

An Exploratory Study of the Relationship Between Orthomolecular Theory and the Maladjusted College Student

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Introduction

For the past fifteen years, this author has worked closely as a counselor and advisor to hundreds of students enrolled in various programs at the University of Missouri-Columbia. Over this period of time, this author has been generally dissatisfied with the effectiveness of traditional forms of counseling and therapy in working with the maladjusted college student. For whatever reason, a large number of students never seem to get better relative to their mental health. The question this author continually asked was, "Why?" The answer now seems to be more apparent.

Approximately three years ago, this author tried a little experiment. When students would come in for help, they were asked a series of questions concerning their eating habits, their drinking habits, their exercise habits, and their sleeping habits. Frankly, their responses were shocking! In a general sense, their habits in the aforementioned areas did not seem to be conducive to good mental or physical health. Namely, they survived on junk foods, often drank too much alcohol, rarely exercised, and developed sleeping habits that resembled a roller coaster. Perhaps the reasons they were maladjusted could, in part at least, be

explained by their subsistence behaviors. For a traditional counselor, this thought was at the very least, revolutionary! Could the factors leading to the maladjusted nature of students be controlled by a means other than traditional counseling and therapy? The concept was so exciting that this author began a journey of inquiry as exciting as any he had experienced.

The search for answers led to the development of a whole new vocabulary. Terms like "psycho/nutrition" and "Orthomolecular" have become commonplace in this author's approach to counseling and therapy, and in the approach to teaching coursework in counseling psychology. In a scientific sense, of course, "gut" feelings are rarely accepted by the profession of psychology as being worthy of practice. Assumptions have to undergo the test of scientific scrutiny.

Statement of the Problem

The research question posed for this study was, *Is there a relationship between the symptoms displayed by maladjusted*

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college students and factors associated with the lack of mental health as defined by Orthomolecular theory? More specifically, is it possible to predict whether a college student is adjusted or maladjusted on the basis of his/her score on an inventory designed to measure mental health as defined by Orthomolecular theory?

Psycho/Nutrition Defined

The definition of "psycho/nutrition" utilized in this research study, is based primarily on the works (listed chronologically) of Pauling (1968), Watson (1972), Hawkins and Pauling (1973), Hoffer (1974), Cheraskin, Ringsdorf, and Brechar (1974), Pauling (1974), Fredericks (1976), Hoffer and Walker (1978) and Hoffer (1979). All of these writers, through their respective work in the broader field of Orthomolecular theory, have made a substantial contribution to the theoretical base of this study.

In a general sense, psycho/nutrition refers to how an individual's nutritional and corollary habits affect his/her state of mental health. According to Watson (1972), ... *the answer to the question about how nutrition could possibly have anything to do with mental health is quite simple. What one eats, digests and assimilates provides the energy-producing nutrients that the bloodstream carries to the brain. And any interference with the nutritional supply lines or with the energy-producing systems of the brain results in impaired functioning, which then may be called "poor mental health"* (p. 19). In referring to treatment strategies, Pauling (1974) says, *Orthomolecular psychiatry is the achievement and preservation of mental health by varying the concentrations in the human body of substances that are normally present, such as the vitamins. It is part of a broader subject, Orthomolecular medicine, an important part because the functioning of the brain is probably more sensitively dependent on its molecular composition and structure than is the functioning of other organs* (p. 1251).

Combining the general concepts of physiometabolism (the way an individual's body chemistry meets the needs of the body) and psychometabolism (the subjective experiences

of human feeling and thought), Fredericks (1976) offers perhaps the most succinct definition of psycho/nutrition when he says *it is a wedding of these concepts, for we are and we think and we feel and function and are maintained with what we eat* (p. 9).

A number of other writers (Blaine, 1969; Knowles, 1977; Silverman, 1975; Bloomfield and Kory, 1978; McCaldon, 1979; Pelletier, 1979; Pearson and Long, 1982 and Martin and Martin, 1983) have dealt, in a broad sense, with strategies for maintaining good mental health through proper nutrition.

