



Effective Lifestyle Habits and Coping Strategies for Stress Tolerance among College Students

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ABSTRACT

Background: Stress among college students is a major problem, impacting their overall health. Students, especially freshmen, are expected to handle difficult academic workloads at a faster pace while adapting to new social situations. In addition, findings from new stress data purport that stress responses might vary by gender and race. **Purpose:** The purpose of this study was to determine effectiveness of lifestyle habits and coping strategies on stress tolerance among college students, specific to race and gender. **Methods:** College students (N=459) completed a stress inventory, which was comprised of three established surveys of stressors, symptoms and coping strategies. Stress tolerance ratios (STRs) were calculated, and subjects divided into high or low stress tolerance groups. Statistical differences were determined by chi-square estimates and odds ratio calculations (95%CI). **Results:** Seven lifestyle/coping factors (out of 20) were significantly associated with high stress tolerance (HST) for males, 13 for females, and five were commonly shared ($P<0.05$). Whites had 13 significantly factors associated with HST while Blacks had only three ($P<0.05$). **Discussion:** The findings of this study support those from previous research studies wherein it was found that college students are “overwhelmed,” “suffer from emotional ups and downs,” “have difficulty falling asleep,” and “feelings of anxieties.” **Translation to Health Education Practice:** Differences in effectiveness of coping strategies among students strongly suggest that genders and races cope differently and that “one size fits all” health education stress intervention programs may not be effective for college students.

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BACKGROUND

College years have been deemed as one of the most stressful times in a person's life.¹ Younger college students navigating the transition from high school to college face the most difficult tasks of all.^{2,3} College freshmen are expected to handle a more difficult academic workload at a faster pace than they are used to while simultaneously adapting to a new social situation with little supervision or structure.² The new social environment of college creates pressure to make friends and build meaningful relationships. These demands can be difficult when

students are used to receiving guidance and direction, which is often not available in a college climate.³ In addition, many students are being given more responsibility for their own finances.² All of these new expectations combined with the student's search for identity, autonomy, and purpose, creates an incredible amount of pressure and stress.⁴

Every person encounters stress, understood as the nonspecific response of the body to a demand made upon it.⁵ Any type of stress elicits the same biological response, understood as the General Adaptation Syndrome (GAS).⁶ The brain becomes

more alert, heart rate increases, breathing quickens, adrenaline is released, and, because the digestive and immune system are nonessential in a crisis, they are shut down.⁵ This stress reaction, also known as “flight or fight,” can be stimulated by anything from

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slipping on a wet floor to the death of a loved one. Even eustress, defined as a positive stress event, reduces the GAS syndrome. When the stressor is no longer present, the body's parasympathetic nervous system returns the body to homeostasis.⁷ Major problems arise when a long-lasting stressor is present. The body does not shut the stress response off, which can lead an individual to exhaustion and breakdown.⁷ It is estimated that a long lasting stressor can compromise the immune system for up to a year.¹ Constant stress is linked to physical and mental illnesses. The significance of the impact of stress can further be understood through quantification. Centers for Disease Control and Prevention (CDC) now estimates that 1 in 2 Americans are annually diagnosed with a mental disorder.⁸ Furthermore, the National Center for Health Statistics attributed 46 million physician office-based visits in 2003 to mental disorders.⁸ Although stress is not considered a mental disorder, stress has been reported as a contributing factor or comorbidity of mental illnesses. Stress can lead to suicidal ideation and depression in young adults.⁹ Suicide is the second leading cause of death in college students, and over 44 percent of college students reported feeling symptoms of depression.¹⁰ In a study conducted by the American College Health Association, 63% of college students felt "hopeless" at times, and 94% reported feeling "overwhelmed." Forty-eight percent of females and 39% of males reported that they felt so depressed it was difficult to function.¹¹

When faced with similar stressors, not all people react the same. The variance in ability to handle stress can be attributed to stress tolerance.¹² The natural differences in psychological and biological traits between individuals allow some to thrive under pressure and cause others to crumble.¹³ The *Surgeon General's Report on Mental Health* stated "understanding variability among individuals to stressful events is a major challenge to research."¹⁴ The question is how some people can seemingly handle large amounts of stress while others are crippled with much less. This phenomena is defined as stress tolerance.¹²

Stress tolerance can be affected by a number of things, including genetics, lifestyle habits, and coping strategies. Results from research studies have revealed that the factor most strongly associated with high stress tolerance is a strong social network,^{15,16} which many young college students lose upon their initial transition to college. This group, thrown into an entirely new environment and forced to find ways to adapt to the stress of college life, offers a unique opportunity to uncover factors associated with stress tolerance.

