

# Self-care in Medical Education: Effectiveness of Health-habits Interventions for First-year Medical Students

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## ABSTRACT

**Purpose.** To examine changes in health habits (sleep, alcohol, and exercise) and the effects of an educational intervention promoting self-care on the emotional and academic adjustment of first-year medical students.

**Method.** Fifty-four medical students completed questionnaires that assessed various health habits, alcohol use, depression severity, and areas of life satisfaction at the beginning of the semester, at mid-term, and at finals. Approximately half of the students received written feedback or participated in an educational discussion group at mid-term.

**Results.** The students demonstrated significant changes in health habits, with increases in alcohol consumption and decreases in exercise and socialization. The changes in health habits were predictive of both emotional and

academic adjustment, with students who decreased in positive health habits, particularly socialization, being more depressed at finals. The feedback and educational interventions influenced some sleep and exercise behaviors, but the groups did not differ in overall emotional or academic adjustment.

**Conclusions.** First-year medical students show significant changes in health habits as they adjust to medical school. An educational intervention demonstrated promising effects in changing these patterns, but self-care needs to be further elaborated to address the specific challenges associated with acute adjustment as well as with long-term stressors.

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Medical students' health habits have an impact on their academic performances, emotional adjustment, and future functioning as physicians. Recognizing the importance of students' health, the Indiana University School of Medicine has adopted self-awareness, self-care, and personal growth as part of the core

competencies of the medical curriculum. Students are expected to master an awareness of their strengths, limits, and personal vulnerabilities and to develop appropriate coping strategies. Areas of students' vulnerability within medical school concern satisfaction with life, physical activity, alcohol use, and hours of sleep.<sup>1</sup> Approximately 20% of medical students have reported seeking psychiatric services<sup>2</sup>; many other medical students may have difficulties adjusting but choose not to seek services.

The structure of medical education itself is likely to contribute to disruptions in students' health habits. Although sleep deprivation is a common occurrence during the later clinical years and residency, changes in sleep

habits may occur as early as the first year as students adjust their sleep schedules in favor of studying (e.g., "pulling all-nighters"). An additional health issue is substance use. A recent study of graduating medical students found that 18% reported drinking alcohol more than three times a week, while 21% reported at least one episode of binge drinking in the preceding 30 days. Also, 18% of women and 11% of men medical students reported that their drinking had increased in medical school, and impairment rates due to alcoholism for physicians are reported to be as high as 10%.<sup>3</sup> Providing medical students with information about their health habits could positively affect students' functioning, particularly if the students are

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For a research report on a related topic, see page 918.

able to modify their health behaviors accordingly. In addition, if medical students understand appropriate health habits and their impact on emotional adjustment, they are more likely to address these issues effectively in their future practice as physicians.<sup>2</sup>

We designed this study to examine the prevalences of and changes in health habits across the first semester for medical students. Our second aim was to investigate the effectiveness of self-awareness and self-care interventions for promoting positive health habits and emotional adjustment during the students' first semester.

## METHOD

We recruited 64 first-year medical students from an Introduction to Clinical Medicine (ICM-I) class at the Indiana University School of Medicine. Eight sections of eight students each, approximately one third of the class, agreed to participate in the study and gave their voluntary written consent. Over the course of the semester, one student took a leave of absence and nine others did not complete one of the assessments, resulting in a final sample of 32 men and 22 women. The average age of the students was 24.02 years (SD = 3.42). The students who volunteered for the study did not differ in their demographics from the remainder of their class.