Review of Some Relevant Literature — Psycho/Nutrition and Behavior

The evidence suggests that there is a strong relationship between diet, nutrition, relaxation, physical exercise, and the achievement of good mental health. As the relationship between these components becomes more clearly understood, the prevention and treatment of mental dysfunctioning will be more within the grasp of those who deliver psychological services (Belloc and Breslow, 1972; Breslow, 1972). It is apparent that the medical profession has known for years the relationship between nutritional deficiencies and mental illness (Knowles, 1977). It is becoming increasingly clearer that *how we think, feel, and perceive our world is often affected by our nutritional intake* (Martin and Martin, 1982, p. 22). Research suggests that emotional and mental states can be improved through proper nutrition (Cheraskin and Ringsdorf, 1974).

A review of the literature reveals that very little research has been conducted regarding the relationship between nutrition and the mental health of college students. As a matter of fact, this author only found one study that addressed this issue directly (Bagley, 1981). Bagley found a strong relationship between the diet of college women and their emotional complaints and behavioral problems. Observations of maladjusted college students by this author over time, would suggest that they drink too much coffee, eat too many fast foods, smoke too much, eat too many sweets, eat too many carbohydrates, drink too much alcohol, get too little exercise, eat entirely too many processed foods and eat irregularly. The negative psychological effects of these habits

on people in general have been well documented.

We know from the literature that certain foods are related to depression (Roth, 1978); that certain vitamin deficiencies are related to stress, depression, anxiety, tension and lethargy (Mindell, 1979); that sugar intake and other refined carbohydrate consumption is related to a variety of mental symptoms such as fatigue, anxiety, headaches and crying spells (Abrahamson and Pezet, 1970; Abrahamson, 1971; Duffy, 1975; Fishbein (1982); and that caffeine, nicotine and alcohol are related to nervousness, irritability, restlessness, lethargy, anxiety and depression (Greden, 1974; Greden, 1975; Bolton and Null, 1981; Martin and Martin, 1982).

Maladjusted College Students — A Definition

In 1960, Benjamin Kleinmuntz reported in the *Journal of Counseling Psychology* a study he described as *an initial attempt at identification of the college maladjusted* (p. 209). For purposes of this study, Kleinmuntz analyzed the Minnesota Multiphasic Personality Inventory (MMPI) profiles of students who had come through the University of Nebraska Mental Hygiene Clinic for two different purposes. One group consisted of 40 randomly selected students, including both male and female, who had taken the MMPI for *routine mental health screening examination required by Teachers College* (p. 209). According to Kleinmuntz, *only those records were retained for item analysis in which the student's health questionnaire contained no information pertaining to prior psychiatric treatment* (p. 209). He called this group the "criterion adjusted". The second group, which he called the "criterion maladjusted", included *40 students (male and female) who had voluntarily contacted, or had been encouraged to contact the clinic by one of the staff physicians, and who had remained in psychotherapy for three or more interviews* (p. 209).

The responses of the two criterion sub-samples to the 566 items of the MMPI were tabulated. Kleinmuntz found 43 items which

differentiated between the two groups at the .01 level of significance. He then developed a scale which included these 43 items. The MMPI records of the two criterion sub-samples were scored using the new scale. The mean score difference between the two groups yielded a t test critical ratio of 9.57 (p. 210) which he reported as being significant beyond the .001 level.

Following a factor analysis of the 43 items relating to maladjustment, a picture emerged of the maladjusted college student. The first cluster of items revealed that the maladjusted student sees him or herself as possessing a *feeling of ineffectiveness and worthlessness* (p. 210). They are pessimistic about the future, lack self-confidence, and doubt their ability to make proper decisions. A second cluster of items showed the maladjusted student to be lacking interest in life and to be procrastinating. A third cluster of items indicated that life seems to be a strain for the maladjusted student much of the time. In a fourth cluster of items, the maladjusted are described as *nervous, easily upset, as worriers, and persons fearful of going to pieces* (p. 210). A fifth cluster described them as having a preoccupation with gastrointestinal related problems. And finally, the maladjusted students, according to Kleinmuntz, *express their inability to concentrate and keep their minds from wandering* (p. 210).

