	0.	0.	0.	0.	0.
Alcohol									
Non-binge drinking[b]	1.32	0.46-3.81	0.61	1.94	0.65-5.83	0.24	0.84	0.29-2.47	0.76
Non-heavy drinking[c]	1.07	0.35-3.24	0.91	1.80	0.59-5.51	0.30	0.81	0.25-2.59	0.73
All habits									
Overall health behaviors[d]	2.42	0.24-24.71	0.46	2.09	0.20-21.38	0.53	0.56	0.07-4.25	0.57
1st, 2nd, 3rd, and 4th year students									

combined (n=230)									
Diet									
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.12	0.64-1.97	0.69	1.19	0.67-2.09	0.56	1.22	0.69-2.15	0.50
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.82	0.48-1.38	0.45	0.73	0.43-1.23	0.23	0.65	0.38-1.10	0.11
Smoking									
Non-smoking[a]	0.51	0.05-5.74	0.59	0.62	0.06-6.98	0.70	0.61	0.05-6.85	0.69
Alcohol									
Non-binge drinking[b]	1.35	0.80-2.29	0.26	1.52	0.89-2.59	0.13	1.35	0.79-2.30	0.27
Non-heavy drinking[c]	0.78	0.42-1.44	0.43	1.01	0.54-1.86	0.99	0.89	0.48-1.65	0.71
All habits									
Overall health behaviors[d]	0.68	0.21-2.20	0.52	0.55	0.17-1.79	0.32	0.39	0.11-1.32	0.13

Healthy behaviors	Reporting having a positive attitude[†] regarding:					
	Alcohol			**All behaviors**		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value
1st year students (n=57)						
Diet						
Consuming ≥ 5 daily servings of fruits and/or vegetables	0.89	0.27-2.90	0.85	0.79	0.23-2.70	0.71
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.84	0.27-2.59	0.76	0.82	0.26-2.61	0.73
Smoking						
Non-smoking[a]	0.	0.	0.	0.	0.	0.
Alcohol						
Non-binge drinking[b]	1.15	0.37-3.55	0.81	1.10	0.34-3.53	0.88
Non-heavy drinking[c]	4.39	0.51-38.09	0.18	3.64	0.42-31.74	0.24
All habits						
Overall health behaviors[d]	0.	0.	0.	0.	0.	0.

2nd year students (n=48)						
Diet						
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.97	0.51-7.68	0.33	1.54	0.37-6.43	0.55
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.83	0.25-2.74	0.76	0.90	0.25-3.27	0.87
Smoking						
Non-smoking[a]	0.70	0.04-11.96	0.81	0.39	0.02-6.78	0.52
Alcohol						
Non-binge drinking[b]	2.58	0.79-8.44	0.12	2.44	0.69-8.71	0.17
Non-heavy drinking[c]	0.62	0.18-2.17	0.45	0.65	0.17-2.46	0.52
All habits						
Overall health behaviors[d]	0.	0.	0.	0.	0.	0.
3rd year students (n=65)						
Diet						
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.00	0.36-2.80	0.99	0.96	0.33-2.80	0.95
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.52	0.18-1.48	0.22	0.65	0.22-1.91	0.43
Smoking						
Non-smoking[a]	0.	0.	0.	0.	0.	0.
Alcohol						
Non-binge drinking[b]	1.23	0.45-3.33	0.69	1.27	0.45-3.60	0.65
Non-heavy drinking[c]	0.54	0.16-1.82	0.32	0.78	0.22-2.74	0.70
All habits						
Overall health behaviors[d]	0.69	0.06-8.05	0.77	0.98	0.08-11.40	0.99
4th year students (n=60)						
Diet						
Consuming ≥ 5 daily servings of fruits and/or vegetables	0.73	0.20-2.67	0.63	0.90	0.24-3.33	0.87
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.74	0.58-5.20	0.33	2.41	0.77-7.59	0.13