## Materials

**Questionnaires.** The health-habit questionnaires consisted of the Health Habits Survey, developed for use in this study, and the Alcohol Use Disorders Identification Test<sup>4</sup> (AUDIT). The Health Habits Survey assessed the prevalences of different types of sleep habits (e.g., difficulty falling asleep, maintaining consistent wake times, eating or drinking to promote sleep, pulling "all-nighters") as well as the frequencies of socialization, exercise, and caffeine use. As a descriptive measure, the Health

Habits Survey was developed using a categorical format. For example, students indicated amount of sleep by selecting one of four categories: less than four hours, four to six hours, seven to eight hours, nine or more hours. The AUDIT is a ten-item questionnaire about alcohol consumption and problems associated with alcohol. A cutoff score of 8 or higher is predictive of hazardous and harmful drinking. The instrument has shown good reliability and sensitivity for detection of alcohol-related problems.<sup>5</sup>

The primary adjustment outcome measures were the Beck Depression Inventory-II<sup>6</sup> (BDI-II); the Medical Education Quality of Life Questionnaire (MEQL), developed for use in this study; and the Epworth Sleepiness Scale.<sup>7</sup> The BDI-II total scores range from 0 to 63: scores of 13 or less are interpreted as minimal depression, 14–19 as mild depression, 20–28 as moderate, and 29 or more as severe depression. The MEQL consisted of satisfaction ratings using a Likert rating where 1 = "completely unsatisfied" to 7 = "completely satisfied" for the areas of quality of teaching, amount of material, academic progress, study habits, mastery of material, social life with partner, social life with friends, social life with family, physical health, emotional health, spiritual life, recreational activities, household chores, finances, time management, overall satisfaction with medical education, and overall satisfaction with other areas of their life. The Epworth Sleepiness Scale contains eight situations rated on a 0–3 scale for the likelihood of falling asleep during the day. The Epworth total scores are 0–5 = desirable, 5–10 = mild sleepiness, 11–15 = moderate sleepiness, and 16–24 = severe sleepiness, usually associated with impaired performance. Clinical intervention is typically suggested for scores of 11 or more. The Epworth scale has good internal and test–retest reliability and has also shown moderate correlation with objective sleep-propensity tests.<sup>8,9</sup>

At the third assessment period, a form was included for students to rate their own perceptions of change across the semester in various areas of their health habits using an eight-point scale from +3 = "much improvement" to 0 = "no change" to –3 = "much worse."

**Self-awareness intervention materials.** The self-awareness intervention focused on increasing students' self-perceptions about changes in their emotional adjustment. The students were given individual written feedback on their Epworth scores, AUDIT scores, and BDI-II scores. They were informed of their scores relative to established norms and relative to those of their peers, as well as any changes that had occurred from the beginning to the middle of the first semester. The students were offered the option of contacting the investigators for further discussion, which none of them chose to do.

**Self-care intervention materials.** The self-care intervention included a lecture, written information about self-care habits, and a group discussion of self-care issues. The intervention was conducted by a co-investigator (AB) who was not involved in the evaluations of the students. The materials were developed from the perspective of good health care and from the educational literature on the effects of health habits on learning and memory. Information included education about good sleep hygiene habits; effects of substance use on physiologic sleep, learning, and emotional substrates; and recognition and management of depression and anxiety.

## Procedures

Students completed the questionnaires during the first meeting of the ICM-I class. The second administration occurred at mid-term, and the third administration was at the end of the first semester prior to the start of finals week. Students provided their names at each

assessment in order to track individual changes, but they were informed that their responses were maintained with strict confidentiality. Course instructors did not have access to students' responses or to the feedback given to the students.

After the second assessment, four sections, or a total of 29 medical students (53.8%), were randomized to receive the self-awareness intervention of the written feedback regarding depression, sleepiness, and alcohol use. The self-care intervention was also offered to three of the sections, and 23 students participated (17 of whom had received feedback). The lecture and discussion took approximately one and a half hours.

At the end of the first semester, designated the end of the study, the students were asked whether they would be willing to be followed up at the end of the second semester. Forty-eight of the 54 students agreed and were contacted. Forty students completed a final assessment just prior to the onset of their second semester's finals.

All study procedures were reviewed and approved by the Indiana University–Purdue University Institutional Review Board.