In general, the maladjusted college student can be described as that of an *ineffectual, pessimistic, procrastinating, anxious and worried person who tends to somatize and who finds that much of the time life is a strain* (Kleinmuntz, 1960, p. 210).

Development of the Index of College Student Adjustment

For purposes of this study, an instrument had to be developed which would differentiate between the adjusted and maladjusted college student. The results of the Kleinmuntz study (1960) provided the basis for the development of the instrument which this author chose to call the *Index of College Student Adjustment (ICSA)*.

First of all, it was necessary to identify the 43 items of the MMPI (Hathaway and McKinley, 1966) which Kleinmuntz found to differentiate between the adjusted and maladjusted college student. Once the items were identified, they were typed on a test sheet in the order of their original appearance

on the MMPI. A set of instructions was entered at the top of the test sheet as follows: *This inventory consists of numbered statements. Read each statement and decide whether it is true as applied to you or false as applied to you. Mark 'A' if your response is true, 'B' if false. Remember to give your own opinion off yourself. Do not leave any blank spaces if you can avoid it. Please use a #2 pencil and order your responses on the answer sheet provided. Thank you.*

Once the instrument was completed, it could be scored by an optical scanning device. The instrument was keyed so that the higher the score the greater the extent of maladjustment on the part of the student.

Development of the Psycho/Nutrition Inventory

In order to obtain a measure of the students' level of mental health as defined by Orthomolecular theory, it was necessary to develop an inventory for this purpose.

During the spring of 1983, this author conducted a seminar with five selected graduate students enrolled in a masters degree program in counseling psychology at the University of Missouri-Columbia. The seminar was entitled *Psycho/Nutrition — Implications for Counselors and Therapists*. In order to be selected for inclusion in the seminar, the students had to have a strong interest in Orthomolecular theory, pass a test of general knowledge of the science of Orthomolecular theory, and be extensively interviewed by this author. For the first four weeks of the seminar, this author instructed the participants on the major tenets of orthomolecular-psycho/nutrition theory. In addition, they were given an extensive required reading list pertaining to Orthomolecular theory.

For weeks five through twelve, the seminar participants were required to do their own extensive research into Orthomolecular theory. More specifically, they were to develop sample questions to be used in the development of the *Psycho/Nutrition Inventory*. Only those questions related to mental health and psychological state, and supported by Orthomolecular research, could be included in the pool of items from which

the inventory would be developed. For weeks thirteen through sixteen, the items were analyzed for appropriate inclusion in the final inventory. An initial instrument was developed which contained 400 items. The order in which the items appeared on the instrument was determined by random assignment.

The instrument was field tested in a counseling class with nearly 100 students. The instructions to the participants read as follows: *Please respond to the following 400 items on the answer sheet you have been provided. If you agree with, and/or find that the statement describes you, blacken in the T for True. If you do not agree with, and/or find that the statement does not describe you, blacken in the F for False. Please try to answer each question.* The results were collected and an item analysis was conducted. A final instrument was developed containing 268 items. This 268 item instrument became the *Psycho/Nutrition Inventory (PM)*.

The PNI could be scored by an optical scanning device. Like the ICSEA, the PNI was keyed so that the higher the score the greater the lack of mental health of the student as defined by Orthomolecular theory.

Methodology

During the fall of 1984, this author gave both the ICSEA and the PNI to the 85 members of a class he taught in counseling psychology. The class was selected because it had a heterogeneous population. Namely, the class included both male and female students; students ranging in age from 19 to 41; students representing eight different academic majors; and students at all academic levels (e.g. freshmen through doctoral level students).

In all, 74 usable matched sets of instruments were included for analysis. The instruments were scored by an optical scanning device at the University's Testing and Evaluation Service. A computer program was written so that the following information was provided for each instrument: frequency count of item respondents; item analysis; raw score distribution; mean score; median; standard deviation; semi-interquartile range; Kuder-Richardson 20 reliability coefficient; and standard error of measurement.

Results

The mean score for the PNI sample was 83.4. In other words, the average respondent answered in the keyed direction (negative direction as defined by Orthomolecular theory) on approximately 83 of the 268 items contained in the instrument. The standard deviation for the PNI sample was 16.7. The Kuder-Richardson 20 reliability coefficient was a rather high .849. This result would indicate that the PNI has a high degree of internal consistency.

