EFFECTS OF STRESS ON THE HEALTH OF COLLEGE STUDENTS: IMPLICATIONS FOR SCHOOL HEALTH EDUCATION

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Abstract
This study was carried out on the effects of stress on the health of college students: Implications for school health education. It was carried out at the College of Education, Afaha Nsit, Akwa Ibom State. The original study sample were 139 students only. The Chi-square, ANOVA, ANCOVA, Pearson Product Moment Correlation co-efficient were used in the analyses. The findings showed that events are not related to subsequent health status. The data demonstrated no significant difference in health index scores between low stress and high stress groups. This study provides a database to support the development of College Stress Management instruction unit. School health education programmes should incorporate study of stress management into their health education curricular.

Introduction
Stress has been described as the “non-specific response of the body to any demand made upon it”, (Selye, 1974). That is, the physiological reactions to a stressor are similar regardless of the variety of stressors that may occur. Stress may be caused by biological stressors (example, toxins, heat and cold), psychological stressors (e.g., use of time and purpose in life), and others (Greenberg, 1994). All these stressors will result in a similar stress response: increased heart rate, blood pressure, muscle tension, glucose and serum cholesterol and decrease protein stores, digestive process and T-lymphocytes. These physiological stress responses result from hormonal secretions involving the pituitary, thyroid, parathyroid and adrenal glands as well as the hypothalamus and other parts of the brain. Life situations that are perceived by the individual as stressful trigger these glandular responses. Consequently, the stress model which can be described as depicting responses to stress that result from life situations that are perceived as stressful, resulting in emotional responses that in turn lead to bodily reactions and could eventually lead to illness or diseases.
Numerous studies have attempted to validate this stress theory and concluded that physiological responses to stress, if chronic or frequently occurring can lead to illness and disease states. The most noteworthy of the studies has defined stress as the need to adapt to change life events. The theoretical basis for this approach to stress research pertains to the General Adaptation Syndrome described by Selye (1956). Selye theorizes that three distinct stages of stress exist: alarm reactions; resistance and exhaustion. These stages are the bodies attempt to adapt to the stressor in order to restore equilibrium (the pre-stressed state). If the stress is persistent and chronic, the exhaustion of adaptation energy occurs and the body is more susceptible to illness and disease.

An obvious important consideration in studying the effects of stress resulting from life changes (requiring adaptation) is stress management. There have been many methodical enquiries regarding the development of stress measurement scales, most of which are based upon the work of Holmes and Rahe (1967). Holmes and Rahe developed a weighted scale of life changes that require adaptation. The sum of the weighted scores on the items a subject experienced (there were 43) was a measure of stress.

Employing variations of the social readjustment Rating Scale developed by Holmes and Rahe (1967) researchers have studied the relationship between stress, illness and disease. Lundberg and Colleagues (1991) compared subjects who had experienced myocardial infarctions with a matched group of control subjects who had no history of myocardial infarction. They found the subjects who had infarctions had higher total life change scores than the control subjects. In a study of men on a Navy attack carrier, Rubin and Colleagues (1991) concluded that life change score discriminated illness and disease and could be used for illness prediction. Rahe collaborated with Theorell (1992) and employed ballistocardiography as an index of cardiac contraction force in subjects who had experienced a myocardial infarction. They concluded that life change peaked preceding balistocardiographic evidence of an overworked heart. Further, the subjects who died from coronary disease over a six year period experienced greater life changes than those who survived. Others have found life change to be related to neurosis onset. Theorell, Lund and Floderus, (1990), hypertension (Lapin & Cherkovich, 1992), academic performance of students (Harris, 1992), job performance (Clinard, 1993), traffic accidents, (Selzer & Vinokur, 1989), imprisonment (Masuda, et al, 1988) and children’s psychobiological adjustment (Coddington, 1992, Padilla, Rohisenow & Benjamin 1990). To prevent stress from resulting in illness or disease intervention can occur on level of the stress model in Figure 1 (a) The life situation can be controlled such that stressors are avoided; one’s


