Frontiers in Medicine and Health Research
An open access journal
eSciRes
FMHR-3-113
Original Research

Teaching Lifestyle Medicine to Medical Students by Increasing Self-Awareness

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Abstract

Lifestyle is increasingly recognized as an important factor in chronic illness. Future physicians need education about lifestyle behavior change and best strategies to manage patients. The goal of the current study was to involve medical students in their own behavior change as a way of teaching lifestyle medicine. Twenty-four medical students completed an elective in lifestyle medicine which included general lectures, case discussions and participation in one of three focus groups which they chose based on their own assessment of their personal lifestyle which comprised distress, nutrition and physical activity. The assessments were completed pre-elective, post elective and at three-month follow up. Students demonstrated improvements in distress, nutrition, and physical activity. Significant improvements were observed in consumption of fats (baseline, post elective and follow up) in the whole group. The nutrition focus group significantly decreased fat consumption pre-elective and post-elective. The stress management group significantly reduced perceived stress pre-elective and follow up and reduced fat consumption pre and post elective. There were no significant changes in physical activity in the whole group or in the activity group. This study illustrates that students own lifestyle can be used as an educational method in lifestyle medicine and students are able to make meaningful changes.

Keywords: Lifestyle; Medical education; Nutrition; Stress; Physical activity

Introduction

The importance of lifestyle medicine (LM) tenets in preventing and treating some chronic medical conditions has become increasingly apparent. Thus, the necessity of educating medical students about these concepts has become clear [1,2]. Reddy et al. [3] assert that there is an urgent need to incorporate LM into medical training and the formation of a lifestyle medicine collaborative to provide resources for educators supports that urgency [4].

Previous publications have described efforts to educate medical students about lifestyle medicine. Trik and colleagues [5] described a multi-faceted plan to increase medical students' "knowledge and application of lifestyle medicine". Polak and associates [6] described a program teaching LM by instructing students in "coaching" family members or friends in making lifestyle changes, and then later using this same coaching approach with patients. In reporting on a student-led LM curriculum, Kaye et al. [7] described some of the challenges in obtaining time in the medical students' schedule to teach LM. Active involvement of students who already knew the value of LM concepts helped to persuade curriculum administrators to free up scarce time in the schedule. Rockfeld et al. [2] used a workshop format for teaching LM to third year medical students. The authors acknowledged that although it was not the primary goal of the program, it may have been of personal benefit to the students.

Previous reports of teaching LM have largely emphasized the "nuts and bolts" of putting such a program together. For the most part, these papers have not reported on the impact of such didactics on student behaviour. One exception was Pasarica et al. [8] who found that following their educational program, students reported greater confidence in setting LM change goals with their patients. Some of their students were taught in a traditional face-to-face method, while others were taught remotely. They found no significant differences between the students' responses based on teaching methods. The approach to teaching LM used by McGrady et al. [9] focused on the students' own LM behaviors as a basis for learning skills. Students were offered the opportunity to participate in an elective for which they received credit. After being evaluated with measures of distress, diet and exercise, students chose one of these areas; they attended focus groups directed to personal improvement. At the end of the elective, students demonstrated statistically significant improvement in the particular area on which they focused, decreasing stress reactions, improving nutrition or increasing physical activity.

The current study replicated and extended previous research [9]. A three-month assessment follow up was added. Two additional standardized assessment tools were incorporated at baseline, post program, and follow up. Data was also collected on students' perception of their achievement of the goals that they set at the beginning of the

elective.

Methods

First and second year students at a medium sized, midwestern medical school were informed through the academic website about the availability of a one semester Lifestyle Medicine elective. Approximately 175 students were eligible each year the elective was offered, for a total of 350 eligible students. Twenty students took the elective in 2019 in person and five students signed up in 2020 for remote instruction. Participating students signed up at the beginning of the semester and received credit after completion of course requirements. The study was approved by the Institutional Review Board (IRB), and all participants were offered the consent form to sign, but this was not necessary for the students to receive credit. One student did not give consent and no further information is available on that student.

Twenty-four students (nineteen who participated in person and five who enrolled in the fall of 2020 when classes were remote) gave informed consent and provided data during the two semesters during which the elective was offered. Nine (seven in-person and two remote) chose the nutrition focus group; four (all in-person) chose physical activity and eleven (eight in-person and three remote) chose stress management.

