

Relationship of Diet to Physical/Emotional Complaints and Behavioral Problems Reported by Women Students

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Introduction

It was no surprise to me that John W. Hinckley Jr., university drop-out, and would-be assassin, was reported to consume substances which are commonly referred to as non-nutritious (junk) food (Time, April 13:41). The comment prompted me to write the following letter to the editors of Time.

Your article "A Drifter Who Stalked Success" (April 13) disclosed a common denominator found among those who are committing violent/criminal acts against society. Swafford's comment (page 41) that "Every where there were empty bags from hamburger joints and cartons of ice cream," identified a factor which many of us, in the field of human behavior, have associated with anti-social acts. Despite Weiler's contention (Letters, April 13), clinical ecologists (March 16) have demonstrated, in controlled environments, that the foods/beverages we consume, and the air we breathe, are the most common stressors faced every day of our increasingly polluted lives. Nutrient deficient tissues can, and

98373

often do, become reactive upon exposure to various substances. When the central nervous system becomes reactive to commonly consumed foods/beverages and to chemical exposure, anti-social behavior is the rule rather than the exception.

My dissertation research revealed that, among 158 subjects from two southern California universities, the consumption of non-nutritious (junk) foods and beverages was significantly (statistically) related to self report statements of: I feel like doing terrible things which frighten me; I lose my temper easily; I easily become violent; and I have suicidal tendencies.

My effort to determine if a statistically significant relationship could be shown between the physical/emotional complaints and behavioral problems of university women and their consumption of non-nutritious foods and beverages evolved through a sequence of events. During the period 1973 - 1977, a number of my clients were university women students who had dropped out of school because of depression, anxiety, inability to concentrate, diminished memory, and loss of incentive. Without exception, they all reported poor dietary habits; for example, excessive consumption

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of coffee (in excess of three cups a day), candy, cookies, assorted soft drinks, pastries, ice cream, and other nutrient deficient carbohydrates such as boxed cereals, noodles, spaghetti, macaroni, and white bread. One such young woman, who spent her meal money on a radio and supposed necessities rather than nutritious food, tried to get by on cookies, cake, and fudge from home. She also made liberal use of university candy and coke machines. Formerly lighthearted, calm and relaxed, she became irritable, extremely depressed, and unable to handle the slightest stressor. She could not concentrate, suffered from insomnia and lost all interest in school. She also experienced schizophrenic phenomena such as auditory hallucinations. This, and other symptoms, disappeared shortly after she began nutritional therapy. The immediate loss of sensory dysperception suggested a subclinical pellagra condition.

The case just related paralleled many reported by orthomolecular therapists and clinical ecologists who have screened their clients for physiological dysfunction as the root cause of behavioral problems (Randolph, 1980; Hoffer and Osmond, 1974; Philpott, 1979; Mandell, 1977; Mandell and Scanlon, 1979; Ross, 1976; Fredericks, 1976; Cheraskin et al., 1974). I considered it probable that the example previously cited, and others, were not rare, isolated cases, but instead represented an ongoing prevalent condition to be found among university women students.

Nora Kinzer (1979) captured the atmosphere of the university academic environment encountered by university women when she described her personal observations and experiences at a university. She wrote:

The whole graduate-school syndrome is sick...How well I knew the syndrome!...The strong and sane got out early...Upset stomachs and assorted gastrointestinal problems absorbed us...Our hands shook from too much coffee, too many cigarettes, too little sleep, and from justifiable paranoia. We were being persecuted. Some committed suicide. Pills combined with booze was a favorite method (Kinzer, 1979:4-5).

Kinzer, perhaps unknowingly, identified

stressors more significant than the academic pressures when she wrote, "too much coffee, too many cigarettes." Philpott (1977a: 280) emphasized the essence of Kinzer's observation when he wrote:

Hans Selye was right when he observed chronic stress leads to chronic disease, either physical or mental. However, what Hans Selye did not know was that mankind's greatest stressors are addictions to frequently used foods and commonly met chemicals.

Similarly, McCarthy and Corrin (1955) reported that stressors lead to psychophysiological disorders. They wrote that "These disorders are increasing in our modern civilization with its abnormal pressures and stresses, combined with overwork and neglect of proper habits of living" (McCarthy and Corrin, 1955: 426). Bad habits of living were identified as "lack of proper meals, rest and sleep, often associated with overwork, tension and worry, common in the student" (McCarthy and Corrin, 1955: 429).

The point just made is that abnormal stressors, such as those found in the academic environment, have another component. That component, neglect of proper habits of living, and specifically, poor dietary habits, has been implicated in the learning and behavioral problems of young children (Rim-land, 1977; Cott, 1977; Brown, 1977; Fein-gold, 1977). However, only anecdotal emphasis has been given to the university student who has candy, soft drinks, caffeine and processed, high energy foods, which are liberally laced with artificial flavorings, colorings, and preservatives, available in resident hall dispensing machines. Therefore, when I began my graduate study, I was determined to investigate the relationship of diet to the manifestation of stress as reflected in physical/emotional complaints and behavioral problems of university women. The following is a synopsis of my dissertation research of the question.