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perception of the stressor can be altered so that it does not result in physiological correlates of stress; one’s emotion can be controlled; or one’s physiological responses can be alleviated (though strenuous exercise). Behavioral psychologists teach people how to control their environments (life situations) to reduce stress. Such control might include changing jobs, avoiding crowds or divorce. Obviously, such an approach to stress is not always possible or desirable. One’s perception of stressors can be altered with drugs (e.g. depressants that affect the limb system, psychotherapy or a change in philosophy). However, such approaches also are not always possible. Emotions can be controlled by drugs, relaxation techniques (e.g. meditation, autogenic training, progressive relaxation) and bio feedback (Greenberg, 1994).

Stress intervention programme have suffered from a lack of empirical inquiry regarding their effectiveness. Peters, et al (1987) reported statistical significant improvement in symptoms, illness days, performance and sociability-satisfaction for experimental group subjects. Brown (1987) also documents the use of feed back to affect the health status. The purpose of this study was to test whether college students reporting greater life changes contract more illnesses and diseases than college students reporting less life changes. Since stress is seen as the need to adapt to life events changes, it is evident that college students experience a great deal of stress. College students are presented with situations requiring decisions about drug and alcohol related behaviour, sexual behaviour and other behaviours. Such decisions can be quite stressful (distressing). Further, if life event are related to the onset of illness and disease according to literature, then college students experiencing significant life changes could contract more illness and disease than those experiencing less stress from the changes.

Method

Students who registered and took part in physical fitness activities were asked to complete the College Schedule of Recent Experience (CSRE) health index and provide demographic data. This set of students were chosen because since it was expected that students enrolled in these programmes would be representative of the total College population. Three hundred and eight students completed the package of instruments at the beginning of the academic year.

Table 1
The Original Sample (N=308) and the Study Population (N=139)

<table>
<thead>
<tr>
<th></th>
<th>Class in School</th>
<th>Original Sample</th>
<th>Study Population</th>
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<tbody>
<tr>
<td>1</td>
<td>(a) Pre-NCE</td>
<td>N=195 (63.3%)</td>
<td>N=88 (63.3%)</td>
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<tr>
<td></td>
<td>(b) Year I</td>
<td>N=75 (24.4%)</td>
<td>N=34 (24.5%)</td>
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<td></td>
<td>(c) Year II</td>
<td>N=24 (7.8%)</td>
<td>N=12 (8.6%)</td>
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<td></td>
<td>(d) Year III</td>
<td>N=14 (4.5%)</td>
<td>N=5 (3.6%)</td>
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</table>

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<th>2</th>
<th>Sex</th>
<th>Original Sample</th>
<th>Study Population</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(a) Male</td>
<td>N=136 (44.2%)</td>
<td>N=51 (36.7%)</td>
</tr>
<tr>
<td></td>
<td>(b) Female</td>
<td>N=172 (55.8%)</td>
<td>N=88 (63.3%)</td>
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<tr>
<th>3</th>
<th>Marital Status</th>
<th>Original Sample</th>
<th>Study Population</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(a) Unmarried</td>
<td>N=303 (98.4%)</td>
<td>N=136 (97.8%)</td>
</tr>
<tr>
<td></td>
<td>(b) Married</td>
<td>N=3 (1.0%)</td>
<td>N=3 (2.2%)</td>
</tr>
<tr>
<td></td>
<td>(c) Divorced or separated</td>
<td>N=2 (1.6%)</td>
<td>N=0 (0.0%)</td>
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</table>