At the first session, the faculty explained the schedule and requirements to receive credit. This was followed by a general lecture on the prevalence of chronic illnesses in the general population and the relationship of the major lifestyle factors on development of todays' major illnesses. Then, the effects of lifestyle on personal mental and physical well-being of medical students were emphasized. Students completed screening instruments which assessed physical activity, consumption of fats and fruits/vegetables, anxiety, perceived distress, life events in the past year and depression; these are described below in the Measures section below.

During the second group session, students received their scores on the screeners. If they did not sign the consent form, they received their data, but their information is not included in the analysis. The faculty provided interpretation of the scores, including normal ranges. It was emphasized that the focus groups were not support groups nor were they designed to substitute for mental health services.

After receiving their scores, students chose the focus group in which they wanted to participate. No student was assigned to a group. Students were guided through a goal setting exercise utilizing the SMART goal framework [10] for their specific area. A SMART goal is characterized by these attributes: specific, measurable, achievable, realistic, and time-based. During the following 8 weeks, students met with the focus group leaders who were experts in their field as described below.

Students in the stress management group attended three 45-min sessions, directed for the most part on decreasing anxiety and to a lesser extent on improvement of symptoms of depression. Topics included identifying current major stressors in medical school and recognizing maladaptive reactions, for example catastrophic thinking. Some students highlighted the effects of anxiety and worry on sleep patterns; a portion of one session was allocated to changing thought patterns associated with insomnia. Skill building consisted of slow breathing, progressive relaxation, mindfulness and basic cognitive restructuring [11]. Regular daily practice using phone apps or written materials was recommended, but not formally tracked.

Students in the nutrition group met with a registered and licensed dietician at least 3 times. A more detailed analysis of daily consumption of healthy and unhealthy foods was conducted based on Dietary Guidelines for Americans 2020-2025 [12]. The students created a specific nutrition goal based on the analysis completed. Examples of goals including decreasing high fat foods, learning how to eat mindfully and increasing consumption of fruits and vegetables without a significant increase in food costs. Emphasis was placed on practical strategies to achieve their goals, behavior change skills and the use of technology to assist them in maintaining accountability.

Students who chose to focus on physical activity improvements met 3-4 times during the semester. Pre-COVID, the group met while walking around campus in hopes of increasing steps for the day. Group leaders also helped students problem solve ways to include more activity into already busy days with tips such as having walking meetings when possible, keeping gym clothes/shoes in their car so always available, having accountability buddies, and rewarding oneself for reaching activity goals. Students shared their challenges with increasing activity especially during exams and study time, and problem-solved ways to add increased activity incrementally during the day. Group leaders stressed importance of taking at least brief study breaks to help with focus, and benefits of inserting activity on heavy study days. No students chose physical activity during the remote 2020-2021 year.

After the 8 weeks allocated to the focus group meetings, students attended two additional group sessions. Students discussed patient cases which highlighted the effects of unhealthy lifestyle on physical and emotional health; then students designed theoretical treatment plans for the patients. Students completed the same assessments as they did at baseline and received a summary of their second set of scores. They also completed an evaluation for the elective.

Three months after the end of the elective, students were contacted and asked to complete the same assessments again. There was no contact between faculty and students between the end of the elective and the follow up data collection point. All follow up data collection was done remotely. Nineteen of 20 students from the in-person elective and three of five students from the remote class returned the questionnaires.

Measures

Students were encouraged to track activity using smart phones and watches, which typically come standard with pedometers and other methods of measuring activity. In addition, recording number of steps, minutes of activity, and types of activity helped to hold students accountable and track progress. Steps per day was the variable used in the analysis.

Nutrition was assessed by screeners for fruits/vegetables, and fat consumption [13]. These consisted of lists of fruits and vegetables and fat containing foods consumed on a daily, weekly or less frequent basis. A score was generated based on consumption per week of fruits/vegetables and the percentage of saturated fats in the diet. Those scores indicated whether students were consuming too few fruits/vegetables and/or too

high fat. For example, if the fruits/vegetables screener generated a score of less than 10, that student's consumption of those foods was 1-2 per day, whereas if the score is 16 or more, that student was consuming 5 fruits/vegetables per day. With regard to fats, if the screener generated a score of less than 7, that student was consuming less than 25% fat in their diet, whereas if their score was higher than 23, they may be consuming greater than 40% fat in their diet.