Instrument

The survey instrument, consisting of 15 pages and 409 items, was primarily based on instruments and information used by ortho-

molecular therapists and clinical ecologists to sample emotional/physical complaints and behavioral problems identified singularly, or collectively, as attributable to dietary and/or ecological factors (Randolph, 1978; Cheraskin et al., 1974; Zamm, 1976; Philpott, 1977c; Fredericks and Goodman, 1969; Mandell, 1977; Pfeiffer et al., 1975; Reed, 1977; Baron, 1971; Rosenberg and Feldzamen, 1974; Kirschmann, 1975; Livingston-Wheeler and Wheeler, 1977).

The instrument was originally developed to research the relationship of physical/emotional complaints of women students at a northwestern university. As a pilot study (162Ss), it proved to be beneficial in the refinement and development of the instrument used in the survey of women students at two southern California universities.

The first fifty questions dealt with stress symptoms commonly reported among hypoglycemic/adrenal insufficient patients. Stress, as reflected in emotional/physical complaints and behavioral problems, can be the result of prolonged impingement of exogenous or endogenous stressors. Therefore, questions were included to determine which of the following variables were significantly related statistically to the top half and top one-fourth stress scorers:

1. Severe trauma within the past year.
2. Frequency of exercise.
3. Hours of daily sleep.
4. Number and frequency of non-nutritious foods/beverages consumed.
5. Number and frequency of nutritious foods/beverages consumed.
6. Use of non-prescription drugs.
7. Genetic susceptibility as reflected in family medical history.
8. Use of the birth control pill.
9. Age.
10. Symptoms of galactosemia.
11. Yeast or other fungus infections.
12. University attended.
13. Meals skipped.

Questions, singularly and collectively, which were similar to questions 1 through 50 (stress syndrome), were used for internal testing. For example, questions comprising syndromes, which were suggestive of severe hypoglycemia,

diabetes, and depression, were included for statistical comparison of top and bottom stress scorers. Also included were questions to sample test bias, academic record, recent change to a more nutritious diet, and dietary habits. Dietary habits were sampled by listing 236 foods/beverages (including tobacco use) composed of three categories: (1) 157 nutritious foods/beverages, (2) 53 non-nutritious foods/beverages, and (3) 26 neutral foods/beverages. Neutral foods/beverages were so identified because of their questionable nutritional value and to avoid a direct correlation between stress syndrome questions, which related to food/beverage use, and to the same food/beverage selected as being consumed. Milk and other lactose containing dairy products were listed as neutral because of the current controversy about their nutritional value following pasteurization/ homogenization and because of the fairly common condition of galactosemia, especially among blacks.

Other questions dealt with maladaptive (allergic) reactions and personal practices which affect physiological processes. Vitamin and mineral deficiency symptoms were also sampled. In addition, responses concerning university food services, nutritional knowledge, dietary habits, and other factors considered important in arriving at conclusions were included.

Subjects and Distribution Procedure

The instrument, which assured anonymity, was proportionately distributed to 350 women students at two Southern California universities. One university, hereafter referred to as University A, was primarily composed of undergraduate students and the other university, University B, was primarily composed of graduate students seeking Master's and Ph.D. degrees. Ages ranged from 18 to 57 and educational level from undergraduate freshmen to Ph.D. graduate students. Most of the students at University A, who participated in the study, resided on campus; the majority of participating students at University B were commuters.

Subjects had no personal contact with the researcher and participation was voluntary. Computer NCS response forms were used

to record response selection. Response sheets were anonymously deposited into a sealed, secure container at designated collection points. If the results of the study were desired, a separate document was deposited.

Method

Descriptive and inferential statistics were used to describe and evaluate instrument data. Fifty instrument items, questions one through 50, with a rating scale from A to D, corresponding respectively to scores of 0, 1, 2, and 3, were used to provide a stress score for comparison of scorers to a number of variables/factors. For example, the top/bottom half scorers and the top/bottom one-fourth scorers were statistically compared to their corresponding report of consuming a discriminating number of non-nutritious foods and beverages, at specified frequencies, to determine whether a significant difference ($<.05$) between groups existed. Discriminating quantities and frequencies of non-nutritious foods/beverage consumption were established as: 1. five or more, two to five times a week (often); 2. three or more daily (except for occasional misses); and 3. two daily if one non-nutritious food/beverage was reported as consumed two to five times a week.

A majority/minority and chi-square analysis was used to determine whether the differences between groups were significant. In addition, an analysis of the Difference in Correlated Means of non-nutritious food/-beverage consumption was made.

Stress scores of 20 points or more were considered to reflect a hypoglycemic (stress) condition. More definitively, this was considered to be a reflection of pancreatic insufficiency and possibly, to some degree, adrenal insufficiency. The pancreas is the initial, and most important stress shock organ, which adapts to stress by inhibition (Philpott, 1978).

Deficiency symptoms of vitamins A, B6, C and minerals zinc, calcium and magnesium were used to sample possible nutrient deficiencies because of little or no controversy concerning such symptoms. In addition, these vitamins/minerals are vital to the physiological

adaptation to stressors. Therefore, Ss who reported a high frequency and number of stress symptoms were expected to report more deficiency symptoms than Ss with fewer stress indicators.