## RESULTS

### Prevalences of and Changes in Health Habits

Across the first semester, the students' health habits significantly changed in the areas of sleep, exercise, socialization, and substance use. By the end of the semester, over half of the students reported staying up late to study, waking up early to study, taking daytime naps, sleeping in places other than the bed (e.g., chairs, sofas), but maintaining consistent sleep schedules. We conducted the Friedman test for related samples to determine whether the prevalence of any of these sleep-related behaviors significantly changed across the

first semester. At baseline, 47% of the subjects obtained six hours or less of sleep per night. The students' estimated amount of sleep per night did not change across the semester ( $\chi^2(2) = 2.33$ , ns), but there were significant changes in the habits of staying up late to study, with less tendencies towards the end of the semester ( $\chi^2(2) = 7.6$ ,  $p = .022$ ), and increases in naps ( $\chi^2(2) = 11.44$ ,  $p = .003$ ). Both of these changes persisted to the end of the first year ( $\chi^2(3) = 10.46$ ,  $p = .015$  for staying up late;  $\chi^2(3) = 10.26$ ,  $p = .016$  for naps).

Table 1 displays the frequencies of socialization and exercise over the first year. Students significantly decreased in their exercise frequencies ( $\chi^2(2) = 20.39$ ,  $p < .001$ ) and their socialization ( $\chi^2(2) = 29.61$ ,  $p < .001$ ). Within the subsample of students who were assessed at the second semester, exercise frequency returned to levels similar to baseline ( $Z = -1.7$ ,  $p = .09$ ), but socialization frequency remained significantly lower than baseline ( $Z = -4.3$ ,  $p < .001$ ).

Over the study period, alcohol use also significantly increased, as shown by a repeated-measures ANOVA using the AUDIT scores. As can be seen in Table 2, the students' mean score on the AUDIT doubled over the semester ( $F(1,53) = 41.98$ ,  $p < .001$ ), with 20% of the students scoring above the cutoff score for being at risk for problematic drinking. This higher consumption was sustained across the second semester as the subsample of students continued to show significantly greater alcohol consumption than at their baseline assessment ( $t(40) = -2.97$ ,  $p < .001$ ). With regard to other substances, nicotine use was very low, with only two students using nicotine at baseline and only one by the end of the first semester. The mean number of caffeinated beverages at baseline was 2.5 (SD = 2.11) and did not significantly change across the semester ( $F(1,53) = 2.60$ , ns; M number of beverages at end of semester = 2.7, SD = 2.5).

### Emotional and Academic Adjustment

The students reported becoming significantly more depressed and dissatisfied with their lives during the course of the first semester. A repeated-measures ANOVA was conducted using the BDI scores. At baseline, the mean BDI score was 6.19 (SD = 6.32). The students were significantly more depressed at midterm (M = 8.02, SD = 6.53) than at the final exam period (M = 7.20, SD = 5.72),  $F(1,53) = 10.7$ ,  $p < .002$ . Depression scores at baseline and at finals, however, did not significantly differ from each other ( $t(53) = -1.67$ , ns). The percentages of students who scored above 20 on the BDI were 3.8% at baseline, 7.4% at midterm, and 7.4% at finals. At the end of the second semester, none of the students scored above 20 on the BDI.

Table 3 displays the satisfaction ratings from the Medical Education Quality of Life (MEQL) scores across the first semester and at the end of the second semester. Repeated-measures ANOVAs were computed for the first-semester ratings for the items individually and the overall scores. The quadratic effects indicate significantly greater scores at midterm, whereas the linear effect indicates significantly greater scores at the final period compared with baseline. As can be seen, at midterm, the students had become significantly more dissatisfied with most every area of their lives. By finals, satisfaction ratings had improved, but the students remained significantly more dissatisfied from their baseline ratings for the areas of teaching quality, life with family, recreational activities, and overall ratings for their medical education and for their overall life areas. The subsample of students who completed the second semester's ratings continued to show similar dissatisfaction patterns; however, only their ratings for finances were significantly different from the ratings made at the end of the first semester ( $t(39) = 2.10$ ,  $p < .05$ ).