While the biological reaction to stress is similar in all people, there may be differences by gender and race. "Fight or flight" may be a primarily male response. Studies on stress conducted prior to 1995 contained only 17% females, which could have skewed the data to emphasize the male response.¹⁷ The female response to stress is being called "tend and befriend." Women in the time of distant ancestors protected the children (tended) and banded together with other women (befriended) in times of hardship. Whereas, the male response would have been to either fight or flee, females found it much more beneficial to use "strength in numbers" to protect their children and themselves.¹⁸ When mothers experience an excess stress in the work environment, they are more likely to concentrate on their children when they get home. Men are more likely to withdraw.¹⁷ Although research results have begun to show that the stress reaction for males and females is not the same,¹⁸ few researchers have yet to discover if coping strategies' effectiveness on stress tolerance also varies by gender. It has been assumed that strategies to mediate stress are equally effective across race and gender. With increasing evidence of a differing stress response (due to both physical and societal differences) this assumption may not be valid. Even less is known about stress response and coping differences between races. Research reports some minorities deal with more stress in a college environment due to being "outnumbered" in a strange campus community.^{18,19} Stressors may be compounded and have more negative

consequences for a minority student at a predominately white campus. Research on frequency and types of stressors and differential vulnerability to these stressors by race remains inconclusive.²⁰ Future research to investigate coping styles that could mediate the effects of minority stress levels is needed.²¹ The relationship between race and mental health has been called a central issue in epidemiological research.²⁰

PURPOSE

The purpose of this study was to determine effectiveness of lifestyle habits coping strategies on stress tolerance among college students, specific to race and gender. A necessary first step to achieving this objective was the development and quantification of the concept of "stress tolerance." This framework can be useful in assessing the effectiveness of coping strategies in future studies. If certain lifestyle habits or coping strategies are found to be effective, it might be possible for college students to improve their stress tolerance rather than try to mediate stress once already overburdened. Lifestyle habits and coping strategies will be deemed effective if they are significantly associated with high stress tolerance. If significant gender or racial differences are found, intervention programs may be tailored to fit the audience rather than the current, broad approach. Specifically, this study attempted to address the following research questions: (1) What is the prevalence of stressors and stress symptoms among college students?; (2) Are any lifestyle habits or coping factors used by college student significantly associated with either high or low stress tolerance?; and (3) Do habits and factors significantly associated with high or low stress tolerance differ by gender or race?

METHODS

Design and Sample

The research design employed was of an epidemiological, analytical, observational, cross-sectional nature. Analytical studies can be used to look for associations between exposure factors and health outcomes.²² A cross-sectional design enabled the re-

searchers to obtain a brief description of the lifestyles of the subjects.²³ One disadvantage to a cross-sectional study is the inability to determine causal relationships.²² Researchers employing a cross-sectional study design, however, can readily measure relationships and propose ideas to be further investigated.²⁴

Sampling methodology employed for this study was randomized, cluster sampling technique. A cluster sample is a sample that involves groups of individuals, rather than individuals, who have been randomly selected. Cluster sampling is recommended for sampling intact groups²⁵ and can be a highly effective and efficient method of sampling a large population.²⁶ For this study, general Healthful Living classes were randomly selected and students in those classes surveyed. This course is a required class that many college students take their freshman year. Targeting a required, freshman level course was done intentionally; these students are still adapting to the change of college life. Minimum sample size, given a population of 2,096 students enrolled in Healthful Living classes, was determined to be 322 in order to establish an alpha level of 0.05 with 95% Confidence Intervals.²⁷ A total of 541 students were in attendance during times of data collection; 470 surveys were returned. Eleven of these surveys were not usable, yielding a usable survey total of 459. The return rate after discarding the 11 unfinished surveys was 84.8% (459/541). The survey took about ten minutes to complete. Data were collected in fall semester at the beginning of the class period. Non-participants were given review material compiled by the professor and unrelated to this study. Both completion of the survey or the worksheet were voluntary. Institutional Review Board approval was obtained prior to initiation of this research project.

Measures

The instrument encompassed four pages. Each page contained a previously established survey.

The first page of the survey was comprised of a Life Events Checklist (LEC).

This page was a version of the Life Event's Checklist for Adolescents originally constructed by Johnson²⁸ and later updated in various research.²⁹⁻³¹ This 37-item scale encompasses common major life events facing today's college students. The subjects were asked to check "yes or no" if the event had occurred in the past year. Examples included serious difficulties with roommate, having to repeat a course, and death of close family member. Cronbach's α , a measure of internal consistency reliability, was 0.696 for the Life Events Checklist, signifying acceptable reliability.²⁵

The second page was a Daily Hassles Questionnaire (DHQ). The DHQ was similar to the LEC, except the events were reflective of everyday minor occurrences. The DHQ was comprised of stressors established by some of the same research studies on college LECs.^{29,30,31} The DHQ contained 31 items, and the subjects were asked to check "yes" if the event had occurred in the past month. Examples include change in plans for major, argument with friends, and car problems. Cronbach's α for the Daily Hassle Questionnaire was 0.760.

The third page was a stress symptom scale. This scale was developed by Schafer³² and used verbatim. Consensual content validity was established. The scale contained 45 "symptoms of stress." The subject was instructed to mark which of the events had occurred in the past two weeks. Response choices included "did not occur," "occurred 1-2 times," "occurred several times," or "occurred more than 10 times." Each response has a set point value, 0, 1, 5, and 10 respectively. Total stress symptomatology score could range from 0-450. Cronbach's α on the stress symptom scale was 0.946.

The last page of the instrument contained 20 factors that are effective ways to cope with stress.^{7,16,30} Each exposure factor was either marked "yes" or "no." The last page also contained demographics, including gender, race, age and year in school. Cronbach's α on this combination of lifestyle habits and coping mechanism scale was 0.628.

Expert content validity was established by the original authors of the separate in-

struments. Cronbach's α reliability test for internal consistency was run on the data set and yielded a score of 0.943, indicating a highly reliable instrument. Cronbach's reliability scores for subscales were reported previously and were above 0.60.