Possible maladaptive (addictive/allergic) symptoms were based upon checklists and text material developed by clinical ecologists (Randolph, 1976a, 1976b, 1978; Philpott, 1977a, 1977b, 1977c; Mandell, 1977; Mandell and Scanlon, 1979).

Symptoms comprising a syndrome suggestive of galactosemia, diabetes, severe hypoglycemia, and depression were derived from orthomolecular literature. Evaluative analysis, identical to that previously described, was used to determine significance in differences between groups of scorers.

Computations were derived from a computer printout of responses which were considered to be 99.9 percent accurate. A programmed calculator was used to compute data which were manually obtained from the computer printout.

Results

Of the 350 instruments distributed, 166, or 47 percent, were returned; 158 were usable, Table 1. The instruments returned were considered to have proportionately sampled the female student population at the two universities surveyed. Correspondingly, various age groups were represented as well. A summary of subject grade level/ages is shown in Table 2 and reflects the marked contrast in grades and ages of women students surveyed at the two universities.

Of the university women surveyed, 143, or 91 percent, scored 20 or more points on the first 50 questions, suggesting a stress condition. The mean score was 33 and the standard deviation was 12.3. The scores ranged from 4 to 86. There was no significant relationship between scores and age, university population sampled, or grade level. Comparatively, the population scores were similar to those obtained in the pilot study for which the mean score was 28 and variability of scores was less with a standard deviation of 10.96. The mode for the pilot study was 28 compared to 27 for this study. Eighty-one percent of the pilot study group scored 20

or higher. Stress score data are presented in Table 3; comparative score data of the pilot study are shown as well. The homogeneity

of the university population surveyed is apparent, Table 4.

TABLE 1 SURVEY INSTRUMENTS RETURNED

| INSTRUMENTS UNIVERSITY | RETURNED | PERCENTAGE RETURNED | USABLE INSTRUMENTS |
|------------------------|-----------|---------------------|--------------------|
| A | 91 | 52 | 86 |
| B | <u>75</u> | <u>43</u> | <u>72</u> |
| Total | 166 | 47 | 158 |

TABLE 2 SUBJECT DEMOGRAPHIC INFORMATION

| University | GRADE | | | | | | AGES | | | | | | | |
|------------|-------|----|----|----|-----|-----|------|----|----|----|-------|-------|-------|-------|
| | 13 | 14 | 15 | 16 | 17a | 18b | 18 | 19 | 20 | 21 | 22-29 | 30-35 | 36-40 | 40-57 |
| A Subjects | 44 | 24 | 10 | 6 | 2 | 0 | 23 | 36 | 13 | 10 | 3 | 1 | 0 | 0 |
| B Subjects | 6 | 3 | 4 | 7 | 24 | 28 | 4 | 3 | 3 | 4 | 23 | 18 | 8 | 9 |

17a - Master's Level

18b - Ph.D. Level

TABLE 3 CURRENT STRESS SYNDROME SCORE DATA COMPARED TO PILOT STUDY

| | 20 or Higher | Below 20 | Mean Score | Standard Deviation | Mode | Median | Range of Scores |
|------------------------------|--------------|----------|------------|--------------------|------|--------|-----------------|
| Present Study (158 Subjects) | | | 33 | 12.3 | 27 | 30.5 | 4-86 |
| Number of Subjects | 143 | 15 | | | | | |
| Percentage | 91 | 9 | | | | | |
| Pilot Study (162 Subjects) | | | 27 | 10.96 | 28 | 27 | 7-83 |
| Number of Subjects | 134 | 28 | | | | | |
| Percentage | 81 | 17 | | | | | |

TABLE 4 HOMOGENEITY OF POPULATION AMONG SCORERS

| Scorers | Grade | | | | | | Ages | | | | | | University | |
|---------------------|-------|----|----|----|-----|-----|------|----|----|----|-------|-------|------------|----|
| | 13 | 14 | 15 | 16 | 17a | 18b | 18 | 19 | 20 | 21 | 22-29 | 30-57 | A | B |
| Top 1/4 (N = 39) | 15 | 2 | 8 | 2 | 9 | 3 | 8 | 6 | 6 | 5 | 6 | 8 | 23 | 16 |
| Bottom 1/4 (N = 39) | 12 | 8 | 3 | 4 | 7 | 5 | 6 | 12 | 3 | 4 | 7 | 7 | 21 | 18 |
| Top 1/2 (N = 79) | 25 | 11 | 8 | 8 | 13 | 14 | 14 | 16 | 9 | 7 | 13 | 20 | 45 | 34 |
| Bottom 1/2 (N = 79) | 15 | 16 | 6 | 5 | 13 | 14 | 13 | 22 | 7 | 7 | 13 | 17 | 41 | 38 |

17a-Master's Level
18b-Ph.D. Level

Eighty-one percent of the university women students surveyed reported a major deficiency symptom of two or more vitamins. Vitamin B6 deficiency symptoms were most commonly reported, followed by vitamin C and vitamin A deficiencies,

respectively. The number and percentage of vitamin deficiencies reported are presented in Table 5. Table 6 shows the number and percentage of students reporting multiple vitamin deficiency symptoms.