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<thead>
<tr>
<th>4</th>
<th>Accommodation</th>
<th>Original Sample</th>
<th>Study Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) On-campus</td>
<td>N=138 (44.8%)</td>
<td>N=65 (46.8%)</td>
</tr>
<tr>
<td></td>
<td>(b) Off campus (without parents)</td>
<td>N=34 (11.0%)</td>
<td>N=15 (10.8%)</td>
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<tr>
<td></td>
<td>(c) With Parents</td>
<td>N=136 (44.2%)</td>
<td>N=59 (42.4%)</td>
</tr>
</tbody>
</table>

Table 1 shows that the original sample consisted pre-dominantly of Pre-NCE males and females who had never been married and resided either at home with their parents or in on-campus residences. After the data on the 308 students were obtained it was observed that some student started loosing interest because of pressure from academic work thus post-test administration at the end of the
academic semester would not be possible. These factors resulted in reducing the study population to 139 subjects. To determine whether the subjects remaining in the study differed from those for whom data was incomplete, chi-square analysis was conducted for class-in-school, marital status and accommodation, (see the population in the table above). No statistically significant differences at the 0.05 level were found for class-in-school ($\chi^2=0.73, 3$df), marital status ($\chi^2=5.30, 2$df), accommodation ($\chi^2=0.40, 2$df). It was found however that the study population differed from the original sample by sex ($x^2=5.19, 1$df, $p<.02$).

The original sample comprised 44% males and 56% females and the study population consisted of 37% males and 63% females. As noted in the results, the findings indicated no significant difference by sex in life change resulting in illness or disease. Therefore, the fact that the original sample and study population differed by sex was considered of little import. To determine whether other differences existed between the original sample and the study population, analysis of variance (ANOVA) was conducted for the independent variables of life change and health status. The scores of the CSRE did not differ between the two groups ($df=1/306, F=1.02, p>.31$); and the scores did not differ on the health index ($df=1/306, F=0.36, P>.55$). As a result of the comparisons between the original sample and the study population, it was concluded that the study sample was the representative of the original sample, and, therefore, representative of the College population where the study was conducted (College of Education, Afaha Nsit, Akwa Ibom State).

Procedure
During the first month of academic year (September) students enrolled in physical fitness activity classes were asked to complete a pre-test instrument that included the previously validated CSRE, the health index, a lie-scale and items seeking the demographic data of sex, marital status, grade in school and accommodation. Based upon the CSRE scores on this, pre-test, students scoring $1/2$ a standard deviation below the mean were designated the low stress group. Subjects whose lie scale scores indicated they were responding honestly to the items were eliminated from the data analysis.

Instrumentation
The CSRE is a modification of the Holmes and Rahe Schedule of Recent Experience appropriate for College students. The CSRE has been tested (Anderson 1972) with college students and demonstrated to reliably differentiate between high and low stressed college students.

Table 2
Health Index
During the last 45 days, have you had any of the following injuries and accidents (with or without subsequent infection) sustained from any cause, vehicular, athletic, occupational and other. For example skin cuts, bruises, punctures, muscle strains, pulls, including back; bone or joint sprain, breaks, face or mouth – tooth break, nose break, black eye etc, (a) 1 time (b) 2 times (c) 3 times, (d) 4 times (e) 0 times.

Infection (bacterial or viral) of any system except respiratory and gastrointestinal, for example: skin infections, poison ivy, warts, boils, rashes, acne, flair-ups; blood infections, mononucleosis, organ infections, e.g. Liver hepatitis; genito-urinary, veneral disease, urinary tract infection. (a) 1 time (b) 2 times (c) 3 times, (d) 4 times (e) 0 times.

Respiratory infection, for example, infections of ear, nose, throat, or lungs; coughs, colds, sinus, middle ear infections, bronchitis, sore throat, laryngitis, pneumonia, asthma flair-up, hay fever flair-up, running nose, pleurisy. (a) 1 time (b) 2 times (c) 3 times, (d) 4 times (e) 0 times.