Outcome Measure

The outcome measure in this study was stress tolerance. Stress tolerance has been previously operationalized in previous studies.^{12,33} Rowlinson and Felner linked the amount of stressors and stress symptoms to determine a participant's stress tolerance and defined stress tolerance as an "association between the cumulative number of life events experienced and various forms of symptomatology."^{33(p.438)} Izutsu et al¹² divided workers into groups based on stress tolerance by a job control score.

Following these examples, the researchers of this study operationalized stress tolerance by dividing the total number of stressors (frequency count) of an individual by that individual's stress symptomatology score. This calculation gave a number which upheld the relationship described above. The larger the number was, the higher the individual's stress tolerance. For example, an individual with high stress tolerance had many stressors and few symptoms, yielding a larger number. A person with low stress tolerance had few stressors and many symptoms, yielding a smaller number. Stress tolerance has thus been defined as the ability of an individual to handle stressors without succumbing to their effects. This ratio simplifies the complex phenomenon of stress tolerance into a linear relationship, which is often done to create numbers that would be unquantifiable through strictly rigorous means. While this approach has limitations, it also allows for a much more careful and consistent analysis. This ratio will be referred to as the Stress Tolerance Ratio (STR).

Data Analysis

Frequencies and descriptive statistics were calculated to describe the population under study. In order to study differences in exposure to certain factors between subjects, 2x2 tables were constructed.



		Disease or Condition		
		Yes	No	
Exposure Status	Yes	a	b	a+b
	No	c	d	c+d
		a+c	b+d	

Chi-squares and odds ratios reported with 95% confidence intervals were calculated. Chi-squared determined statistical significance with categorical variables.²³ Odds ratios were used to try to understand the relative importance of the factors in relation to each other. Any odds ratio of over 1.0 indicates a risk factor, and an odds ratio of less than 1.0 indicates a protective factor.³⁴

The key to 2x2 tables is correct assignment of a “diseased” or “condition” group. Low stress tolerance was the condition under study. In this study, stress tolerance was originally a continuous variable described by the formula below:

$$\frac{\text{Stressor total}}{\text{Symptom Score}}$$

Based on their STR, people were assigned to groups. A “diseased” or “condition” group consisted of those with a STR between 0 and 0.4 (low stress tolerance). Low stress tolerance is certainly not a disease, but it can be viewed as such in order to be placed into this common epidemiological framework. The low stress tolerance group was compared to a “healthy” group, whose STRs were 0.6 and above (high stress tolerance). The 0.2 difference was a necessity to ensure that a real difference existed between the groups. Currently, there are no national guidelines for grouping individuals in such a fashion or indicating when a stress tolerance number is low enough to be of concern. This study instead made use of the fact that there are differences in stress tolerance, and the “healthy” group really exhibited better stress tolerance than the “diseased” group. Since it is always desirable to increase stress tolerance, it is not necessary to deal with strictly “sick” people. Participants with STRs between 0.4 and 0.6 were excluded (82 surveys). Even without these surveys, the sample size for the latter part of the study was 377, well above the minimum originally targeted.

RESULTS

All of the subjects in this study ($N = 459$) were college students enrolled in Healthful Living, a university-wide required course (Table 1). Freshmen were intentionally overrepresented (75.9%, $N = 347$). Gender and race distribution reflected the university population.³⁶ Males comprised 47.7% ($N = 216$), while females were 52.3% ($N = 237$). Racial distribution of the participants were: white 73.1% ($N = 332$), black 21.1% ($N = 96$) and Other 5.7% ($N = 26$).

Three research questions were proposed in this study. They are addressed individually below.

Among college students, what is the prevalence of stressors and symptoms?

An average number of Life Events, Daily Hassles, total stressors and symptoms by frequencies and percentiles per demographics were calculated (Table 2). The overall mean for Life Events was 9.98, males (9.50) fell below this number, while females (10.46) were above. This trend was followed for the Daily Hassles Mean (11.58), total stressor mean (21.56), and stress symptom mean (60.00); females scored higher in every category (12.42, 22.89, 68.35; respectively). Caucasians were below the mean for stressors (21.48) and above the mean for stress symptoms (60.32). African Americans had more stressors than average (22.34) but less stress symptoms (56.74). The ‘other’ category for race exhibited a similar Life Event mean, a lower Daily Hassles mean (10.34), a lower total stressor mean (20.25), and yet a much higher stress symptom mean (73.96). As age increased, the total number of stressors decreased, suggesting that younger students are under more stress. There was no apparent trend in stress symptomatology compared to age.

Additionally, frequencies and percentiles were calculated for life events, daily hassles

and symptoms reported by participants. Among Life Events, most seem to be typical college stressors: pressure to do well in school ($N = 401$, 87.4%), beginning college ($N = 338$, 73.6%), and change in living condition ($N = 314$, 68.4%). Almost all subjects ($N = 435$, 94.8%) reported the Daily Hassle of “change in sleeping habits.” Although most students initially leaving home are portrayed as happily asserting their independence, 64.9% ($N = 298$) reported not spending as much time as they would like with their parents. A little less than half of the students (42.3%) report having “difficulty with roommate(s).”

Highly reported stress symptoms painted a picture of a still-developing person with much on his/her plate. Although the “general fatigue or heaviness” ($N = 327$, 71.2%) and “inability to concentrate” ($N = 353$, 76.9%) seemed to depict a very tired and overworked group of students, “difficulty falling asleep” ($N = 352$, 76.7%) was one of the most highly reported responses. Examining the high occurrence of symptoms (even the tenth most common symptom was reported in well over half of the subjects) seems to indicate that college students struggle with handling the large amount of stress they are experiencing.

