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LOCUS OF CONTROL, ASSERTIVENESS, AND
ANXIETY AS PERSONALITY VARIABLES
IN STRESS-RELATED HEADACHES

by
Colin Jones

A Thesis
Submitted to the
Faculty of Graduate Studies and Research
through the Department of Psychology
in Partial Fulfillment
of the Requirements for the Degree of
Master of Arts
at the University of Windsor

Windsor, Ontario, Canada

1985

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ABSTRACT

The main purpose of the study was to investigate the relationship between locus of control, assertiveness, and anxiety, on one side and headache frequency and severity, on the other. Information concerning headache incidence and type, precipitating factors, and other psychosomatic symptoms reported, was also provided. The data were obtained by questionnaires (Rotter Locus of Control Scale (LC), Rathus Assertiveness Schedule (RAS), Health Locus of Control Scale (HLC), and a Headache Questionnaire), which were completed by 222 introductory psychology students. A significant correlation was found between anxiety and headache, but it was weaker than might be expected considering that headache is commonly viewed as a physiological sign of anxiety. An explanation for this finding was offered, concerning how level of reported anxiety may be moderated by the subject's assertiveness and locus of control. Subjects who were more internal, more assertive and less anxious, yet reported substantial headache activity, may have been denying their anxiety. Further research, using a physiological measure of anxiety, is needed to add support to this explanation. The incidence of headache in the sample was similar to that found in other recent studies of the general population, but higher than some studies of university populations. This was discussed, along with the clear sex differences that were found and some other related issues.

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CHAPTER 1

Introduction

Although the term "psychosomatic" was probably used first more than one hundred years ago (Weiss & English, 1957), it has only come into common usage within about the last 50 years. Psychosomatic is most often used to refer to those disorders whose, "etiology at least in part is believed to be related to emotional factors;" (Hinsie & Campbell, 1970, p.628). In itself, the word is rather misleading, implying a dualism between mind and body which does not exist. No physical disorder is completely free of psychological factors, just as psychiatric disorders must always contain some organic component or constitutional factor. However certain disorders, such as organic heart disease, functional and nervous system disorders, appear to contain a significant psychological component and are generally considered within the realm of psychosomatic medicine (Weiss & English, 1957). Many researchers have shown a high prevalence of psychological problems in those seeking medical care (Matarazzo & Carmody, 1983). Bakal (1979) has concluded that 60 to 90 percent of general health problems have an important psychological component and this underlines the great importance of this area of investigation. Even more recently the biopsychosocial perspective has postulated that psychosocial factors are

involved in all illnesses, "because illness occurs in individuals, who have not only a biological make-up but a psychological and social make-up as well." (Matarazzo & Carmody, 1983, p.659). This latest advance in psychosomatic medicine therefore recognizes the role that one's social environment plays in illness.

Stress and Illness

Hans Selye (1956) has long recognized that a person's environment may be perceived by him as a source of stress and that this can lead to mental or physical illness, or both. Selye described 31 "signs of danger" and put forward the hypothesis that "each of us tends to respond particularly with one set of signs, caused by the malfunction of whatever happens to be the most vulnerable part in our machinery..." (Selye, 1956, p.174). These "indexes of stress" included the now well-accepted symptoms of psychosomatic disorders, such as gastro-intestinal and sleep disorders as well as migraine headaches, and depressive or emotional reactions. However, at present, the concept of stress is too wide to be of real value in the investigation of the antecedents of psychosomatic disorders, and therefore it needs to be defined more precisely and narrowly (Steptoe, 1980).

A very large amount of research has centered around the relationship of stressful life events to psychiatric and physical disorders. However, as David Mechanic

pointed out, "while there is considerable evidence that stress is associated with some illnesses, the role of stress in many specific illnesses has continued to be a controversial matter." (Mechanic, 1962, p.200). However, to argue causally, that life events influence the course of illness, would be to ignore the obvious sources of invalidity inherent in correlational research. Brown (1973) has suggested that any number of third variables could influence the findings, in particular he mentions anxiety as a possible cause of any correlation between the life event and the illness.