TABLE 5 VITAMIN DEFICIENCY SYMPTOMS REPORTED

| Vitamin: Number of Symptoms: | A | | | | | B6 | | | | | C | | | | | | | | | | | | | | | |
|------------------------------------|----|----|----|----|----|----|----|---|---|----|----|----|----|----|----|----|---|---|---|---|----|----|----|----|----|----|
| | 0 | 1 | 2 | 3 | 4 | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | | | | | | | | | | | | |
| Number of Subjects | 50 | 32 | 64 | 40 | 29 | 12 | 18 | 3 | 2 | 29 | 53 | 18 | 47 | 30 | 20 | 13 | 7 | 4 | 2 | 1 | 44 | 28 | 81 | 51 | 33 | 21 |
| Percentage | | | | | | 8 | | | | 34 | | | | | | | | | | | | | | | | |

TABLE 6 MULTIPLE VITAMIN DEFICIENCY SYMPTOMS REPORTED

| | Deficiency Symptom of Two Vitamins | Deficiency Symptom of Three Vitamins | Two Deficiency Symptoms of Two Vitamins |
|--------------------|--|--|--|
| Number of Subjects | 128 | 71 | 40 |
| Percentage | 81 | 45 | 25 |

Sixty-three percent reported a deficiency symptom of two or more minerals. Zinc deficiency symptoms were most commonly reported, followed respectively by magnesium and calcium deficiencies. The

number and percentage of mineral deficiencies reported are presented in Table 7. Table 8 shows the number and percentage of students reporting multiple mineral deficiency symptoms.

TABLE 7 MINERAL DEFICIENCY SYMPTOMS REPORTED

| Mineral: Number of Symptoms: | Zinc | | | | | Calcium | | | Magnesium | | |
|------------------------------------|------|----|----|----|---|---------|----|----|-----------|----|----|
| | 0 | 1 | 2 | 3 | 4 | 0 | 1 | 2 | 0 | 1 | 2 |
| Number of Subjects: | 47 | 61 | 12 | 35 | 3 | 97 | 43 | 18 | 54 | 80 | 24 |
| Percentage | 30 | 39 | 7 | 22 | 2 | 61 | 27 | 12 | 34 | 51 | 15 |

TABLE 8 MULTIPLE MINERAL DEFICIENCY SYMPTOMS REPORTED

| | Deficiency Symptom of Two Minerals | Deficiency Symptom of Three Minerals | Two Deficiency Symptoms of Two Minerals |
|-------------------------------|------------------------------------|--------------------------------------|---|
| Number of Subjects Percentage | 99 63 | 37 23 | 22 14 |

A majority/minority and Chi-square analysis revealed that the consumption of non-nutritious foods reported by the top one-half stress scorers, compared to consumption reported by the lower one-half scorers, was significant at the .01 and .05 levels

respectively. A comparison of the top one-fourth scorers and the lower one-fourth scorers revealed a difference significant at the .05 level (majority/minority analysis). Comparative results are shown in Table 9.

TABLE 9

DIFFERENCE IN CONSUMPTION OF NON-NUTRITIOUS FOODS BETWEEN TOP AND BOTTOM SCORERS

(Majority/Minority and Chi-Square Analysis)

| Scorers | Number of Subjects Consuming Non-Nutritious Foods: 1. 5 or more 2 to 5 times/week 2. 3 or more daily 3. 2 daily if 1 or more consumed 2 to 5 times/week | Level of Significance | | |
|--------------------------|---|-----------------------|-----------------|----|
| | | Chi-M/M | Square | df |
| Top 1/2 (79 Subjects) | 58 | .01 | .05 | 1 |
| Bottom 1/2 (79 Subjects) | 32 | | | |
| Top 1/4 (39 Subjects) | 31 | .05 | NS _a | 1 |
| Bottom 1/4 (39 Subjects) | 15 | | | |

a - Not Significant

An analysis of the difference between correlated means for the consumption of non-nutritious foods, at daily and two to five times a week frequencies, disclosed the following:

1. Daily consumption of non-nutritious foods reported by the top half scorers, compared to the bottom half, revealed a difference which was significant at the .01 level-, at the two to five times a week frequency, the difference was significant at the .001 level.

2. Daily consumption of non-nutritious foods

reported by the top one-fourth, compared to the bottom one-fourth revealed a difference significant at the .05. level; at the two to five times a week frequency, the difference was significant at the .01 level.

A summary of the computed difference between correlated means for consumption of non-nutritious foods at daily and two to five times a week frequency is presented in Table 10. A study of the relationship between vita-

min/mineral deficiency symptoms and stress scores revealed a number of statistically significant differences between top and bottom scorers. The differences are summarized in Table 11.

Among participants, 128, or 81 percent, reported two or more maladaptive responses. Eight subjects, who had reported fatigue

as one of two maladaptive responses, were discounted because they also reported only eight hours of rest at a frequency of sometimes (now and then), which could account for the reported fatigue. A summary of the type and number of maladaptive responses reported is shown in Table 12.