Smoking						
Non-smoking[a]	0.	0.	0.	0.	0.	0.
Alcohol						
Non-binge drinking[b]	0.65	0.21-2.06	0.47	0.83	0.26-2.68	0.76
Non-heavy drinking[c]	0.90	0.28-2.91	0.86	1.04	0.30-3.56	0.95
All habits						
Overall health behaviors[d]	0.70	0.07-7.24	0.77	0.83	0.08-8.62	0.88
1st, 2nd, 3rd, and 4th year students combined (n=230)						
Diet						
Consuming ≥ 5 daily servings of fruits and/or vegetables	1.04	0.58-1.86	0.90	1.00	0.54-4.85	1.00
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.85	0.49-1.47	0.57	1.02	0.57-1.80	0.95
Smoking						
Non-smoking[a]	1.15	0.10-12.91	0.91	0.86	0.08-9.59	0.90
Alcohol						
Non-binge drinking[b]	1.23	0.71-2.12	0.46	1.27	0.72-2.24	0.41
Non-heavy drinking[c]	0.88	0.47-1.64	0.68	1.02	0.53-1.99	0.95
All habits						
Overall health behaviors[d]	0.33	0.07-1.55	0.16	0.45	0.10-2.11	0.31

[†]Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) are highly relevant to their intended practices.

[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.

[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.

[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.

[d]Overall health behaviors are those who report ≥ 5 daily servings of fruits and/or vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking who believe that talking to patients about diet, exercise, smoking, and alcohol are all highly relevant to their intended practices.

Bold = Statistically significant value (*p*-value ≤ 0.05)

Appendix E

Association between self-reported health behaviors and a positive clinical practice attitude towards preventive counseling on each individual health behavior among medical students in China

Health behaviors	Reporting having a positive attitude[†] regarding: Diet			Exercise			Smoking		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value	OR	95% CI	*p*-value
2nd year students (n=263)									
Diet									
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.16	0.58-2.30	0.67	1.07	0.54-2.12	0.84	1.09	0.54-2.19	0.82
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.15	0.69-1.92	0.59	1.63	0.98-2.74	0.06	1.08	0.64-1.83	0.76
Smoking									
Non-smoking[a]	1.75	0.48-6.35	0.40	0.99	0.28-3.51	0.99	1.52	0.43-5.37	0.52
Alcohol									
Non-binge drinking[b]	0.85	0.29-2.52	0.77	2.60	0.80-8.53	0.11	1.53	0.52-4.49	0.44
Non-heavy drinking[c]	1.14	0.07-18.45	0.93	0.	0.	0.	0.	0.	0.
All habits									
Overall health behaviors[d]	1.81	0.60-5.46	0.29	2.94	0.91-9.48	0.07	1.37	0.45-4.12	0.58
4th year students (n=224)									
Diet									
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	0.85	0.45-1.59	0.61	0.96	0.51-1.80	0.90	1.65	0.84-3.23	0.15
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.31	0.75-2.30	0.34	1.08	0.61-1.89	0.79	0.99	0.55-1.75	0.96
Smoking									
Non-smoking[a]	2.06	0.37-11.46	0.41	1.59	0.28-8.85	0.60	**8.56**[§]	**0.98-74.59**	**0.05**
Alcohol									

Non-binge drinking[b]	1.82	0.52-6.39	0.35	1.39	0.40-4.90	0.61	3.01	0.85-10.60	0.09
Non-heavy drinking[c]	0.	0.	0.	0.	0.	0.	0.	0.	0.
All habits									
Overall health behaviors[d]	0.88	0.34-2.26	0.80	0.56	0.21-1.54	0.26	1.81	0.63-5.21	0.27
7th year students (n=143)									
Diet									
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.07	0.38-3.00	0.90	1.46	0.53-4.04	0.47	0.60	0.22-1.66	0.33
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.02	0.49-2.10	0.96	0.81	0.39-1.68	0.57	0.86	0.42-1.75	0.67
Smoking									
Non-smoking[a]	0.31	0.06-1.77	0.19	1.29	0.23-7.31	0.77	2.91	0.51-16.44	0.23
Alcohol									
Non-binge drinking[b]	0.53	0.17-1.67	0.28	2.28	0.60-8.69	0.23	1.71	0.54-5.36	0.36
Non-heavy drinking[c]	0.	0.	0.	0.	0.	0.	0.	0.	0.
All habits									
Overall health behaviors[d]	1.15	0.25-5.33	0.86	2.17	0.47-10.09	0.32	0.96	0.21-4.45	0.96
2nd, 4th, and 7th year students combined (n=630)									
Diet									
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.02	0.67-1.54	0.94	1.10	0.72-1.66	0.67	1.18	0.77-1.81	0.44
Exercise									
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.16	0.84	1.64	1.21	0.87-1.69	0.26	0.97	0.69-1.36	0.86
Smoking									
Non-smoking[a]	1.17	0.50-2.75	0.72	1.18	0.50-2.81	0.70	**2.72**	**1.12-6.58**	**0.03**
Alcohol									
Non-binge drinking[b]	0.97	0.50-1.86	0.92	**2.09**	**1.02-4.28**	**0.05**	**1.93**	**1.00-3.74**	**0.05**
Non-heavy drinking[c]	2.92	0.30-28.27	0.35	0.	0.	0.	0.	0.	0.
All habits									
Overall health behaviors[d]	1.21	0.64-2.28	0.56	1.31	0.70-2.47	0.40	1.47	0.75-2.90	0.27