It may be most fruitful to consider any correlation between stress and illness as an interaction between the life-event (environment) and the person's behavioral disposition (personality profile). Generally it is not possible to measure the stressor before the occurrence of the illness and any association between for example, anxiety and the illness could be a product of that illness, rather than a cause (Steptoe, 1980). There are several other problems in using questionnaires to obtain information on the antecedents to an illness, including reporting bias and poor memory, but for practical reasons this method continues to be used. In any event it may be that it is more important to consider the personality variables involved in stress related illnesses, rather than the stressful life-events themselves. It seems

likely that most of the general population is exposed to similarly stressful life events and therefore the critical factor may be the individual's method of coping with such stresses.

Stress and Headaches

One area which employs stress management as a treatment technique is that of headache. This approach is based on the assumption that headaches are the outcome of some kind of cognitive response to stressful situations. Accepting this widely held assumption suggests that headache may be used as a physiological measure of stress. However, it seems unlikely that this assumption would apply to cases of organic headache, that is those caused by brain tumours or other serious disorders. As the Ad Hoc Committee on Classification of Headache (1962) has stated, only migraine, tension, combined, and psychogenic headaches are considered to be related to stress. (See Appendix A for headache types).

Research and Treatment Approaches in Headache

Currently there are four research and treatment approaches to the problem of headache (Sargent, 1982).

1. Psychoanalytical. Research has tended to concentrate on migraine rather than tension headaches. Traditionally the migrainous individual has been described as tense, hard driving, and having difficulty in coping with stress (Wolff, 1963). The psychoanalytic concept sees the

migraineur as repressing his hostility or anger, an issue which is also common to many other psychosomatic disorders. In a review of the literature concerning migraine headaches, Bakal (1975) found several studies in which the expression of hostility and competition appeared to trigger the onset of headache in migraineurs. However Bakal also found other studies which showed inconsistencies and he concluded that the idea of a definite migrainous personality was not completely convincing.

2. Pharmacophysiological. Migraine headaches have been shown, by various researchers (see Sargent, 1982), to be due to disturbances of the cranial vasculature. What triggers the constrictions and dilations of these blood vessels is not completely understood but may involve the production of certain chemicals, possibly endorphins (Reed, 1980). In tension and psychogenic headaches, researchers have not found a significant reduction in cerebral blood flow (see Sargent, 1982).

3. Behavioral Therapy. With both migraine and tension headaches the relaxation response has been found to be useful in reducing headaches, as have cognitive coping skills and assertiveness training (see Sargent, 1982). These successes, though limited, strongly suggest a cognitive component to headache, in addition to the muscular tension involved.

4. Psychophysiological. This approach has investigated the use of self-regulation techniques, such as biofeedback, to control headaches. These techniques have been used with both migraine and tension headaches, with some success. Although useful as a treatment technique, this approach adds little to our knowledge about the etiology of headache.

Headache Statistics

For such a common complaint it is surprising how little statistical information is available on the incidence and prevalence of headaches in the general population. As far back as the late 1940s, H.D. Ogden (Ogden, 1952) noted this and set out to study headaches in various occupational groups in New Orleans. Ogden found 64.8 percent of his sample suffered from some form of headache and that its incidence tended to be greater in women, younger adults, single people, educated individuals, professional and executive groups, and students. Studies into the incidence of headache have provided estimates ranging from 47 percent in a U.S.A. college student population (Hicks & Kilcourse, 1983) to approximately 84 percent in a general population in a North American city (Ziegler, Hassanein, & Couch, 1977), (See Table 1 for a summary of selected studies).