**Table 1**

Self-reported Frequencies of Exercise and Socialization (per Month) for 54 First-semester Medical Students, Indiana University School of Medicine*								
Frequency	Start of Semester		Midterms		Finals		Semester II	
	Exercise %	Socialization %	Exercise %	Socialization %	Exercise %	Socialization %	Exercise %	Socialization %
None	9.3	3.7	9.3	0	24.1	3.7	7.5	5.0
1-3 times	14.8	20.4	22.2	38.9	24.1	46.3	22.5	45.0
4-8 times	27.8	27.8	25.9	38.9	27.8	37.0	30.0	32.5
8-15 times	25.9	24.1	24.1	16.7	16.7	7.4	30.0	12.5
16+ times	22.2	24.1	18.5	5.6	7.4	5.6	10	5.0

\* A subsample of 40 students responded for their second semester.

To examine which factors might predict students' emotional adjustment, we used alcohol use, socialization frequency, exercise frequency, caffeine use, sleepiness scores, and sleep habits as univariate variables in linear regression analyses. For depression scores, as expected, those who were more depressed at baseline were more likely to be depressed at midterm ( $r = .78, p < .001$ ). Baseline Epworth scores ( $r = .41, p < .01$ ), socialization frequency ( $r = -.31, p < .05$ ), and exercise frequency ( $r = -.33, p < .05$ ) were each significantly correlated with BDI scores at midterm. After controlling for initial BDI scores, the baseline Epworth sleepiness score ( $t = 3.2, p < .01$ ) and socialization frequency

( $t = 2.45, p < .05$ ) each continued to be a significant predictor of midterm depression.

For quality-of-life ratings, midterm satisfaction was predicted by baseline lower depression ( $r = .46, p < .001$ ), more socialization ( $r = .29, p < .05$ ), and greater exercise frequency ( $r = .27, p = .05$ ). At finals, students' satisfaction with their medical education was predicted by midterm socialization scores ( $r = .33, p < .05$ ) and depression severity ( $r = -.47, p < .001$ ). Similarly, the students' overall satisfaction with other areas of life was greater for those who had maintained higher socialization from mid-term to finals ( $r = .49, p < .001$ ).

The students also rated their esti-

mated average academic performance levels as poor, pass, high pass, or honors at finals. We used the same baseline predictors mentioned above in a univariate linear regression analysis to predict estimated performance at finals. None of the baseline measures significantly predicted academic performance at finals. However, examining the same predictors from midterm to finals, greater socialization frequency ( $r = .29, p < .05$ ) predicted higher academic performance at finals ( $t = 2.15$ ). At the third assessment period, academic performance was also significantly predicted by AUDIT scores, and higher alcohol use was associated with lower performance ( $r = -.35, p < .01$ ). Those students who were more social within the previous month of finals were also more likely to report higher academic performance ( $r = .30, p < .05$ ).

**Table 2**

Frequencies and Mean Scores on the Alcohol Use Disorders Identification Test (AUDIT) across the First Year for 54 Students, Indiana University School of Medicine*				
Frequency and Mean Score	Baseline	Midterms	Finals	Semester II
<b>Frequencies</b>				
0-2 scores	57.4%	66.7%	25.9%	25.0%
3-7 scores	38.9%	29.6%	53.7%	52.5%
8-12 scores	3.7%	1.9%	14.8%	17.5%
12+ scores	0%	1.9%	5.5%	3.7%
Mean score (SD)	2.39 (2.33)	2.24 (2.61)	5.00 (3.56)	5.32 (3.67)

\* A subsample of 40 students responded for their second semester.