TABLE 10

DIFFERENCE BETWEEN CORRELATED MEANS FOR CONSUMPTION OF NON-NUTRITIOUS FOODS/BEVERAGES AT DAILY AND TWO TO FIVE TIMES A WEEK FREQUENCY

$$(\bar{x}_1 \neq \bar{x}_2)$$

| Scorers | Non-Nutritious Food/Beverage Consumption Frequency | | | | Level of Significance | | |
|---------------------------|--|------|-----------|------|-----------------------|-------|----|
| | 2 to 5 times/wk | | Daily | | 2 to 5 times/wk. | Daily | df |
| | \bar{X} | SD | \bar{X} | SD | | | |
| Top ½ (79 Subjects) | 6.1 | 4.22 | 1.73 | 2.15 | .001 | .01 | 78 |
| Bottom ½ (79 Subjects) | 4.0 | 3.29 | .99 | 1.36 | | | |
| Top ¼ (39 Subjects) | 7.0 | 4.85 | 2.07 | 2.45 | .01 | .05 | 38 |
| Bottom ¼ (39 Subjects) | 4.0 | 3.33 | 1.00 | 1.37 | | | |

TABLE 12 NUMBER AND PERCENTAGE OF MALADAPTIVE RESPONSES REPORTED

| Scorers | Number of Subjects Reporting | |
|--------------------------|------------------------------|------------|
| | Maladaptive Responses | Percentage |
| Top 1/4 (79 Subjects) | 76 | 96 |
| Bottom 1/4 (79 Subjects) | 55 | 70 |
| Responses, All Subjects | | |
| Joints | 27 | 17 |
| Skin | 35 | 22 |
| Head Pain | 53 | 34 |
| Eyes | 47 | 30 |
| Stimulated | 90 | 57 |
| Nasal | 66 | 42 |
| Throat, Mouth | 18 | 11 |
| Muscle | 20 | 13 |
| Speech/Comprehension | 18 | 11 |
| Generalized | 23 | 15 |
| Lungs/Heart | 15 | 9 |
| Depressed | 46 | 29 |
| C-1/Abdomen | 62 | 39 |
| Ears | 20 | 13 |
| Fatigue | 92 | 58 |
| Genital/Urinary | 30 | 19 |
| Vision | 18 | 11 |

TABLE 11
 DIFFERENCE IN VITAMIN/MINERAL DEFICIENCY SYMPTOMS
 REPORTED BY TOP AND BOTTOM SCORERS
 (Majority/Minority Analysis)

Two Vitamin/Mineral Deficiencies Reported

| Scorers | A | B | C | Zinc | Calcium | Mag- nesium | Level of Significance | df |
|---------------------------|-------------------|-----------------|-----------------|-----------------|----------------|----------------|--------------------------|----|
| | $\frac{29^a}{15}$ | | | | | | .05 | 1 |
| | | $\frac{48}{28}$ | | | | | .05 | 1 |
| Top ½ (79 Subjects) | | | $\frac{23}{10}$ | | | | .05 | 1 |
| Bottom ½ (79 Subjects) | | | | $\frac{26}{24}$ | | | NS | 1 |
| | | | | | $\frac{12}{6}$ | | NS | 1 |
| | | | | | | $\frac{19}{5}$ | .01 | 1 |
| | $\frac{17}{4}$ | | | | | | .01 | 1 |
| | | $\frac{27}{11}$ | | | | | .05 | 1 |
| Top ¼ (39 Subjects) | | | $\frac{15}{4}$ | | | | .05 | 1 |
| Bottom ¼ (39 Subjects) | | | | $\frac{15}{9}$ | | | NS | 1 |
| | | | | | $\frac{9}{1}$ | | .05 | 1 |
| | | | | | | $\frac{12}{3}$ | .05 | 1 |

a - Number of subjects reporting two vitamin/mineral deficiencies; top scorers over bottom scorers.

Statistically, in addition to the consumption of non-nutritious foods being found significantly related to stress scores, other behaviors and emotional/physical complaints were also determined to be significantly related to such scorers. Examples are shown in Table 13. Instrument questions have been reduced to abbreviated words and phrases. Items comprising a syndrome are explained in footnotes in the table. Evidence of construct validity was investigated by testing internal relationships for discrimination between groups by comparing group selection of items similar to those found in the first 50 questions.

The number of subjects reporting suggestive evidence of the following conditions/behaviors was considered to be worthy of special mention: (1) severe hypoglycemia, 29 subjects; (2) severe depression, 44 subjects; (3) galactosemia, 49 subjects; (4) diabetes,

(5) easily become violent, 20; (6) think frequently that others are against them, 7; (7) hallucinations not related to drug use, 8; (9) suicidal, sometimes or more frequently, 24; and (10) numerous maladaptive (addictive/allergic) symptoms, reference Table 11.

A few random and specific comparisons were made with the pilot study (162 subjects). Remarkably, there were a number of nearly identical figures, reference Table 14. Overall, the California subjects seem to have reported slightly more negative occurrences in responding to instrument questions than the Washington state pilot study group. This observation pertained to consumption of non-nutritious foods and beverages as well. Consumption of foods/ beverages by high and low scorers for both studies is shown comparatively in Table 15.