Headache and Personality Variables

There is no doubt as to the pervasiveness of

headache throughout the population of the world. It cuts across all occupations, socio-economic levels, races, creeds, and ages. However there seems to be fairly strong evidence for believing that women tend to experience more headache, overall, than men. (See Table 1). There is weaker and less conclusive evidence concerning the role of personality variables in headache, although this area would appear to have great potential for understanding and therefore treating headache. As Martin (1983) points out, there has been a lot of attention paid by clinicians to the question of why one individual suffers from a particular problem while another individual does not. Although Martin suggests that the search for antecedents would be a better way to understand headache mechanisms, we still do not have a clear idea about the first question. Of course it would add greatly to our knowledge of headaches and be especially useful for prevention, if an individual could predict (and therefore avoid) situations or stimuli that could precipitate his or her headache. However such knowledge would be facilitated by first being aware of which psychological or personality features interact with the stressful situation to produce a headache. Also there are very many "triggers" for headaches. For example, fatigue, heat, hunger, allergic reactions, excitement, menstruation, constipation, eye strain, and hypertension,

just to name a few. Certainly investigation of the individual's own headache triggers could be of great benefit to him or her, but it is hardly feasible to consider investigating each and every case of headache scientifically. It is possible that idiosyncratic responses to stress may be the only valid way to understand headaches, but at this time the search for a more general aspect of personality or psychological functioning should not be abandoned.

Several specific personality characteristics of headache sufferers have been cited as being related to headache activity. In particular the roles of neuroticism, depression, and anxiety have been examined.

Neuroticism and Depression

Huber, Hubert, and Herper, (1982) investigated whether long-term migraine patients differed from a psychosomatic reference group or a healthy control group, in terms of personality characteristics and physiological responses to stress. They found that the migraineurs received the highest scores on the neurotic triad (Hypochondriasis, Depression, and Hysteria) of the Minnesota Multiphasic Personality Inventory (MMPI). The psychosomatic group was second and the control group of normals, third. These differences were all statistically significant. They also found that the three groups differed significantly in their physiological responses

to stress, although this pattern was not clear. Huber et al emphasized that, as this sample was highly selective (females with long-term migraine), it may not be representative of the general population of headache sufferers. However Waters and O'Connor (1970) had also found headache patients more neurotic than controls. Using the Cornell Medical Index as a measure, they further reported no significant differences in neuroticism between migrainous and other headache patients.

Cuyppers, Altenkirch, and Bunge (1981) also found no significant differences in neuroticism (using the Freiburg Personality Inventory), between groups of patients having migraine and cluster headaches (vascular type headaches which occur in bunches). However they further reported no indication of neuroticism in either group. Ajwani and Ajwani (1983) found significantly higher anxiety and depression scores (using the MMPI and an Anxiety Scale), in 130 headache sufferers compared to controls who were without a headache for one year. They too found no significant differences between tension and migraine headache sufferers on anxiety and depression scores.

Another recent study (Garvey, Schaffer & Tuason, 1983) demonstrated the relationship between headache and depression without relying on self-report inventories or

questionnaires. Patients who were diagnosed as having major depressive disorders kept daily recordings of headache frequency and were found to have an increased rate of headache when compared to a non-depressed control group.

It seems then that some evidence exists to support the hypothesis that neuroticism and depression have some kind of relationship to headache. However the role of anxiety is less clear and could stand further scrutiny.

Anxiety

Anxiety has been defined in many different ways with most definitions pointing out that it is a pervasive feeling of dread, characteristic of many neuroses. It is also well accepted that anxiety has, at least, two sides; the psychological and the physiological. (The behavioral side of anxiety is not considered relevant to this discussion). Measuring the psychological element has proved to be rather difficult and is usually attempted by behavioral observation and self-reports. The physiological element appears more amenable to measurement, with increased heart activity, flushing and perspiration, increased respiration, and gastro-intestinal disturbances being considered anxiety indicators (Weiss & English, 1957). It is not unreasonable then to assume that headache activity may also represent a somatic element of anxiety. Tension is

considered to be both an element of anxiety and of headaches, not only of the tension type, but also of migraine (Tfelt-Hansen, Lous, & Olsen, 1981). It should be recognized that "tension" may be intended to refer more to muscle tension when speaking about headaches, while it refers more to a kind of emotional strain, when speaking of anxiety. However, as muscular tension is often assumed to be due, under appropriate circumstances, to mental or emotional strain, the two do appear to be related.