Among college students, are any of the lifestyle habits or coping strategies significantly associated with either high or low stress tolerance?

Levels of stress tolerance among college students by total and demographic determinants were calculated. STRs were used to divide the participants into a case “low stress tolerance” (LST) group ($N = 190$) and control “high stress tolerance” (HST) group ($N = 189$). Adequate representation of each demographic group for both LST and HST groups was obtained. For males, 74 fell in the LST group ($\text{STR } \bar{x} = 0.255$) and 104 in HST group ($\text{STR } \bar{x} = 1.694$). Females had 115 in the LST group ($\text{STR } \bar{x} = 0.249$) and 82 in the HST ($\text{STR } \bar{x} = 1.123$). For whites, 140 were in the LST ($\text{STR } \bar{x} = 0.251$) and 130 in the HST group ($\text{STR } \bar{x} = 1.350$). For blacks, 34 were in the LST group ($\text{STR } \bar{x} = 0.271$) and 47 in the HST group ($\text{STR } \bar{x} = 1.744$).

**Table 1. Demographic Characteristics of Study Participants by Frequency and Percentiles**

Variable	N	(%)	N	(%)
Year in School (N = 457)			Gender (N = 453)	
Freshmen	347	75.9	Male	216
Sophomore	78	17.1	Female	237
Junior	24	5.3	Age (N = 453)	
Senior	8	1.7	< 18	250
Race (N = 454)			19	127
White	332	73.1	20	36
Black	96	21.1	21	11
Other	26	5.7	22	11
			23+	18

Table 2. Mean Frequency Count of Stressors and Symptoms of the College Students

Demographics	Life Events (\bar{x})	Daily Hassles (\bar{x})	Total Stressors (\bar{x})	Stress Symptom (\bar{x})
Overall Total (N = 459)	9.98	11.58	21.56	60.00
Gender				
Male (N = 216)	9.50	10.70	20.20	51.75
Female (N = 237)	10.46	12.42	22.89	68.35
Race				
Caucasian (N = 332)	9.90	11.59	21.48	60.32
Black (N = 96)	10.37	11.97	22.34	56.74
Other (N = 26)	10.03	10.34	20.25	73.96
Age				
< 18 (N = 250)	10.14	11.91	22.08	58.34
19 (N = 127)	10.15	11.73	21.88	63.40
20 (N = 36)	9.75	11.78	21.53	64.75
21 (N = 11)	9.27	11.27	20.55	57.82
22 (N = 11)	8.64	9.18	17.82	46.27
23+ (N = 18)	8.94	8.94	17.89	66.28
Year				
Freshmen (N = 347)	10.36	11.93	22.29	59.84
Sophomore (N = 78)	8.93	10.96	19.90	56.81
Junior (N = 24)	8.54	9.96	18.50	77.25
Senior (N = 8)	9.38	8.62	18.00	55.00

Chi square values and odds ratios were then calculated to determine association.

The data in Table 3 is arranged in ascending order by odds ratio. Odds ratios can suggest the degree to which an exposure factor protects or places one at risk.²² Four lifestyle habits/coping mechanism factors of the 20 were not significant. The first two

exposures are sharply more protective than the rest. The Odds ratio doubles from the second to the third factor, showing the relative importance of feeling control over one's personal life (OR = 0.07) and being well supported by friends, teachers, and family (OR = 0.19). Control displays its importance again by being the fifth protective factor as

well (control over academics). Taking care of one's body also seems to protect against stress. Getting 8+ hours of sleep a night (OR = 0.41), enough leisure time (OR = 0.45), balanced diet (OR = 0.49), regular exercise (OR = 0.49), and being involved in an extra-curricular sport (OR = 0.53) all support this point. The one risk factor that



was significantly associated with low stress tolerance was avoiding problems with a substance (OR = 2.35, CI 1.45, 3.80). Many college students believe that substances, like alcohol, can help one deal with problems and the only negative effects are those related to addiction and disease. These data, however, serve to dispute that notion. These data suggest that using substances to avoid problems hinders one's ability to handle stress. Those who used a substance to deal with problems suffered more from stress related physical ailments than those who had not.

Among college students, do factors significantly associated with high or low stress tolerance differ by gender and/or race?

Numbers often can be misleading. When examining a set of data for a given sample, a researcher can consider group differentials that make up the sample. Table 4 contrasts lifestyle habits and coping strategies that were significant for males versus those that were significant for females. Only eight of the 20 lifestyle habits/coping strategies were significant for males, while 13 of the 20 were for females ($P < 0.05$) Control over personal life and feeling well supported are still the most protective exposure factors for both men and women. As one looks a little further down the list, however, the paths diverge. Satisfaction with environment was the third highest protective factor for males, but was not significant for females. The fourth and sixth most protective factors for males (getting 8+ hours of sleep a night and regular contact with family) were also not significant protective factors for females. Thus, of the eight significant factors for males, females shared only five of these. Meanwhile, of the 13 significant factors for females, eight of these were not effective for men. Others, like enough social interaction, were significant for both sexes but are much more important for women (OR = 0.50 for men and OR = 0.28 for women). Balanced diet, extra-curricular sport, and regular exercise (all of which have to do with physical health) were not significantly protective against the low stress tolerance for males, but they were for females. Enough leisure time, enough privacy, and having been taught in school