The mean score for the ICSA was 13.5, meaning that the average respondent answered in the keyed direction (maladjusted direction) on approximately 14 of the 43 items included in the instrument. The standard deviation on the ICSA for this sample of 74 individuals was 7.4. The Kuder-Richardson 20 reliability coefficient was .875. Therefore, like the PNI, the ICSA has a high degree of internal consistency.

For purposes of addressing the research question posed for this study, it was necessary to compare the scores on the two instruments for each of the subjects in this study. It was the conclusion of this author that it would be appropriate to use as the cut-off point the mean scores on both instruments. Namely, if subjects scored *above* the mean on one instrument, they should also score *above* the mean on the other instrument. Conversely, if they scored *below* the mean on one instrument, they would likewise score *below* the mean on the other instrument. For example, a subject identified as maladjusted

(one who scored above the mean on the ICSA) would be expected, according to the research question posed for this study, to score above the mean on the PNI (in the lack of mental health direction). A review of Table 1 suggests support for this contention.

As the reader can see from Table 1, the subjects scored in the predicted direction 83.8% of the time (62 out of 74). In other words, knowledge of a subject's score (above or below the mean) on the PNI would allow for accurate prediction of his/her score (above or below the mean) on the ICSA approximately four out of five times. These findings would suggest that a high degree of correlation exists between a college student's degree of mental health as predicted by Orthomolecular theory and the degree to which he/she is adjusted or maladjusted as predicted by Kleinmuntz' findings (1960).

Summary and Conclusions

This study was conducted to determine the relationship between the symptoms associated with college students' maladjustment and their mental health as predicted by Orthomolecular theory. To test this hypothesis, two instruments were developed. One instrument, the Psycho/Nutrition Inventory, was constructed according to the scientific research collected in support of Orthomolecular theory. The results of the inventory could be used as a measure of the psychological health of the individual completing the instrument. A second instrument, the Index of College Student Adjustment, was designed utilizing 43 items selected from

TABLE 1
COMPARISON OF MATCHED SCORES ON THE ICSA AND PNI
(N=74)

Scored	ICSA*		Scored
	Above Mean	Below Mean	
PNI**	Scored Above Mean	31	6
	Scored Below Mean	6	31

*Mean = 13.5 Standard Deviation = 7.4

**Mean = 83.4 Standard Deviation = 16.7

NOTE: Given a students score (above or below the mean) on the PNI, one could predict his/her score (above or below the mean) on the ICSA 83.8% of the time (62 of 74).

the Minnesota Multiphasic Personality Inventory as a measure of a college student's adjustment/maladjustment.

Based upon the results of this study, the following conclusions seem warranted:

1. There is merit in the use of the Psycho/Nutrition Inventory as a predictive measure for determining a college student's degree of psychological adjustment.

2. Knowledge of a college student's nutritional habits and their resultant manifestations could provide a basis for the treatment of his/her maladjustment.

Discussion

One of the criticisms frequently made relative to research in the psycho/nutrition area has to do with what many call "the chicken or egg concept". With regard to the results of this study, the question could be asked, "Are the clinical symptoms associated with the maladjusted college student caused by his/her poor nutritional or corollary habits, or is the maladjusted student, by definition, more likely to engage in nutritionally maladaptive behaviors?" In other words, what came first, the chicken or the egg? It seems to this author that the question is irrelevant. Namely, there is a sufficient amount of evidence available in the Orthomolecular research literature to suggest that a maladjusted person is certainly not going to get better psychologically if he/she continues to exhibit nutritionally maladaptive behaviors. Clearly, if maladjusted clients can learn to effectively control those nutritional and corollary habits that increase their mental "unhealthiness", as defined by psycho/nutrition theory, then they at least have a fighting chance to become healthy through the utilization of other treatment strategies employed by the counselor.