TABLE 13

STATISTICALLY SIGNIFICANT RELATIONSHIPS BETWEEN STRESS SCORES AND SURVEY ITEMS

**Majority/Minority and Chi-Square
(P1 not equal P2 and P1a not equal P2a)
Analysis**

| Symptoms, Condition Behavior | Tested Frequency Plus Any Higher Frequency | Scorers | | Level of Significance df=1 | | | |
|-------------------------------------|--|-------------------|--------------------|----------------------------|------|------------|-----|
| | | Top1/2 (79 Ss) | Top 1/4 (39 Ss) | Majority | | Chi-Square | |
| | | Bottom1/2 (79 Ss) | Bottom 1/4 (39 Ss) | 1/2 | 1/4 | 1/2 | 1/4 |
| Moods Related to Foods (54) | Sometimes | 49/31 | 29/10 | NS ^a | .05 | NS | .05 |
| Diet/Offended Easily (55) | Frequent | 18/2 | 10/0 | .001 | .01 | .01 | .01 |
| Study/Need Caffeine/ Candy (56) | Frequent | 32/15 | 17/6 | .05 | .05 | .05 | NS |
| Skip Meals to Keep Weight Down (57) | Frequent | 23/10 | 17/7 | .05 | NS | .05 | NS |
| Others Against Me (64) | Frequent | 7/0 | 6/0 | .05 | .05 | .05 | NS |
| Do Things That Frighten Me (69) | Sometimes | 26/9 | 14/6 | .01 | NS | .05 | NS |
| Quit School (73) | Frequent | 8/1 | 6/0 | .05 | .05 | NS | NS |
| Lose Temper Easily (74) | Frequent | 11/2 | 9/0 | .05 | .01 | .05 | .05 |
| Neglect Cleanliness (75) | Sometimes | 27/10 | 16/5 | .01 | .05 | .05 | NS |
| Suicidal (79) | Sometimes | 18/6 | 12/1 | .05 | .001 | .05 | .05 |
| Poor Memory (80) | Frequent Frequent | 11/4 | 10/1 | NS | .05 | NS | .05 |
| Easily Become Violent (81) | Sometimes | 16/7 | 12/2 | .05 | .05 | .05 | .05 |
| Damage to Others (82) | Sometimes | 19/6 | 12/3 | .05 | .05 | .05 | NS |
| Limbs Numb (95) | Sometimes | 32/9 | 18/3 | .01 | .01 | .01 | .01 |
| Birth Control Pill (97) | Sometimes | 20/11 | 13/4 | NS | .05 | NS | NS |

Table 13—Continued

| Symptoms, Condition Behavior | Tested Frequency Plus Any Higher Frequency | Scores | | Level of Significance df=1 | | | |
|--|--|---|---|----------------------------|------|------------|------|
| | | | | Majority /Minority | | Chi-Square | |
| | | <u>Top 1/2 (79 Ss)</u> /Bottom 1/2 (79 Ss) | <u>Top 1/4 (39 Ss)</u> /Bottom 1/4 (39 Ss) | 1/2 | 1/4 | 1/2 | 1/4 |
| Mind Goes Blank (101) | Sometimes | 53/29 | 30/10 | .05 | .01 | .05 | .05 |
| Galactosemia | b | 31/18 | 18/6 | NS | .05 | NS | NS |
| Hands/Legs Cold (102) | Frequent | 21/4 | 14/2 | .01 | .01 | .01 | .05 |
| Yeast Infection (104) | Sometimes | 30/19 | 18/6 | NS | .05 | NS | NS |
| Phobia (108) | Frequent | 24/5 | 19/1 | .001 | .001 | .01 | .001 |
| Internal Testing Tired No Matter How Much Sleep (53) | Frequent | 22/3 | 20/1 | .001 | .001 | .001 | .001 |
| Use Campus Candy/ Drink Machines (59) | Frequent | 21/8 | 16/2 | .05 | .01 | .05 | .01 |
| Impatient (76) | Frequent | 18/10 | 14/4 | NS | .05 | NS | NS |
| Things Irritate Me (77) | Frequent | 32/14 | 24/6 | .05 | .01 | .05 | .01 |
| Sleep Deep/Not Refreshing (83) | Frequent | 21/2 | 10/1 | .05 | .05 | .05 | .05 |
| Fainting Spells (84) | Sometimes | 10/4 | 9/1 | NS | .05 | NS | .05 |
| Dizzy/Stand Up Quickly (100) | Frequent | 15/10 | 12/0 | NS | .001 | NS | .01 |
| Severe Hypoglycemia | c | 27/2 | 19/0 | .001 | .001 | .001 | .001 |
| Diabetes | d | 9/1 | 6/1 | .05 | NS | .05 | NS |

DIET AND WOMEN'S HEALTH PROBLEMS

Table 13—Continued

| Symptoms, Condi- tion Behavior | Tested Frequency Plus Any Higher Frequency | Scorers | | Level of Significance df = 1 | | | |
|---|--|------------------|------------------|---------------------------------|------|------------|-----|
| | | Top ½ (79 Ss) | Top ¼ (39 Ss) | Majority | | Chi-Square | |
| | | Bottom ½ (79 Ss) | Bottom ¼ (39 Ss) | Minority | | ½ | ¼ |
| | | | | ½ | ¼ | ½ | ¼ |
| Depression 2 Symptoms | | <u>56</u> 30 | <u>33</u> 11 | .01 | .01 | .05 | .05 |
| Depression 3 Symptoms | e | <u>34</u> 10 | <u>20</u> 3 | .001 | .001 | .01 | .01 |
| Maladaptive Respon- ses (153b to 169b) | f | <u>20</u> 2 | <u>13</u> 0 | .001 | .001 | .001 | .01 |