Distress was indexed by measures of anxiety, depression, and perceived stress. Anxiety was assessed by the GAD-7 [14]. This self-report screener is composed of seven items on which subjects record the frequency of anxiety symptoms over the previous two weeks. Scores range from 0-21. Scores of five, ten, and 15 are taken as the cut-off points for mild, moderate and severe anxiety, respectively. Using the threshold score of ten, it has a sensitivity of 89% and a specificity of 82% for the diagnosis of Generalized Anxiety Disorder.

Depression was assessed by the PHQ-9 [15]. This screener has nine items and subjects rate the frequency of depressed symptoms over the previous two weeks. Scores can range from 0-27. Scores of five, ten, 15 and 20 are taken as the cut off points for mild, moderate, moderately severe, and severe depression. Using ten as a threshold score, the PHQ-9 was found to have a sensitivity of 88% and a specificity of 89% for Major Depressive Disorder.

The social readjustment scale [16] lists events that may have occurred in a person's life during the past year. Some events are positive, such as receiving a promotion at work, and others are negative, such as losing a job. Items are weighted based on severity and then totaled. Scores above 300 suggest that the person may be at risk for illness.

The Perceived Stress Scale questionnaire measures the extent to which subjects consider the sample situations to be challenging [17]. A total score of 12 (males), 13.7 (females) in the age range 18-29 is considered normal.

For evaluation of the course, students answered two questions using a four-point Likert scale. One item asked students to rate the usefulness of the course; a value of one indicated not useful and four equaled very useful. The second item asked how likely they were to recommend the course to others. They also were asked to estimate their progress towards the goal that they set in the beginning of the elective. One hundred percent was equal to fully meeting the goal and 0% indicated that the student had made no progress in meeting their goal.

Analysis

Statistical analysis consisted of descriptive statistics, paired t-tests, and analysis of variance. Significance level was set at $p<0.05$.

Results

Descriptive statistics and baseline comparisons

The population is described as follows. There were 22 women and four men of average age 23.8 years. There were two students who identified as Hispanic. The ethnicity breakdown was 22 Caucasian and three Asian. In terms of relationship status, most were single; one was married. Ten were in a dating relationship and two lived with their significant other.

The perceived stress questionnaire yielded a mean of 16.3 which is higher than the norms. The mean anxiety score of 5.9 and the average mood score of 4.7 are both below the clinical range. However, five students had anxiety scores higher than 10 and one student scored over 14. One student had a score of over 10 on the PH-Q 9 mood screener. Five students had a life events score over 300 which suggests that these students were at higher-than-normal risk for development of a physical or emotional illness.

Regarding the fat and fruit/vegetable assessments, 16 of 19 students reported high fat consumption; four students had a fruit consumption score lower than what is recommended for good nutrition. Six students were meeting the recommended number of steps per day of physical activity (10,000).

Analyses of baseline or pre-elective data

Comparing baseline values for the group of 19 who participated in person during the 2019 -2020 year and the five students who participated virtually in 2020-2021 yielded no significant differences. Thus, the data was collated and analyzed together.

Table 1 describes the comparison of baseline values among students who chose to be in the nutrition focus group compared to the stress management group and the physical activity group and suggests that students chose the group that was most appropriate to their needs. There were significant differences in baseline values of perceived stress between the stress management and the nutrition groups; students choosing the stress management option had higher scores. There was a significant difference in baseline fat consumption. The eventual nutrition group had significantly higher fat scores at baseline. There was no significant difference in physical activity scores among the three groups, despite the eventual physical activity group reporting the lowest number of steps per day.

Comparison of pre-elective, post elective and follow up values of the dependent variables

Table 2 shows the pre post follow up comparison of each dependent variable in the entire group of students. There were no significant differences in the distress variables pre and post elective, although all trended in the desired direction. When comparing baseline and three-month follow up, there was a trend towards a significant difference in perceived stress in the whole group ($p=0.064$).

Whole group comparison of the nutrition variables shows a significant decrease in fat consumption ($p= 0.00$); there was a trend in increased fruit consumption, but this difference was not significant. There was also a significant decrease between baseline and follow up in consumption of fats ($p=0.032$). With regard to the physical activity data for the whole group, the analysis showed a slight change pre and post elective (NS) and a slight change between baseline and follow up (NS). The average steps per day for the whole group did not reach the recommended levels of 10,000 steps per day at baseline, post elective or follow up.

Table 3 illustrates the comparison of pre/post and follow up data in each of the focus groups.

In the stress group, there was a significant difference in pre and follow up perceived stress (0.015); the stress group also reduced fats pre and post (p=0.003). No other group showed significant improvements in another focus area.