Table 3. Factors Associated with High or Low Stress Tolerance Reported in Ascending Order by Odds Ratio (n = 379) for Entire Sample

Variable	OR	95% CI
Control Over Personal Life	0.07	0.03, 0.18*
Feeling Well Supported	0.19	0.09, 0.41*
Satisfaction with Environment	0.39	0.25, 0.63*
Enough Social Interaction	0.40	0.26, 0.62*
Control Over Academics	0.41	0.25, 0.68*
8+ Hours of Sleep	0.41	0.25, 0.66*
Use of Calming Hobby	0.43	0.28, 0.68*
Enough Leisure Time	0.45	0.29, 0.69*
Enough Privacy	0.48	0.31, 0.75*
Balanced Diet	0.49	0.32, 0.76*
Regular Exercise	0.49	0.32, 0.74*
Regular Contact with Family	0.50	0.26, 0.96*
Extra-Curricular Sport	0.53	0.35, 0.80*
Satisfaction with grades	0.53	0.35, 0.80*
Taught in School How to Deal With Stress	0.56	0.36, 0.86*
Extra-Curricular Activity	0.80	0.53, 1.20
Listen to Calming Music	0.88	0.59, 1.32
Peer Pressure	1.09	0.61, 1.95
Grades Extremely Important	1.21	0.51, 2.87
Avoiding problems with substance	2.35	1.45, 3.80*

* $P < 0.05$

how to relieve stress were also significant for females but not for males. The one significant risk factor, avoiding problems with substance, seemed to equally affect both males and females (OR = 2.75 for males and OR = 2.55 for females). These findings suggested that the factors under consideration impact males and females differently.

Differences were found in life habits and coping strategies effectiveness with regard to race (Table 6). The "Other" category was not tested because there were only 26 subjects of this 'race' and was a combination of many diverse minority populations. The first apparent difference in data between races was the total number of significant lifestyle habits/coping strategies for whites and blacks. Blacks had only four effective significant lifestyle habits/coping strategies factors, of which two were commonly shared with whites: control over personal life and use of calming hobby. These findings indicated a contrast between the two races and how factors that improve stress tolerance are different. It is interesting to note that feel-

ing pressured by peers was a significant risk factor for blacks but not the population as a whole. An odds ratio of 4.51 indicated that this factor very significantly decreases a black individual's ability to cope with stress. Interestingly, commonly espoused strategies to lower stress are not effective universally. The lack any other identified significant factors suggested that either the black community may have other, possibly unstudied, ways of coping with stress that serve to protect against low stress tolerance.

Predictably, the 14 of the 16 coping strategies that were found to be significant in the sample population were significant among whites. Two factors that were not significant for whites were "taught in school how to deal with stress" and "regular contact with family." This identified divergence between races could suggest real differences in effectiveness of lifestyle habits/coping strategies.

DISCUSSION

The results from this study revealed that younger college students who participated

**Table 4. Significant Lifestyle Habits/Coping Strategies Reported Separately for Males and Females in Ascending Order by Odds Ratio**

Variable	Men OR (95%CI)	Women OR (95%CI)
Male (N = 178)		
Control Over Personal Life	0.10 (0.03, 0.31)*	0.05 (0.01, 0.23)*
Well Supported	0.24 (0.09, 0.66)*	0.14 (0.04, 0.49)*
Satisfaction with Environment	0.27 (0.14, 0.54)*	0.58 (0.31, 1.08)
8+ Hours of Sleep	0.28 (0.13, 0.62)*	0.54 (0.28, 1.03)
Control Over Academics	0.40 (0.20, 0.83)*	0.43 (0.21, 0.88)*
Regular Contact with Family	0.41 (0.17, 0.98)*	0.51 (0.17, 1.49)
Enough Social Interaction	0.50 (0.26, 0.93)*	0.28 (0.14, 0.55)*
Avoiding problems with substance	2.75 (1.39, 5.46)*	2.55 (1.23, 5.30)*
Female (N = 197)		
Control Over Personal Life	0.10 (0.03, 0.31)*	0.05 (0.01, 0.23)*
Well Supported	0.24 (0.09, 0.66)*	0.14 (0.04, 0.49)*
Enough Social Interaction	0.50 (0.26, 0.93)*	0.28 (0.14, 0.55)*
Regular Exercise	0.79 (0.43, 1.45)	0.38 (0.21, 0.68)*
Enough Leisure Time	0.66 (0.33, 1.23)	0.39 (0.21, 0.71)*
Satisfaction with grades	0.70 (0.38, 1.29)	0.39 (0.22, 0.71)*
Enough Privacy	0.58 (0.30, 1.10)	0.42 (0.22, 0.79)*
Balanced Diet	0.58 (0.31, 1.09)	0.43 (0.24, 0.79)*
Control Over Academics	0.40 (0.20, 0.83)*	0.43 (0.21, 0.88)*
Use of Calming Hobby	0.53 (0.25, 1.11)	0.45 (0.25, 0.82)*
Taught in School How to Deal With Stress	0.69 (0.37, 1.31)	0.50 (0.27, 0.93)*
Extra-Curricular Sport	0.70 (0.37, 1.22)	0.53 (0.29, 0.98)*
Avoiding problems with substance	2.75 (1.39, 5.46)*	2.55 (1.23, 5.30)*