**Impact of Interventions**

We used repeated-measures ANOVA with feedback as the between-group variable to examine the effect of the feedback intervention. Those who received feedback at midterm showed a greater reduction in their sleepiness from mid-term to finals (M change in Epworth sleepiness scores =  $-1.55, SD = 2.69$ ) compared with those who did not get feedback (M change =  $.12, SD$

**Table 3**

Mean Satisfaction Ratings by 54 First-semester Medical Students of Medical Education Quality-of-life Scale Items, Indiana University School of Medicine						
Quality-of-life Items	Start of Semester Mean (SD)	Midterms Mean (SD)	Finals Mean (SD)	Semester II Mean (SD)	F Quadratic (Semester I)	F Linear (Semester I)
Teaching quality	5.54 (0.86)	4.81 (0.97)	4.89 (0.82)	4.77 (1.00)	11.29†	27.131‡
Amount of material	4.93 (1.26)	4.52 (1.27)	4.78 (1.24)	4.75 (1.10)	5.5*	1.1
Academic progress	5.04 (0.99)	4.57 (1.13)	5.06 (1.12)	4.90 (1.08)	17.15‡	0.015
Study habits	4.63 (1.22)	4.28 (1.23)	4.59 (1.12)	4.68 (1.02)	9.50†	0.04
Mastery of material	4.61 (1.11)	4.65 (1.05)	4.94 (0.92)	4.85 (1.10)	1.60	3.7
Life with partner	4.74 (1.68)	4.06 (1.93)	4.44 (1.76)	4.33 (1.61)	5.61*	2.04
Life with friends	4.72 (1.51)	4.00 (1.65)	4.35 (1.56)	4.28 (1.62)	14.19‡	2.61
Life with family	4.85 (1.39)	4.11 (1.67)	4.43 (1.57)	4.30 (1.57)	15.27‡	7.29†
Physical health	5.21 (1.21)	4.72 (1.51)	4.81 (1.21)	4.68 (1.38)	5.00*	4.8*
Emotional health	5.30 (1.34)	4.83 (1.44)	4.96 (1.26)	4.70 (1.40)	7.10†	4.08*
Spiritual life	4.98 (1.47)	4.46 (1.51)	4.69 (1.49)	4.23 (1.40)	6.99*	3.85
Recreation	4.44 (1.31)	4.13 (1.67)	3.94 (1.42)	3.98 (1.27)	0.16	7.19†
Household chores	4.59 (1.25)	3.83 (1.48)	4.26 (1.40)	4.08 (1.38)	12.32†	2.66
Finances	4.69 (1.41)	4.24 (1.48)	4.46 (1.49)	4.10 (1.48)	3.57	1.66
Time management	4.54 (1.22)	4.11 (1.30)	4.39 (1.17)	4.07 (1.19)	9.13†	0.969
Overall medical education	5.33 (1.15)	4.85 (1.11)	5.02 (1.05)	4.88 (0.99)	7.69†	4.07*
Overall other areas	5.06 (1.16)	4.52 (1.38)	4.61 (1.42)	4.50 (1.18)	8.07†	8.93†

\*  $p < .05$ ; †  $p < .01$ ; ‡  $p < .001$ .

= 3.28;  $F(1,52)$  interaction = 7.23,  $p = .01$ ). On the other hand, those who received feedback did not differ in their change in depression scores ( $F(1,52) = .33$ , ns); M change for the feedback group = -1.3 (SD = 3.1) and M change for the no-feedback group = -.28 (SD = 3.2). Alcohol use also did not differ from midterm to finals between the feedback group (M change = 3.31, SD = 2.37) and the no-feedback group (M change = 2.12, SD = 2.17;  $F(1,52)$  interaction = 3.67, ns).

The effect of the self-care intervention was examined by comparing changes in health habits between those who participated in discussion group ( $n = 23$ ) and those who did not ( $n = 28$ ). Those who participated in the discussion group were more likely to have improved in a consistent wake time ( $\chi^2(2) = 6.3$ ,  $p < .05$ ) and to have less trouble with falling asleep by the end of the semester ( $\chi^2(2) = 5.9$ ,  $p < .05$ ); interactions between groups across time for the

other sleep hygiene variables were not significant. Alcohol use was not significantly affected by the discussion-group intervention ( $F(1,52)$  interaction term = 1.5, ns), nor was caffeine consumption ( $F(1,52)$  interaction term = .32, ns). The students who participated in the discussion group, however, did increase their exercise frequency from mid-term to finals significantly more than did those who did not participate in the discussion group ( $\chi^2 = 7.83$ ,  $p = .026$ ).