Students in the nutrition group significantly decreased fat consumption when baseline values were compared to post elective (p=0.028); but there was no longer a significant difference when baseline and follow up were compared. No analysis of the physical activity focus group data was carried out because of the small number in that group (n=4) and the data available for analysis (n=3).

Variables	Stress Management	Nutrition	Physical Activity	p-value
DISTRESS				
Perceived Stress Screener	16.0 (6.9)	12.56 (5.5)	16.0 (5.5)	0.48
Live Events Screener	211.0 (94.5)	123.67 (115.9)	152.50 (96.3)	0.28
Anxiety Screener	8.43 (5.1)	4.22 (2.1)	6.50 (3.1)	0.095
Mood Screener	5.29 (3.8)	4.0 (2.7)	5.50 (2.9)	0.636
PHYSICAL ACTIVITY				
Average steps per day	8360.4 (4591.9)	5816.9 (2848.1)	4833.3 (288.7)	0.267
NUTRITION				
Dietary Fat Screener	12.57 (4.3)	22.11 (8.0)	16.25 (6.7)	0.034*
Fruit-Vegetable Screener	15.71 (6.1)	13.44 (6.0)	12.50 (1.9)	0.602

*p<0.05

Table 1: Comparison of baseline means (SD) separated by the focus groups.

Variables	Baseline	Post elective	Follow up	Comparison p-value
DISTRESS				
Perceived Stress Screener	15.92 (6.6)	14.67 (6.7)	13.05 (5.4)	1 *vs.* 2: .26; 1 *vs.* 3: .06
Anxiety Screener	6.15 (3.9)	5.60 (4.5)	6.94 (4.5)	1 *vs.* 2: .50; 1 *vs.* 2 : .37
Mood Screener	4.75 (3.1)	4.25 (3.4)	4.5 (4.1)	1 *vs.* 2: .52; 1 *vs.* 3: .88
PHYSICAL ACTIVITY				
Average steps per day	6433.54 (2603.4)	6660.06 (2616.4)	6818.82 (2951.9)	1 *vs.* 2: .75; 1 *vs.* 3 .89
NUTRITION				
Dietary Fat Screener	17.38 (7.7)	12.67 (6.7)	14.24 (7.4)	1 *vs.* 2: .000; 1 *vs.* 3: .032*
Fruit-Vegetable Screener	14.48 (5.3)	15.04 (5.1)	17. 9 (6.2)	1 *vs.* 2: .62; 1 *vs.* 3: .06

Code: 1 = baseline; 2 = post elective; 3 = follow up

Table 2: Comparison of baseline, post elective and follow-up means (SD) in the whole group (n=24).

Stress Management Group				
Variables	**Baseline**	**Post elective**	**Follow up**	**Comparison p-value**
Perceived Stress Screener	18.64 (6.7)	16.73 (6.9)	12.30 (4.1)	1 *vs.* 2: .30; 1 *vs.* 3: .015*
Anxiety Screener	8.43 (5.1)	8.57 (7.3)	8.0 (5.1)	1 *vs.* 2: .94; 1 *vs.* 3 .99
Mood Screener	5.29 (3.8)	5.29 (4.9)	3.0 (2.0)	1 *vs.* 2: .99; 1 *vs.* 3: .16
Nutrition Group				
Dietary Fat Screener	22.11 (8.0)	15.78 (8.0)	18.71 (7.7)	1 *vs.* 2: 0.044; 1 *vs.* 3: .29
Fruit-Vegetable Screener	13.44 (6.0)	16.67 (4.8)	18.86 (6.5)	1 *vs.* 2: .18; 1 *vs.* 3: .132
Physical Activity Group				
Average steps per day	4833.33 (288.68)	4766.67 (750.56)	7500.0 (3278.72)	1 *vs.* 2: .9; 1 *vs.* 3 .27

Table 3: Comparison of baseline, post elective and follow-up means (SD) separated by focus group.

Correlations among the dependent variables

Significant (all $p<0.05$) intercorrelations among the measures of distress: perceived stress, anxiety and mood scores were found. The higher the perceived stress, the higher the anxiety and mood scores. Similarly, the fats and fruits/vegetable scores were corrected negatively. The higher the reported consumption of fats, the lower the consumption of fruits and vegetables. This data is not shown.

Evaluation of the elective

Analysis of the results of the evaluation was conducted after the end of the elective and not re-assessed at follow up. On the question of the usefulness of this elective, the average score was 3.4 out of a maximum of 4.0. On the question of recommending the elective to another student, the average score was 2.8 on a maximum score of 3.0. Students were also asked if they met their goal, using a range of 0% to 100%. The average score was 75%.