*P < 0.05

in this study experienced numerous stressors and change over a very short period of time. "Beginning college," "change in living conditions," "decreased number of family get-togethers," "losing a friendship or friend," and "new boyfriend/girlfriend" were all related to this change and make up half of the most common stressors facing young college students today. The other stressors had to do with demands of the academic environment (pressure to do well in school, beginning college, difficulty in identifying a major) and the pressures of new social environment (not dating, difficulty with roommates). Reported daily hassles follow the same pattern of the interplay between change (change in sleeping habits, change in social habits), academic pressures (tests, too many things to do, increased workload, and lower grades than expected), and so-

cial challenges (not spending enough time with parents and worried about a family member). Other miscellaneous items include boredom and feelings of uncertainty about the future. The findings of this study concurred with like studies that emphasize inordinate change and transition in young college freshman.^{2,3,15}

Stress symptoms give an idea of the physiological and psychological distress exhibited by a person experiencing stress.³² The findings of this study support those from previous research studies wherein it was found that college students are "overwhelmed," "suffer from emotional ups and downs," "have difficulty falling asleep," and "feelings of anxieties." Ten of the physical and psychological symptoms were reported as being experienced by 60% or more of the students in the last two weeks. Mental health

experts warn that young college students are at risk and suffer due to stress.¹⁰ The symptomology reported by the students in this study concurred and portrayed a tired, overworked group of individuals.

Given the burden of stressors and physical/psychological distress, what did college students do to protect themselves? Many of the protective factors significantly associated with high stress tolerance within this study can be put into categories. Feeling well supported, enough social interaction, and regular contact with family all are connected with a strong social network. Getting 8+ hours of sleep a night, having a balanced diet, getting regular exercise, and being involved in an extra-curricular sport all are related to physical health. This finding supports a link between physical health and stress response. Those who took better care of their body were significantly more likely to be in the high stress tolerance group. Satisfaction with environment and enough privacy shows the importance of one's living areas to mental and physical health. Sense of control is a reoccurring theme in stress research, which has shown that those who feel as if they control their problems actively try to fix them.¹⁶ This is why control over personal life and control over academics were both in the top five lowest odds ratios. Enough leisure time and use of calming hobby give the body a period of rest and allows the body to recuperate for upcoming stress. The use of a substance to avoid problems was actually shown to interfere with the ability of the user to deal with the problems in his/her life. When one uses a substance to avoid problems, one receives both the negative health effects of the substance and a decreased ability to handle stress.

In summation, in this study significant associated factors to deal with stress among college students agreed with findings previous research^{2,15,16} and supported much of current textbook writings regarding how to reduce stress.^{17,30} Yet, one is left to wonder why this population remains at risk if the coping mechanisms are indeed effective? Why did the researchers of this study find so many colleges students suffering from a large



frequency of stress symptoms? What the researchers of this study proposed to do was to go a step further and break down the effectiveness of lifestyle habits and coping strategies by subgroups that are currently taught by a “one size fits all” approach. New research is beginning to show that different groups have different responses to stress.^{18,20,21} The results of this study supported this conclusion and indicated something further, that perhaps divergent responses require divergent mediation techniques. These results were unexpected.

Males and females coped with stress very differently. Out of the 16 significant lifestyle habits/coping factors for the population as a whole, males and females shared only five. The top two on each list (sorted in ascending order by odds ratio) were control over personal life and feeling well supported. For those significant in males, the most important of the protective factors were control over personal life, well supported, satisfaction with environment, and getting 8+ hours of sleep a night (from the fourth to the fifth there is an odds ratio drop from 0.28 to 0.40). None of the factors dealing with physical health (enough exercise, balanced diet, extra-curricular sport) were significantly associated with higher stress tolerance for males, which is contradictory with current research findings.² Being taught in school how to deal with stress was not significantly associated with high stress tolerance for males, meaning that the education received may not address or support stress coping strategies meaningful to males.

Females, on the other hand, utilized a wide variety of factors to deal with stress. Interestingly, satisfaction with environment, getting 8+ hours of sleep a night, and having regular contact with family were not significant for females but were for males. For this sample, the current educational structure may be effective for teaching females how to cope with stress. The “tend and befriend” strategies are supported in this research as females sought to build a strong social network, relax, and actively try to fix problems (theirs and others).¹⁷

As with gender, large differences were

Table 5. Significant Lifestyle Habits/Coping Strategies Reported Separately for Whites and Blacks in Ascending Order by Odds Ratio