Suggestions for Practice

Professional practitioners involved in the delivery of psychological services such as counselors, psychologists and psychiatrists, would be advised to pay heed to the increasing body of knowledge available in the field of Orthomolecular psychology. Perhaps one of the most significant failures in the vast number of training programs for those who will ultimately deliver psychological services, is the virtual

absence of and disregard for the effects of nutrition and the concomitant behaviors (rest, exercise, alcohol consumption, etc.) on the psychological well-being of the individual. It's not really a question of approaching all individual psychological dysfunctions from an Orthomolecular point of view. Rather, what is suggested is that the body of Orthomolecular research be incorporated into the diagnostic and treatment programs of those who deliver psychological services. Counselors and psychologists surely must have learned by now, that traditional psychotherapy is ineffective in a large number of cases (Gross, 1977). It is the judgement of this author that failure to consider all potentially effective treatment strategies, including Orthomolecular approaches to therapy, borders on unethical behavior on the part of the therapist. By the same token, psychiatrists who shun the importance of Orthomolecular theory and rely on their version of "psychiatric treatment", which includes the use of lithium, antidepressants, couch therapy and the like, are failing in their Hippocratic pledge to deliver the most thorough and comprehensive care to their patients.

It is the recommendation of this author, in part based upon the results of this study, that psychological practitioners become involved in their own research into Orthomolecular therapy. This study or similar models could be replicated using different populations of clientele. The researcher may very well discover, as this one has, that Orthomolecular approaches to the treatment of individuals suffering from psychological dysfunction, can be effective in a significant number of cases. In summary, this author would like to share with the reader a story told him by a colleague. Several years ago, the colleague had been a staff psychologist at a university counseling center. One of his clients was a 19-year-old sophomore who was suffering from delusions of persecution and extreme paranoia. For months, he treated the individual with traditional psychotherapy. Unfortunately, the person showed no noticeable improvement in his psychological state. It seemed that every intervention strategy tried resulted in failure. Finally, one day out of total frustration, he decided to inventory the young man's eating and drinking habits.

Much to his surprise, his client drank an average of 40 cups of coffee per day! Nothing else seemed to work, so he decided to help his client develop a program for reducing his coffee consumption to about five cups per day. Again, to his surprise, the client got significantly better within a very short period of time! If only he had considered this treatment earlier, he could have saved his client and himself much pain and frustration. This author has already implemented plans to conduct a psycho/nutrition assessment with each student seen who is suffering from psychological dysfunction; incorporate Orthomolecular material into each of the counseling psychology courses taught; and, attempt to convince colleagues at the University Counseling Center to include a psycho/nutrition assessment device into the normal and routine client intake procedure.

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Letters

To the Editor:

Avogadro's Number Revisited

The following was triggered by doctors and other people telling me that there is no way that 5 ppb of anything can hurt anybody. They consider their intuitive reaction proved when I tell them that that is the equivalent of 5 seconds out of 31.7 years. I think they envision one molecule every fifty feet blowing down the street!

In Chemical Hypersensitivity Disease we have a situation where seemingly insignificant quantities of materials have effects that are intuitively all out of proportion to the cause. The problem is the misuse of intuition. It has been demonstrated that an exposure to quantities of an isocyanate as small as of the order of 5 ppb (parts per billion) for 10 minutes can produce dramatic effects. In one example, the result was the loss of 73 percent of lung capacity in the resulting bronchial spasm in a sensitized individual (Karol). To most readers, 5 ppb probably appears as a number followed by a unit of measure. It is intuitively a very small number because a billion is clearly a very large number.

The following exercise gives an insight into just what we are dealing with with respect to airborne pollution that is obscured by dealing with ratios such as ppb.

I recently, after many years, became re-acquainted with Avogadro's number. This number, $6.02E23$, ($E23$ represents 10 raised to the 23 power) is the number of molecules in a volume of 22.4 litres of a material in its vapour phase at 0 degrees Celcius and a pressure of 760

millimeters of mercury. Converting to the number of molecules in a cubic foot and using Boyle's Law to room temperature, we have $7.1E23$ molecules per cubic foot. This is a number of astronomical proportions. To put such a number into perspective it must be handled in a conservative, even pessimistic way.