Discussion

This study further illustrates the strategy of teaching LM concepts to medical students by using their own health behaviors as the framework for instruction. The training of future health care providers in these basic concepts becomes more critical each decade [18,19]. Students were willing to complete assessments of their personal distress, nutrition, and physical activity. After receiving feedback on their self-assessments, students tended to choose a focus group in the area revealed to be problematic for them.

Interestingly, the mean values of anxiety and mood were lower, and a smaller percentage of students scored in the clinical range compared to our earlier study [9]. This may explain why there were not significant improvements in anxiety and mood in this study, although the changes were in a positive (decrease in anxiety and increase in mood) direction.

On the contrary, most students were high consumers of fat containing products, specifically, 15 of 24 students' scores were determined to be outside of recommended ranges. There were striking differences between baseline and post elective consumption of fats in the entire group, in the nutrition group and in the stress management group. Students lowered their consumption of fats, and also increased fruit consumption, although the latter was not significant.

Students were able to achieve marked improvement in lifestyle behaviors. Participants in the stress management group had significantly lower distress scores at the end of the intervention. Those students choosing the diet option improved their eating choices significantly. When scores on perceived stress for all subjects were analyzed following the intervention, there were significant improvements. It may have been that even those students not receiving specific stress reduction instructions felt empowered by the lifestyle changes they had made in other areas, thus reducing their overall level of stress. Similarly, the entire group of students demonstrated improvements in their diet, even those students not receiving dietary guidance. Alternate ways of managing stress may have decreased the use of unhealthy foods to deal with stress. Additionally, the large group meetings discussing patient cases related to nutrition may have made an impact even without setting a specific goal in improving diet.

The follow up data is important since it suggests that students' scores do not revert completely back to baseline values. Some of the changes that they made during the elective were maintained at least in part for three months. It would be valuable in the next study to send reminders to students during this time to see if that further helps students reinforce the positive behavioral changes.

The evaluations were similar between the larger group who attended in person and the small group who were forced into remote learning. The much smaller registration for the elective in fall 2020 may have also resulted from the lack of in person instruction. Indeed, remote students commented that they wished they could have had the focus group sessions in person. On the contrary, only one student declined to provide consent. Therefore, it is important that studies in lifestyle medicine involving trainees obtain IRB approval to collect data.

A major limitation of the study was the small number of subjects. Only four students choose the activity option which diminished the power of the analyses. Disruption and confusion in the sign-in process (especially challenges posed by the COVID pandemic) reduced the number of students participating. The higher number of students enrolled in an earlier, similar study [10] supports this supposition. In addition, the specific goals were not tracked and not all students set a goal that was directly measured by the assessment tools that we chose. Some wanted to improve sleep or to decrease procrastination, which they said was affecting their anxiety or mood. However, the variables measuring distress that we used might not have captured the improvements that they made. In the future, we could ask students to define their goal to better align with the measures that we are using. It would be simple to ask students to track their sleep, but more difficult to measures other variables such as procrastination.

Conclusion

In conclusion, students chose the group best suited to their needs as indicated by the feedback they received from the baseline screeners. Medical students are capable of behavioral change if the goal is important and meaningful to them, they are given the opportunity and taught specific skills. Students demonstrated improvements in one of the variables linked to distress and in one of the variables that reflects healthy nutrition. Students rated the course favorably and most stated they would recommend the elective to other students. This further supports the assertion that using the students' own behavior and experiences can be an engaging and effective approach to teach them about LM.

Funding Source

There was no outside support for this project.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

AMcG, course director, teaches stress management, statistical analysis; JB, course director, teaches nutrition; AR, physical activity focus group; JD, physical activity focus group, IRB liaison, data management, statistical analysis; DL, manuscript preparation, references. All authors participated in writing the manuscript.

Acknowledgements

We acknowledge the Department of Psychiatry for allowing us to use space, office equipment and technology. We acknowledge Carolynn McCartney for assistance in the elective and Daniel Valentine for assistance in literature review.

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Received date: August 27, 2021; **Accepted date:** October 28, 2021; **Published date:** November 11, 2021

Citation: McGrady A, Brennan J, Riese A, Dowling J, Lynch D (2021) Teaching Lifestyle Medicine to Medical Students by Increasing Self-Awareness. *Front Med Health Res* 3(1): 113.