Gastrointestinal infection, for example, vomiting, nausea, diarrhea, change in bowel habits, other pains in gastro-intestinal area. (a) 1 time (b) 2 times (c) 3 times, (d) 4 times (e) 0 times. Neurological and emotional, for example, seizures or fits, depression or apathy, anxiety or nervousness, insomnia, loss of appetite, headaches, migraine, difficulty concentrating, irritable speech or memory problems. (a) 1 time (b) 2 times (c) 3 times, (d) 4 times (e) 0 times. Other and problems
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not classifiable above, for example, change in menstrual flow, sudden weight change, anemia, flair up of any existing (chronic) condition (e.g. diabetic flair up) problems of sexual functioning, change in blood pressure, heart problem, blood vessel problems, swelling ankles, eye problems

(a) 1 time (b) 2 times (c) 3 times, (d) 4 times (e) 0 times.

Table 2 shows the health index which is a self report questionnaire based on the “Probes of New Health Problems” developed by Marx, Garrity and Bowers (1975) and used in their study of college freshmen. The health Index asks respondents to report the incidence of injuries and accidents, bacterial and viral infections, neurological and emotional disorder and other health problems. Respondents record the number of times each category of illness or disease is contracted.

Table 3

Table 3 shows the lie scale consisting of 10 questions from the Minnesota Multiphasic Personality Inventory (1943) whose answers were known. If subjects did not answer the questions as expected, their data were eliminated from the analysis.

Lie Scale Questions
1. Do you become angry once in a while?
2. Are you kind to people you do not like?
3. Do you always tell the truth?
4. Do you like to know important people?
5. Have you gossiped at various times?
6. Do you ever laugh at a dirty joke?
7. Do you sometimes feel like swearing?
8. Is it necessary to keep a promise?
9. Would you rather win than lose?
10. Do you read every editorial daily?

Data Analysis
Numerous data analyses techniques were employed. Frequency distribution was computed for responses on the CSRE and the Health Index. Chi-square analysis were conducted to determine whether any differences existed between the low stress and high stress groups on the variables of class-in-school, sex, marital status and accommodation. Analysis of variance (ANOVA) was employed to determine differences between the low stress and high stress groups on the health index scale on the pre-test. Analysis of covariance (ANCOVA) was performed to determine differences between the low stress and high stress groups on the health index for post-test 1 and post test 2, using the pre-test health index scores as the covariate.

Results
The Findings of Each of the Test Administration are as Follows

Pre-test
The CSRE mean for 139 subjects was 103.68. Analysis of variance found significant differences on the CSRE by sex (df=1/122, F=1.90, p>.17), class-in-school (df=2/122, F=1.12, p>.33), accommodation (df=2/122, F=0.63, P>.54); interaction of sex and class-in-school (df=2/122, F=0.29, p>.75), sex and accommodation (df=2/122, F=0.62, p>.54), grade and accommodation (df=2/122, F=1.58, p>.18), or by sex, class-in-school and accommodation (df=2/122, F=0.35, p>.79). More than 50% of the subjects reported experiencing one life event or the other at least once during the prior year.

The mean score of the pre-test Health Index for the 139 students was 5.11 with only the categories of injuries and accidents (65%) and Respiratory Infections (38%) reported experienced by more than half of the subjects. The Health Index categories reported as occurring least were other problems (25%) and Bacterial and Viral Infections (36%). The low stress group (N=46) scoring ½ Standard Deviation below the mean on CSRE and the high stress group (N=35) scoring ½ standard deviation above the mean were compared on their pre-test Health Index scores. The low stress group
(x=2.52) reported less illness/disease than the high stress group (x=7.40). This differences were statistically significant (df=79, F=35.32, p<.00).

When the differences between the low stress and high stress groups were analyzed for each separate category of the Health Index, only the categories of injuries and Accidents proved not to be significant statistically (df=79, F=0.67, p>.42). The means of this category were 1.09 for the low stress group and 1.31 for the high stress group. When demographic data were analyzed, sex (x²=1.41, 1df) class-in-school (x²= 4.83, 3df), Accommodation (x²=4.26, 2df), and marital status (x²=0.02, 1df) were not found to differ between the low stress group and high stress groups.