- a. Not Significant
- b. Affirmative responses which corresponded closely to the frequency of dairy product consumption reported to at least two of the four survey questions, were statistically noted.
- c. A severe hypoglycemic condition was statistically noted if **most of the time** and **frequently** responses were made to statements such as I get hungry or feel faint, unless I eat frequently; I get "shaky" if hungry; I tremble inside; when I'm hungry, my hands shake.
- d. A score of 20 or higher on survey questions 1-50 and a **most of the time** response to I'm thirsty combined with a **frequent** or **most of the time** responses to My skin itches, were statistically noted.
- e. A frequency response of sometimes or higher to survey questions such as, I'm tired of living, and I have suicidal tendencies, were statistically noted.
- f. Seven of the maladaptive (addictive/allergic) response items were identical to or similar to some of the stress syndrome questions 1-50; therefore, only eight or more affirmative responses were statistically noted.

TABLE 14
SIMILARITY OF PILOT AND CURRENT STUDY SUBJECTS' RESPONSE
TO SOME INSTRUMENT ITEMS

| Item | Number of Affirmative Responses | |
|---|---------------------------------|---------------|
| | Pilot Study | Current Study |
| Feelings of impending doom (23) | 56 | 59 |
| When hungry, hands shake (26) | 26 | 33 |
| Hallucinations not attributable to drug abuse (45) | 7 | 8 |
| Others against me (frequently) (64) | 9 | 7 |
| Associated moods, behavior, or phys- ical feelings with foods eaten (54) | 72 | 80 |
| Past has been bad, present no good; future no better (48) | 26 | 30 |
| Wake up tired no matter how much sleep (53) | 110 | 114 |

TABLE 15 CONSUMPTION OF NON-NUTRITIOUS/NUTRITIOUS FOODS/BEVERAGES, REPORTED BY HIGH AND LOW SCORERS, PILOT AND CURRENT STUDY

| | Consumption of Non-Nutritious Foods/Beverages | | Consumption of Nutritious Foods/Beverages | |
|--------------------|---|-------------|---|-------------|
| | Sometimes | Often Daily | Sometimes | Often Daily |
| High Scorer | | | | |
| Current Study (86) | 25 | 25 | 45 | 28 |
| Pilot Study (83) | 16 | 27 | 49 | 28 |
| Low Scorer | | | | |
| Current Study (4) | 8 | 3 | 28 | 25 |
| Pilot Study (7) | 11 | 0 | 49 | 48 |

A number of expected findings were not found. For example, statistical analysis revealed no statistical significance between groups when comparisons of the following factors were made: (1) severe trauma within the past year; (2) age; (3) genetic influence; (4) smoking; (5) alcohol consumption; (6) non-prescription drug use; (7) consumption of coffee and cola drinks; (8) less than eight hours of sleep frequently to most of the time, and (9) little or no exercise.

Conclusions

The following conclusions were made based on study data analyzed:

1. The consumption of non-nutritious foods and beverages is significantly related to the behavioral problems and physical/emotional complaints of the university women surveyed.

2. The behavioral problems and physical/emotional complaints of the university women surveyed were not significantly related to the following variables: (a) exercise; (b) sleep habits; (c) caffeine consumption; (d) smoking; (e) alcohol consumption; (f) nonprescription drug use; (g) genetic influence; (h) age; (i) severe trauma within the past year; (j) educational level and by inference, academic stressors; or (k) to the university attended—resident, or commuter.

3. Empirically, the variables listed under 2 above may be related to individual cases' of behavioral problems and physical/emotional complaints.

4. The following conditions were prevalent among the university women surveyed:

(a) vitamin/mineral deficiency symptoms; (b) a stress (hypoglycemic) syndrome; (c) poor dietary habits; and (d) maladaptive (addictive/allergic) reactions, which may be attributable to commonly consumed foods/beverages and/or exposure to other substances such as nicotine, drugs, and alcohol.

5. Because of symptoms reported, the following diet-related conditions were prevalent enough among the women students surveyed to warrant special attention by student counselors, class advisors, and pertinent university staff: (a) severe hypoglycemia; (b) diabetes; (c) galactosemia; (d) maladaptive (addictive/allergic) reactions, and (e) vitamin and mineral deficiency symptoms.

6. The following abbreviated instrument items were significantly related to the top half scorers on the stress questions: (a) moods related to diet; (b) when dieting, offended easily; (c) when studying, need candy and/or caffeine-containing beverages;

(d) skip meals to keep weight down; (e) others are against me; (g) think about quitting school frequently; (h) lose temper easily; (i) neglect cleanliness; (j) suicidal tendencies sometimes or more frequently; (k) poor memory; (l) easily become violent; (m) desire to do damage to others; (n) limbs feel numb sometimes or more frequently; (o) mind goes blank; (p) hand and

legs cold; and (q) phobias.