The emotional and academic adjustment scores were also compared using repeated-measures ANOVAs with self-care intervention as the between-group variable. From midterm to finals, depression scores did not differ significantly between those who received the self-care interaction (M change = -.74, SD = 3.68) and those who did not participate in the discussion group (M change = -.87, SD = 2.67;  $F(1,52) = 2.4$ , ns). The average ratings over the

17 MEQL items also did not interact across time between the self-care groups ( $F(1,52) = .25$ , ns). Change in academic performance was not significantly different from midterm to finals for those who were in the discussion group versus the other students ( $\chi^2(3) = 1.6$ , ns).

### Students' Self-perceptions of Change

The students rated their own perceptions of changes in their health habits and their emotional status at the end of the finals and at the end of the second semester (see Table 4). Across the first semester, the students reported improvements in the areas of satisfaction with medical school and their study habits. Contrary to the AUDIT scores, students perceived that they had improved in their alcohol consumption. A repeated multiple analysis of variance (MANOVA) was computed with self-perception ratings as the dependent

**Table 4**

Mean Scores for Students' Self-perceptions of Changes in Health Habits across the First Semester, Indiana University School of Medicine*		
Area of Change	Semester I (n = 52) Mean (SD)	Semester II (n = 39) Mean (SD)
Satisfaction with medical education	0.50 (1.11)	0.27 (1.13)
Satisfaction with other areas of life	0.08 (1.19)	0.08 (1.16)
Average amount of sleep per night	-0.50 (0.92)	-0.15 (0.99)
Sleep habits	-0.50 (1.06)	-0.03 (1.01)
Socialization	-0.25 (1.25)	-0.03 (1.33)
Exercise habits	-1.02 (1.58)	0.03 (1.56)
Caffeine consumption	-0.21 (0.89)	0.05 (0.92)
Alcohol consumption	0.17 (0.68)	-0.03 (0.74)
Study habits	0.77 (1.13)	0.28 (0.97)
Emotional health	0.10 (1.00)	0.18 (1.05)

\* Perception scale ranged from -3 = much worse to 3 = much improved.

ing constraining their time, students may be drawn to more "efficient" ways of releasing stress by alcohol consumption rather than by regular routines of exercise or socialization. Students often fail to recognize that their studying expands to fill the amount of time allotted, and therefore they opt for short-term strategies to reduce their stress. Third, while socialization decreases, the social occasions that do occur with other students are more likely to be centered around alcohol, such as dances or post-test "binges," rather than non-alcoholic opportunities. Further, the gradual change in alcohol consumption patterns is likely to go unnoticed by students. In this study, the students rated perceived improvements in their alcohol use over the semester rather than the actual changes that were measured by the AUDIT. This lack of awareness places students at greater risk for failure to recognize the potential harmful effects of their alcohol consumption.

Findings from the emotional-adjustment measures indicate that these students were actually more stressed during their midterm than their final exams. This result suggests that the first part of the semester is more overwhelming due to the initial demands and the volume of course materials. By the end of the first semester, most students perceived themselves as having made their adjustments to the rigors of medical school. Students, thus, may be more attuned and responsive to interventions that are delivered at the initial part of the semester, particularly the first four weeks.

The primary interventions for this study focused predominantly on sleep and associated behaviors. Providing students with feedback about their sleepiness resulted in students' changes over the remainder of the semester, but feedback about alcohol consumption and depression did not affect behavior. The complexities of these symptoms and behaviors suggest that they will require more direct intervention. In our program, most students found the lecture

variable and self-care intervention as the between-group variable. Those students who participated in the discussion group reported less worsening in their average hours of sleep per night (M rating =  $-0.17$ , SD = 1.03) than did those who did not participate in the discussion (M rating =  $-0.76$ , SD = 0.74;  $F(1,50) = 4.38$ ,  $p = .02$ ). Across the second semester, the mean ratings for the different areas of self perception were close to zero, indicating that most students perceived little further adjustment during the second half of the year.