A great problem in research involving anxiety is whether the measuring instrument is valid. Anxiety is a complex emotional state, having many different components. In order to lend support to claims that their particular instrument does in fact measure anxiety, many researchers have sought criterion validity. One such measure is the anxiety "second order factor" of Raymond Cattell's Sixteen Personality Factor (16PF) Questionnaire (Cattell & Eber, 1962). In this very well established self-report inventory, anxiety is seen as a pattern of the scores obtained in emotional stability, threat sensitivity, suspiciousness, guilt, low integration, and tension, plus several other scores varying with the sex of the subject. (Krug, 1981). This pattern of scores has been shown to be strongly correlated with criterion measures of anxiety (Krug, Scheier, & Cattell, 1976). On

the other hand, the empirical criterion keying approach of the MMPI selects items to be included in various scales by virtue of their power to discriminate between groups. The 16PF then, may be a more appropriate method for measuring anxiety, at least in a non-psychiatric population, as it was standardized using a "normal" population and is correlated with other anxiety measures.

In order to avoid the problems inherent in a one-time assessment questionnaire (e.g. memory and reporting bias, as previously discussed), Arena, Blanchard, and Andrasik (1984) used rating scales completed daily, one of which was used to rate anxiety from "not at all anxious" to "as anxious as ever been." Subjects also completed the Spielberger State-Trait Anxiety Inventory (STAI) and rated their headache activity four times a day on a six point scale, from 0 (no headache) to 5 (intense, incapacitating headache). Only a weak relationship was found between headache and anxiety (and the two other affects, anger and depression). The authors concluded that their findings, "cast serious doubt upon many psychological theories regarding the etiology of headache and on the relationship between affect and headache in general". (Arena et al., 1984, p.1). However the study did show some relationship between anxiety and headache and it does seem that headache sufferers may tend to report a little more anxiety, than non-headache sufferers.

In a study comparing the State-Trait Anxiety Inventory (STAI) scores and galvanic skin responses (GSR) of anxious neurotics, tension headache sufferers, and normals, Chattopadhyay and Mazumber (1982) reported a very interesting finding. On the physiologic measure (GSR) both the neurotics and headache patients had similar levels of arousal to a stressful stimulus, but on the self-report measure (STAI) the anxious neurotics had higher scores. It may be then that tension headache sufferers do not report excessive anxiety but do have fairly high physiologic signs of anxiety.

This finding suggests that there may be some other personality variables which moderate the way headache sufferers cope with stress and with anxiety. The individual's locus of control (Rotter, 1966), and level of assertiveness, may be two possibilities for such variables.

Locus of Control

The basic purpose behind Rotter's Locus of Control Scale is to assess an individual's generalized expectancies for reinforcement (Rotter, 1966). The scale items sample locus of control orientation over a variety of situations and contexts. Internal control "attributes agency to oneself, a coping procedure, whereas external control gives agency to others or to fate" (Haan, 1982, p.261).

Lefcourt (1981) proposed that "locus of control measures can operate as moderator variables in the prediction of responses made to life stressors. Those persons who were more external...were more likely to report distress associated with negative life events." (p.269). Along these same lines, other researchers, (Ray & Katahn, 1968; Watson, 1967) reported that the more external the individual's locus of control (as measured by Rotter's Locus of Control Scale), the more anxiety is reported. However, Houston (1972) (also using the Rotter Locus of Control Scale) found that internal-control and external-control subjects did not differ in reporting anxiety in stressful situations. Houston did report though that internal-control subjects became more physiologically aroused (as measured by a change in heart rate) than external-control subjects, when in stressful situations. Research since Houston's study has tended to support the hypothesis that those with a more external locus of control will report more anxiety (e.g. Carter, 1983; Lefcourt, 1981), and this finding is now commonly accepted..