By inference, the above items are related to consumption of non-nutritious foods/beverages, which was the only variable having a causative nature and statistically related, at a significant level, to the stress syndrome. The causative nature is supported by scientifically sound principles and research/practitioner findings which have clearly demonstrated that physiological adaptation is dependent upon nutrients.

7. The results of the pilot study suggest the findings of this study are valid, duplicatable, and have considerable implication for therapists, counselors and other professionals in the business of helping people. The consistency of results, the significant relationships shown, empirically and statistically, for both studies, support the conclusion that diet, particularly the frequency and quantity of non-nutritious foods and beverages consumed, is dramatically and conclusively related to behavioral problems and physical/emotional complaints of university women.

8. The findings of this study support the need for an integrative psychology, an eclectic approach to behavior change. The present psychological approach to behavioral problems and to physical/emotional complaints is to identify many problems as psychosomatic or as having a functional basis. However, the findings of this study suggest that a collective approach to assessment and therapy is both warranted and practical.

A single theory or therapeutic modality cannot provide all the answers for all cases. Therefore, an integrative psychology, which addresses the whole person, including physiological processes, is advocated. Physiological processes are dependent upon nutrients in amounts specific for each individual.

In addition, rest, exercise, training out phobias, obsessions, and compulsions, problem solving, learning of social skills, personality maturity, restoring relationships, and encouragement in therapies are all important and require an eclectic background.

The family constellation, social relationships, cultural traditions and institutions are major, recognizable, impinging external factors which influence the individual's maturation process across time. However, when physiological support processes are dysfunctional or weakened by dietary abuses, the internal environment may become the major impinging factor in the behavior of the individual.

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BOOK REVIEWS

**Roots of Crime —
A Biophysical Approach To Crime
Prevention And Rehabilitation
Thomas O. Marsh
Nellen Publishing Company, Inc.
P.O.Box 18, Newton, N.J. 07860
192 pages, 1981 (\$10.00 U.S.)**

All things to all people? No. But *Roots of Crime* is a mind bender for the open-minded reader, provocative for the skeptic, and a comfort to those who have suspected or dealt with the biophysical truth of crime and behavior disorder all along.

The book is not all that specific. Detailed diet regimens are not given; megavitamin therapies are not spelled out. Rather, as an excited overview of variables of the biophysical basis of criminal behavior, **Roots of Crime** is a strong argument supported by Canadian and U.S. reports and statistics.

Marsh critiques the North American lifestyle, citing the combination of the use of sugar, refined cereals, caffeine and food additives, together with a lack of exercise, as an on-going destructive influence on health.

This health approach, says Marsh, is a major

contributing factor to juvenile delinquency, mental illness, and general criminal behavior. He does, however, distinguish between violent and economic need-based crime.

Reliance on prescription and illegal drugs, and the socially acceptable alcohol is also detrimental to behavioral and mental health, says Marsh. He gives mention to iatrogenic malnutrition associated with prescription drug use.

Hormone balance plays a role in behavior, with times in the menstrual cycle, phases of the moon, and season of the year having their impact. Stress, the role of vitamins and minerals, cerebral allergies to food and additives, pollution and radiation are correlated with behavior disorder. Studies by Hoffer, Osmond, and others are used as supportive evidence.

Much biophysical damage can occur for a fetus in-utero that later can have behavioral consequences. Poor intra-uterine nutrition, says Marsh, interferes with the first brain growth spurt between the tenth and twentieth weeks of gestation, and more generally with the formation of function of the placenta. Mental retardation is perhaps the most obvious consequence of maternal malnutrition, but damage to other internal organs and the nervous system can later

lead to behavior disorder, possibly criminal in nature. Through avoidance of drugs and alcohol during pregnancy and through proper maternal nutrition, the author says social crime will diminish.

The book's clearest victory is its outline for "restoring nutrition to the American diet". General recommendations are given for action by individuals, families, society, schools and government.

"The bulk of the prevention effort must be accomplished by society as a whole in the form of preventative medicine, testing of foods and additives, and environmental protection."

Biotic crime prevention includes dealing with the logistics of finding pregnant women and preschoolers in day care centers who would benefit from nutrition guidance. Marsh is perhaps outdated in his urgent call for getting junk food out of the schools, for this trend seems to be underway. But his idea to biologically screen all public school students diagnosed as hyperactive will be new to some readers.

And this may no longer be true—"So large is the

void (in nutrition education) that any exception is conspicuous." But many would agree that improving nutrition instruction beyond presentation of the four food groups would be a positive step toward developing healthy eating habits for a lifetime.

Unfortunately, Marsh has interpreted his readers as expecting the final control of crime to rest with police, so he quickly wraps up with tips for law enforcement, such as incorporating weather and noise pollution patterns into deploying police patrols. The conclusion digresses into a call for high-protein snacks for on-duty police officers.

Roots of Crime won't convince everyone, least of all medical and political skeptics, for its approach is more excited and personal than dry and scientific, and its enthusiastic demands are a bit outdated in some cases.

But the author has finally put on paper, in a wieldy paperback, some things that needed saying. We can wait for a more refined expose while this book does its groundbreaking work.

Mary Zeldin, B.Sc.H.Ec.