Healthy behaviors	Reporting having a positive attitude† regarding:					
	Alcohol			**All behaviors**		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value
2nd year students (n=263)						
Diet						
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.34	0.68	0.40	1.81	0.88-3.73	0.11
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.86	0.52-1.44	0.57	0.76	0.42-1.39	0.38
Smoking						
Non-smoking[a]	2.43	0.61-9.61	0.21	0.79	0.20-3.15	0.74
Alcohol						
Non-binge drinking[b]	1.87	0.61-5.76	0.27	0.85	0.26-2.80	0.79
Non-heavy drinking[c]	0.	0.	0.	0.	0.	0.
All habits						
Overall health behaviors[d]	2.07	0.69-6.22	0.20	**4.92**	**1.68-14.41**	**<0.01**
4th year students (n=224)						
Diet						
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.39	0.74-2.63	0.30	1.04	0.51-2.09	0.92
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	1.06	0.60-1.85	0.84	1.40	0.76-2.61	0.28
Smoking						
Non-smoking[a]	0.	0.	0.	0.	0.	0.
Alcohol						
Non-binge drinking[b]	2.00	0.57-7.03	0.28	0.	0.	0.
Non-heavy drinking[c]	0.	0.	0.	0.	0.	0.
All habits						
Overall health behaviors[d]	1.62	0.61-4.27	0.33	0.97	0.33-2.81	0.95
7th year students (n=143)						

Diet						
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	0.50	0.17-1.42	0.19	1.16	0.35-3.86	0.81
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.71	0.35-1.44	0.34	0.73	0.30-1.79	0.49
Smoking						
Non-smoking[a]	1.01	0.20-5.21	0.99	0.	0.	0.
Alcohol						
Non-binge drinking[b]	1.70	0.53-5.49	0.37	3.52	0.44-28.18	0.24
Non-heavy drinking[c]	0.	0.	0.	0.	0.	0.
All habits						
Overall health behaviors[d]	0.38	0.07-2.01	0.25	1.51	0.28-8.22	0.63
2nd, 4th, and 7th year students combined (n=630)						
Diet						
Consuming ≥ 200g of fruits *and* ≥ 300g vegetables daily	1.16	0.77-1.76	0.47	1.39	0.88-2.19	0.16
Exercise						
Engaging in ≥ 150 min/week of moderate-to-vigorous physical activity	0.87	0.62-1.21	0.40	0.95	0.65-1.40	0.79
Smoking						
Non-smoking[a]	**2.87**	**1.11-7.43**	**0.03**	2.15	0.63-7.36	0.22
Alcohol						
Non-binge drinking[b]	1.85	0.94-3.64	0.08	2.28	0.87-5.95	0.09
Non-heavy drinking[c]	0.	0.	0.	0.	0.	0.
All habits						
Overall health behaviors[d]	1.39	0.73-2.64	0.32	**2.03**	**1.06-3.92**	**0.03**

[†]Positive attitude towards counseling patients on healthy lifestyles are those who believe that talking to patients about each domain (diet, exercise, smoking, and alcohol) is highly relevant to their intended practices.

[§]Indicates significant value with collinearity concern.

[a]Smokers are those who reported current smoking and having smoked ≥ 100 cigarettes in lifetime.

[b]Binge drinkers are those who consume ≥ 5 (males) or ≥ 4 (females) drinks of alcohol on a single occasion.

[c]Heavy drinkers are males who drink on average > 2 drinks daily and females who drink on average > 1 drink daily.

[d]Overall health behaviors are those who report ≥ 200g of fruits *and* ≥ 300g vegetables daily, ≥ 150 min/week of moderate-to-vigorous physical activity, non-smoking, non-binge drinking, and non-heavy drinking who believe that talking to patients about diet, exercise, smoking, and alcohol are all highly relevant to their intended

practices.
Bold = Statistically significant value (*p*-value ≤ 0.05)

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