Houston's finding that internal-control subjects become more physiologically aroused when under stress, underlines the dual elements of anxiety discussed earlier. It may be that "internalizers" (internal-control subjects) although reporting less

anxiety than "externalizers" (external-control subjects) become more physiologically aroused when experiencing stress. Internalizers may believe that they have more control over stressful life events and therefore will tend to view those situations as less threatening and less anxiety arousing (Lazarus, 1966). It may also be the case that internalizers are reluctant to admit to anxiety and it is therefore expressed somatically. One way this could occur is through headaches, or through other psychosomatic disorders. It seems that externalizers are more likely to report anxiety, and as this is a way to release feelings, any physiological symptoms of anxiety that they may have, might be dissipated somewhat.

Assertiveness

Related to this theory, that headache sufferers may have difficulty in expressing emotions, is the "traditional" belief that unassertiveness is a personality trait of such patients. Anxiety has also been linked to unassertiveness and research has shown that assertiveness training may reduce anxiety levels in ulcer patients (Brooks & Richardson, 1980). Waksman, (1984) also found that after assertiveness training, adolescents had reduced anxiety and scored more in the internal-control direction on a locus of control measure. However, in headache research, assertiveness does not

seem to have been a major area of investigation. Recently though, a group of researchers (Andrasik, Blanchard, Arena, Teders, Teevan, & Rodichok, 1982) conducted a study to investigate the relationship of several personality variables to headache including assertiveness (using the Rathus Assertiveness Schedule, (RAS)). They found no significant relationship between assertiveness and headache using chronic, severe headache patients as subjects. Although it would seem likely that any personality traits (such as unassertiveness) would be more exaggerated in such a group, these patients may not be representative of headache sufferers in general. However Andrasik et al claimed that, as their subjects showed less overall "psychological disturbance" than other headache patients, their results may be more representative of typical headache sufferers. Another possible difficulty with this study involved the control group which contained subjects who could have up to six headaches per year, none of which could be "problematic". How "problematic" was objectively defined is not specified and this word may have been interpreted differently by individual subjects, resulting in the inclusion of headache sufferers in the control group. In summary it appears that the relationship between unassertiveness and headache could be clarified by further investigation, particularly in non-patient

populations.

Purpose of the Study

Bearing in mind the assumption that the majority of people are subjected to a similar amount of stressful life events during their lifetime, the present study examined the relationship between locus of control, assertiveness, and anxiety, as factors in stress related headaches. In particular the study was designed to determine whether specific combinations of these personality variables (e.g. more internal, less assertive, and less anxious), would be useful in predicting or discriminating between severity and/or frequency of headaches. As the entire 16PF Questionnaire was administered, other "second order factors" as well as the individual scales were also scrutinized for possible relationships with headache frequency or severity.

In addition to using a measure of generalized locus of control (Rotter's Scale) a measure specifically designed to assess locus of control in regard to health matters was also used - the Health Locus of Control Scale (Wallston, Wallston, Kaplan, & Maides, 1976). The basis of this scale is that those scoring in a more external direction generally believe that they have little control over the factors determining their health, whereas those scoring more internally tend to believe that their own behavior determines whether they remain healthy or become

ill. (Wallston & Wallston, 1981). The relationship of both these locus of control scales to headache can then be compared with a view to determining whether goal-specific measures, like the HLC, are more useful than generalized measures, in certain situations.

The study also provided various descriptive statistics, including frequency, severity and type of headache; ranking of factors which precipitate headache; and number of other psychosomatic symptoms.

Table 2. lists the dependent and independent variables, and covariates, which were employed in the study.