Variable	White OR (95%CI)	Black OR (95%CI)
White (N = 270)		
Control Over Personal Life	0.04 (0.01, 0.15)*	0.14 (0.04, 0.56)*
Well Supported	0.15 (0.05, 0.45)*	0.30 (0.08, 1.10)
Enough Social Interaction	0.30 (0.18, 0.52)*	0.67 (0.28, 1.68)
Control Over Academics	0.33 (0.17, 0.62)*	0.75 (0.27, 2.11)
Satisfaction with Environment	0.34 (0.20, 0.60)*	0.49 (0.19, 1.30)
Enough Leisure Time	0.40 (0.24, 0.68)*	0.83 (0.33, 2.09)
8+ Hours of Sleep	0.40 (0.23, 0.70)*	0.44 (0.13, 1.51)
Enough Privacy	0.42 (0.24, 0.72)*	0.60 (0.25, 1.47)
Extra-Curricular Sport	0.48 (0.29, 0.78)*	0.87 (0.36, 2.12)
Satisfaction with grades	0.48 (0.30, 0.79)*	0.65 (0.22, 1.95)
Regular Exercise	0.51 (0.31, 0.83)*	0.46 (0.18, 1.15)
Use of Calming Hobby	0.52 (0.30, 0.89)*	0.16 (0.06, 0.45)*
Balanced Diet	0.52 (0.31, 0.87)*	0.57 (0.23, 1.41)
Avoiding problems with substance	2.27 (1.30, 3.96)*	2.10 (0.66, 6.75)
Black (N = 81)		
Control Over Personal Life	0.04 (0.01, 0.15)*	0.14 (0.04, 0.56)*
Use of Calming Hobby	0.52 (0.30, 0.89)*	0.16 (0.06, 0.45)*
Taught in School How to Deal With Stress	0.72 (0.43, 1.20)	0.23 (0.09, 0.59)*
Feeling Pressured by Peers	0.86 (0.44, 1.70)	4.51 (1.10, 18.53)*

* $P < 0.05$

discovered between two races. While the white subjects' significant lifestyle habits/coping strategies are similar to the population's as a whole (probably due to overrepresentation), the factors significant in the black population are rather different. Only four of the 20 of the studied lifestyle habits/coping strategies were significantly associated with stress tolerance. A sense of control over personal life, but not academics, was significant for blacks. A calming hobby was important, along with being taught in school how to relieve stress. Reported odds ratios were very low or high, indicating that the factors either really affected stress tolerance or they do not. Feeling pressured by peers, while not significant for the population as a whole, was significant for the black subjects. This finding suggests that blacks are more affected by peer pressure. With a campus made up of less than 20% blacks, friends might be harder to come by and dismiss. The differences identified in this sample in

lifestyle habits/coping strategies between races indicated that blacks and whites cope with stress very differently.

Limitations

A limitation of this study was the lack of a national guideline for stress tolerance. This lack of national standards led to a state of relativity. The people in the “condition” group had lower stress tolerance than the people in the “healthy” group, but there is no way to determine if the people in the “condition” group actually have an unacceptable STR. Another limitation is that a cross-sectional study inhibits any cause-effect relationships from being established. Therefore, many of the factors could have been caused by high or low stress tolerance. Reliance on self-reported data is a limitation. Individuals may have forgotten certain past events or have changed them mentally since they occurred. Data were only collected from a single university and may not be reflective of all colleges. If the researchers



were to repeat this study, they would have included a “fill in the blank” choice on the life events scale. This option would have enabled the subjects to include other stressors that may have not been foreseen by previous research. Even though current research has not been shaped this way, the researchers believe this would lead to a more accurate representation of stressors that may not be included in the scale.

TRANSLATION TO HEALTH EDUCATION PRACTICE

The implications of this study are directed specifically towards college health education professionals. Differences found between effectiveness of coping strategies between race and gender groupings were real and apparent. The results suggest that the current, broad approach to teaching stress coping/management may not be effective.

Understanding how one effectively copes with stress in the college-age population is key to increasing one’s stress tolerance. Findings from this study suggest different programming strategies would be beneficial to address variations that exist according to gender and race. Health education professionals need to explore appropriate programs that would assist students to explore alternative ways to manage stress. These strategies could consist of population-specific stress management discussion and activities. Creating programs and classes that are geared toward the current millennial generation may enhance stress tolerance. Health educators who are mindful of these differences can teach individuals the best and most practical ways to handle stress.

Future research by health educators needs to continue to explore and focus on how the effects of stressors and lifestyle habits/coping skills differ by gender and racial group membership. Qualitative stress research might be helpful in updating the list of stressors, stress symptoms and coping mechanisms used by the current generation. For example, no questions were asked about social networking, texting, prayer, or recreational sex as potential stressors or coping mechanisms. A qualitative research

study that answered the questions of how and why in relation to college stress could fill in these gaps and update currently used stress inventories.

In addition to the results from this study, this approach offers a new tool to the realm of health education research. By approaching stress tolerance (as opposed to simply stressors or stress symptomatology or some other measure) stress research can assess what is truly important in stress protection. Many life events and daily hassles are unavoidable. Stress mediation education should therefore encourage practices suited to raising one’s ability to handle stress. The STR is a metric that measures just that.

A national guideline for stress tolerance also needs to be established. If a guideline was established, a “diseased” group could be more easily and reliably put together, and would lead to more conclusive findings about stress and effectively dealing with its negative consequences.

REFERENCES

1. Hales D. *An invitation to health*, 13th ed. Belmont, CA: Wadsworth/Cengage Learning; 2009.
2. Hicks T, Heastlie S. High school to college transition: a profile of the stressors, physical and psychological health issues that affect the first-year on-campus college student, *J Cul Diversity*. 2008;15:143-146.
3. Missouri AHEAD. *Stress/support and physical environment differences between high school and college*. Available at: http://www.stlcc.mo.us/fv/moahead/guidebook/fronttext/trans_stress.html. Accessed January 21, 2007.
4. Lyness, D. Teen’s health: stress. Nemours Foundation, 2004. Available at: http://www.kidshealth.org/PageManager.jsp?dn=KidsHealth&lic=1&ps=207&cat_id=2 Accessed November 29, 2006.
5. Donnelly J W, Eburne N, Kittleson, M. *Mental health: dimensions of self-esteem and emotional well-being*. Boston: Allyn & Bacon; 2000.
6. Turner LW, Sizer SS, Whitney EN., et al. *Life choices*, 2nd ed. New York: West Pub Co; 1992.
7. Insel PM, Roth WT. *Core concepts in health*, 8th ed. London: Mayfield Pub Co; 2007.
8. Centers for Disease Control and Preven-

tion. National Center for Health Statistics. Fast stats: mental disorders. 2005. Available at: www.cdc.gov/nchs/fastats/mental.htm. Accessed Nov. 30, 2008.