**Post-test 1**

With the pre-test Health Index score as a covariate, an analysis of covariance (ANCOVA) revealed no significant differences in illness/diseases contracted between the low and high stress groups (df=78, F=1.71, p>.20). The Pearson Product Moment Correlation coefficient of .68 between the pre-test and post-test 1 Health Index scores further revealed that not much change had occurred in contracted illness and disease between the test administrations.

When post-test 1 Health Index data were analyzed for each category, only the bacterial or viral infection category differed significantly between the low stress and high stress groups. The high stress group reported contracting a great number of bacterial and viral infections than the low stress group (df=78, F=6.57, p<.01).

**Post-test 2**

Using the pre-test health index score as a covariate, an analysis of covariance demonstrated no significant difference in contracted illness and disease between the low stress and high stress groups (df=78, F=0.13, p>.68). The correlation coefficient between the pre-test and post-test 2 health index scores further revealed similarities of contracted illness and diseases between these test administrations (r=.56). Whereas post-test 1 analysis found differences between low and high stress groups in the bacterial and viral infections category of the health index, post-test 2 analysis found that only the other problems category differed. The high stress group reported contracting more other problems than the low stress group (df=78, F=4.63, p<.04).

**Discussion**

Based on the result of this study, several conclusions were drawn. One is that life events are not related to subsequent general health status. This conclusion is based on the data demonstrating no significant difference in health index scores between the low stress and high stress groups when the pre-test was used as a covariate. However, several competing explanations of these results can be offered. One explanation is the seven month period between the pre-test and post test 2 is not sufficient to demonstrate the effect of stress upon health. Supporting this conclusion are the data indicating significant difference on post test 2 Other Problems. Since the Other Problems category of the Health Index includes conditions that are developmental and degenerative, their etiology is longer term than other illnesses and diseases. The findings that post-test 1 revealed no significant difference but post test 2 did, supports the conclusion that the effects of stress upon health may have just begun evidencing themselves at the end of seven months.

Another interesting finding leads on to question the seasonal effects of stress on health. As noted, the high stress group reported more bacterial and viral infections than the low stress group in post test 1. This difference was not reported in post test 2. Perhaps stress is more likely to result in bacterial and viral infections during the months of September through December than other times of the year. The data on the pre-test demonstrated statistically significant differences in health status between the low stress group and high stress group. Perhaps the anticipation of the life changes making up the College schedule of Recent Experience was worse than experiencing the changes. Consequently, anticipating the life changes that would occur during the coming academic year might, by itself, have been distressing enough to result in ill health in subjects who also were anticipating
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other life changes. When completing the CSRE and Health Index in September, the subjects may already have experienced the effects of stress upon health.

Therefore, the finding on the pre-test that the high stress group already reported more ill health than the low stress group. Experiencing the life changes, than is not perceived as stressful as anticipating the life changes; and consequently, would explain the finding that there were no difference on the health index between the low stress and high stress groups on the two post tests.

Implications for School Health Education

College students experience a loss of life style when they graduate. This lifestyle has become comfortable and routine. Graduation brings changes – making new friends, accepting new responsibilities and perhaps, obtaining new accommodations. Experiencing and anticipating such changes can be quite distressing. Unfortunately, too few schools health education programmes incorporate study of stress management into their health education curricular. The study results reported in this article provide a database to support the development of College stress management instruction units. Students need to learn how to leave the style to which they have adapted and to effectively meet the challenges ahead without becoming ill. Once such school health education programmes are developed and conducted their efficacy should be determined.

References


C. U. Atiajah, (Ph.D)


Minnesota Multiphasic Personality Inventory. (1943). Minneapolis, MN: University of Minnesota.