Let's operate on this number to find the number of toxic molecules involved in a small exposure to an isocyanate that is known to cause a dramatic reaction. Using the example previously referenced, let's find the number of toxic molecules in a cubic foot of air with a contamination level of 5 ppb. This would be $3.5E15$ toxic molecules per cubic foot. An exposure to this level for 10 minutes using a volume of one-half the average male lung capacity and 18 respirations per minute or 2 cubic feet, (Taber's) the total exposure is to $1.3E8$ toxic molecules. What was intuitively a small exposure has taken on massive proportions!

In further operation on this number it must be recognized that not all of these molecules enter the blood stream. Some are exhaled and others are passivated in the lung tissue. To realistically estimate this transfer, efficiency would be difficult. This problem can be sidestepped by choosing a range of efficiencies that is intentionally pessimistic. Assigning a transfer efficiency range of from 0.01 to 1.0 percent, the number of toxic molecules transferred to the blood would be $1.3E16$ to $1.3E14$. Many of these survivors would be quickly trapped. Choosing a trapping efficiency of from 99 to 99.99

percent, leaves 1.3E14 to 1.3E10 toxic molecules in the blood.

A 70 kilogram individual contains about 5 litres of blood. There would be from 2,600,000 to 26,000,000,000 toxic molecules per milli-litre of blood during or shortly after a 10 minute exposure to 5 ppb of a toxic substance.

While on a molecular scale these numbers are not terribly significant, they are large enough to make it necessary to consider possible damage mechanisms before they can be dismissed as trivial.

Perhaps the most obvious damage mechanism is the free radical oxidation process. This process allows us to reasonably assign a multiplication factor on the above densities of from 1,000 to 1,000,000 in an individual with low defense mechanisms to obtain the number of organic molecules mutilated by toxic contents of each millilitre of blood.

Robert N. Taber BSEE, MSEE

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Dear Dr. Hoffer:

Further to Dr. B. Crook's paper on Candida at CSF (conference in Toronto) in April, 1985, there are two or three wrinkles that clinicians would be interested to learn about mold problems.

For lung and upper respiratory infections Nystatin can be put in the aerosol in a respiratory treatment machine — ten regular treatments are a minimum. (Dr. Wm. Crook has suggested the possibility that Nystatin might cause some harm to the lungs because it is insoluble in water. I have not seen any evidence of this in my experience.) At home and especially for the symbiotic staphylococcus — Candida — the nose needs to be treated vigorously. Any less often than twice a day is a waste of time. Three times a day the patient should clear his nose of the usual crusts and then puff Rynacrom (sodium cromoglycate)

powder into the nose with the supplied insufflator. Then the empty capsules are opened and filled with the same amount of material as before except with Nystatin this time. Sniffing and pulling the Rynacrom inhalator is much more effective and easier.

Many years ago a fellow clinician told me that huge (ten fold or more) doses of female or male hormones for the appropriate sexes, would clear up Candida fast even if stubborn. I tried it in my stubborn cases and it worked. Now, with ketokonazole available it should be more effective.

I now have some idea why! Nizoral (ketokonazole) helps kill molds by blocking the production of a chemical on the way station from cholesterol to the sex hormones. The half formed sex hormone is used as an integral part of the Candida cell-wall. This means that the sex hormones aren't produced too well with resulting impotence in males.

If you use ketokonazole there is a double reason to give big doses of oil soluble sex hormones to the appropriate sex. The high concentration of the final product will slow down production of the steroid hormones, further depriving the yeast of its needs (and if with Nizoral counteracting some of its more serious side effects.) For example in a male adult give 5 ml. testosterone in I.M. at beginning of Nizoral treatment which could be continued for 3 weeks if necessary.

Thanks again for a great conference and especially thanks to Dr. Crook for his interesting, useful and erudite paper.

Yours sincerely,

Lawrence Kotkas, M.D., D.P.M.

P.S. Connected with the sex hormone stimulation of Candida is the fact (well documented) that cortisone and its analogues stimulate Candida tremendously. Often they are combined in nose, throat, ear and sinus preparations with disastrous results clinically if the infection is Candida and stimulation of Candida infections if they are latent.