9. Wilburn VR, Smith DE. Stress, self-esteem, and suicidal ideation in late adolescents. *Adolescence*, 2005;40:33-46.

10. National Mental Health Association. *Mental health facts for students*, 2002. Available at: http://nostigma.org/students_facts.php. Accessed December 29, 2006.

11. American College Health Association. *Mental and physical health data*, 2000. Available at http://www.acha.org/projects_programs/PHYS-MENTALS00.cfm. Accessed January 12, 2007.

12. Izutsu T, Tsutsumi A, Asukai N, et al. Relationship between a traumatic life event and an alteration in stress response. *Stress Health*. 2003;20:65-73.

13. Burns SL. *The medical basis of stress, depression, anxiety, sleep problems, and drug use*, 1997. Available at: <http://www.teachhealth.com>. Accessed December 15, 2006.

14. Substance Abuse and Mental Health Services Administration. *Stressful life events. Mental health: a report of the Surgeon General*, 1999. Available at: http://www.surgeongeneral.gov/library/mentalhealth/chapter4/sec1_1.html. Accessed January 6, 2011.

15. Ainslie RC, Shafer A. Mediators of adolescents’ stress in a college preparatory environment. *Adolescence*. 1996;32:124.

16. Luthar SS. Vulnerability and resilience: a study of high-risk adolescents. *Child Dev*. 1991;62:600-616.

17. Taylor ES, Klein CL, Lewis PB, et al. Biobehavioral responses to stress in females: tend-and-befriend not fight-or-flight. *Psychol Rev*. 2002;107:411-429.

18. Hall NC, Chipperfield JG, Perry RP, Ruthig JC, Goetz T. Primary and secondary control in academic development: gender specific implications for stress and health in college students. *Anx Stress Coping*. 2006;19:189-210.

18. Allen WR. Correlates of black student adjustment, achievement, and aspirations at a predominantly white southern university. In Thomas GE, ed. *Black students in higher education*. Westport, Conn: Greenwood Press; 1991.

19. Ulbrich PM, Warheit GJ, Zimmerman, R.S. Race, socioeconomic status, and psychologi-



cal distress: examination of differential vulnerability. *J Health Soc Behav.* 1989;30:131-146.

20. Smedley, BD, Myers HF, Harrell SP. Minority-status stresses and the college adjustment of ethnic minority freshmen. *J High Educ.* 1993;64:434-452.

21. Anshel MH, Sutarso, T Jubenville C. Racial and gender differences of acute stress and coping style among competitive athletes. *J Soc Psych.* 2009;149:159-177.

22. Merrill RM. *An introduction to epidemiology*, 5th ed. Sudbury, MA: Jones & Bartlett; 2009.

23. Hebel JR, McCarter RJ. *A study guide to epidemiology and biostatistics*, 6th ed. Gaithersburg, MD: Aspen Pub, Inc.; 2006

24. Page RM, Cole GE, Timmreck TC. *Basic epidemiological methods and biostatistics*. Sudbury, MA: Jones & Bartlett; 1995.

25. McDermott RJ, Sarvela PD. *Health education evaluation and measurement: a practitioner's perspective*, 2nd ed. Madison, WI: WCB/McGraw-Hill; 1999.

26. Neutons JJ, Rubinson L. *Research techniques for the health sciences*, 4th ed. San Francisco: Benjamin Cummings; 2009.

27. Isaac S, Michael MB. *Handbook in research and evaluation*, 3rd ed. San Diego: EdITS Pub; 1995.

28. Johnson JH. *Life Events as stressors in childhood and adolescence*. Beverly Hills, CA: Sage Pubs, Inc; 1980.

29. Ryan-Wenger NH, Sharrer VW, Campbell KK. Changes in children's stressors over the past 30 years. *Pediatr Nurs*: 2005;31:282-90.

30. Edlin G, Golanty E. *Health & wellness* (10th ed.). Boston: Jones & Bartlett; 2009.

31. Miller MA, Rahe RH. Life changes scaling for the 1990s. *J Psychosom Res.* 1997;43:279-292.

32. Schafer W. *Stress management for wellness*. (4th ed.) Fort Worth: Harcourt Brace Jovanovich College; 1999.

33. Rowlinson RT, Felner RD. Major life events, hassles, and adaptation in adolescence: confounding the conceptualization and measurement of life stress and adjustment revisited. *J Pers Soc Psychol.* 1998;553:432-444.

34. Gillings DB. *Biostats: A primer for health care professionals*, 2nd ed. Cavco Publications; 1985:186-187.

35. Friis RH, Sellers TA. *Epidemiology for public health practice*. Gaithersburg, MD: Aspen Pub, Inc.; 1996.

36. Wilver P. *University factbook*. Statesboro, GA: Georgia Southern University Print Shop; 2006.