Of the 29 students who received the feedback, 3.6% found it very helpful, 7.1% moderately helpful, 39.3% mildly helpful, and 50% not helpful. Five of the 29 students (17.2%) reported that they had changed their behaviors because of the feedback. Of the 23 students who participated in the discussion group, 8.3% found it very helpful, 33.3% moderately helpful, 37.5% mildly helpful, and 20.8% not helpful. Eight of the 23 students (33.3%) reported changing their behaviors because of the discussion group. Some students reported specific changes in behaviors, which ranged from eliminating naps to getting therapy for their depression.

## DISCUSSION

Our study's findings demonstrate that medical students experience significant changes in health habits during their first year. In particular, positive coping strategies for stress, such as exercise and socialization, decrease, whereas the potentially problematic coping strategy of using alcohol is greatly increased. The multiple assessments in this study allowed us to track these changes, which occurred predominantly after midterm, but were sustained throughout the second semester. The prevalence of hazardous and harmful drinking patterns is quite alarming, but is consistent with other recent reports indicating that problematic drinking is an issue for approximately 20% of medical students.<sup>10,11</sup>

Several factors may be related to students' alcohol use. First, although physicians' attitudes towards tobacco have become more negative, their attitudes toward alcohol have been maintained by data indicating the positive health benefits of limited alcohol intake.<sup>3</sup> Second, students' alcohol consumption may change in medical school due to time pressures. With classes and study-

at least mildly helpful. Despite its brevity, some who received the education shifted their behaviors, particularly by maintaining consistent sleep schedules and increasing exercise. This effectiveness suggests the program should be incorporated as part of the regular curriculum, but additional material also needs to be included, especially with regard to alcohol use. Further curriculum development will need to focus more directly on individual alcohol-use patterns, recognizing normative versus hazardous patterns, and the functional effects of the alcohol consumption (e.g., whether students are using it primarily as a psychological coping mechanism).

Within medical school, students face both acute and long-term stressors. Acute stressors include the rapid changes in the first year of medical school, where college-level study and learning strategies may not meet the demands of their medical courses. An orientation and education session on coping with the volume of material, developing relaxation strategies, promoting exercise, and reducing test anxiety appears necessary to reduce the students' initial reaction to this acute stress. Long-term stressors occur as part of the unpredictability of the schedules, patients, and learning environments in the latter years, which extend to the postgraduate education. Other researchers have demonstrated that students who do not have an adequate support system, perceive medical school as stressful, and are prone to wishful thinking are more likely to develop mental health problems in their postgraduate years.<sup>12</sup> Students can use the first year to build buffers for the long-term stressors. The frequency of socialization in this study was a consistent predictor of both emotional and academic outcomes. Peer mentoring and support

groups have had positive outcomes for buffering both the acute and the long-term stresses of medical school. For example, the University of California, Los Angeles program organizes "well-being" dinner seminars as one avenue to help students to learn to address their own care as part of their professional development.<sup>13</sup>

The strengths of this study include that students were assessed at multiple time intervals and individual changes could be monitored. Of course, the lack of anonymity suggests a potential bias in reporting; however, one might expect that the students' bias would more likely be towards underreporting if they were concerned about confidentiality. In addition, because participation in the study was voluntary, there may have been a self-selection bias. Another constraint of the lack of anonymity was that we elected to not assess for substance use other than alcohol. Other surveys of medical students have indicated that, although the frequency of nonalcoholic substance use is lower than that for alcohol use, students recognize the problematic use of these drugs and are receptive to interventions.<sup>14</sup>

In summary, first-year medical students demonstrate a number of changes in their daily health habits that affect their emotional and academic adjustment across the semester and year. Whether as a formal part of the curriculum or informal mentoring, students clearly would benefit from further attention and education regarding self-care issues. Helping students to give their own well-being priority from the beginning of medical school can build a foundation for the development of physicians who will be better able to serve patients by first taking care of themselves.

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