Table 1

Incidence of Headache as Reported in Selected Studies

<u>Author(s), Year, and place</u>	<u>Size and Type of Population</u>	<u>Reported Incidence of Headaches</u>
Ogden, 1952 New York, U.S.A.	4,634 stratified in occupational groups	64.8% total 50.7% men 71.0% women
Brewis, Poskanzer Rolland, & Miller 1966. Carlisle, U.K.	6,960 General population sample	Disabling headaches only. 6.2% total 4.1% men 8.1% women
Waters, 1974. Pontypridd, U.K.	1,718 Random sample of population	71.7% total 63.5% men 78.4% women
Waters, & O'Connor, 1975. U.K.	4,214 Random sample and two groups of medical patients	Migraine only 19 to 24.5% total 15 to 20% men 23 to 29% women
Ziegler, Hassanein, & Couch, 1977. U.S.A.	1,809 religious, civil and professional groups	83.7% total 82.6% men 84.2% women
Hicks & Kilcourse, 1983. San Jose, U.S.A.	176 College students	47% total (no other figures available
Hicks & Campbell 1983. San Jose, U.S.A.	177 College students	47% total (no other figures available
Ogunyemi, 1984. Nigeria, Africa.	1,756 College students	59.5% total 58.9% men 60.7% women

Table 2.

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Listing of Dependent and Independent variables

Dependent Variables

1. Frequency of headache : Five levels - nil, less than one per year, yearly, monthly, and weekly.
2. Severity of headache : four levels - nil, mild, severe, and disabling.

Independent Variables

1. Health Locus of Control (HLC) : range of possible scores 11 to 66.
2. Rotter Locus of Control (LC) : range of possible scores 0 to 23.
3. Rathus Assertiveness Schedule (RAS) : range of possible scores -7 to +107.
4. Sixteen Personality Factor (16PF) Questionnaire : range of possible scores 1 to 10 (First Order), 10 to 100 (Second Order).

Covariates/Independent Variables

1. Sex of subject.
2. Type of headache : four levels - nil, migraine (including cluster), combined, and tension.

CHAPTER 11

MethodSubjects

There were a total of 222 subjects, 69 men and 153 women, all students drawn from introductory psychology classes at the University of Windsor. Age range of the sample was 17 years to 51 years, with a mean of 20.4 years and a standard deviation of 4.3 years. The modal age was 19 years (for 49% of the subjects) and only 14 subjects (approx 6%) were over 25 years. For most of the statistical analyses, 27 sets of scores were discarded either because the subject had identified his or her headache as "disabling" (11 cases), or the case was identified as an "outlier" on one or more of the variables (12 cases), or the questionnaires were incomplete (4 cases). (See Results section for further details on these deletions). For the 195 subjects remaining, the age range and modal age were the same as for the original sample, but the mean became 20.3 years, the standard deviation 4.2 years and the number of subjects over age 25 years was reduced by two. Each student who participated received two points to be added to his or her final grade in introductory psychology.

Materials

Five questionnaires were used in the study, presented to the subjects in the following order:

1. Health Locus of Control (HLC) Scale. (Appendix B)

This scale consists of 11 items, which are rated using a 6-point Likert-type format. The items are composed of statements measuring expectancies regarding locus of control related to health. Potential range of scores is 11 to 66 and the scale is scored in an external direction. The scale was shown to have discriminant validity, in contrast to Rotter's Locus of Control Scale, when used to discriminate between groups seeking health information and groups in a weight reduction programme (Wallston et al, 1976). Wallston et al found a correlation of .33 ($p < .01$) with Rotter's Locus of Control Scale, further demonstrating the HLC's discriminant validity.

2. The Rotter Locus of Control (LC) Scale (Appendix C).

Introduced by Rotter (1966), this scale, developed from the James-Phares Locus of Control Scale, measures generalized expectancies for reinforcement. It consists of 29 true-false items, 6 of which are "filler" items designed to disguise the purpose of the scale. The scale is scored in the direction of external locus of control and has a potential range of scores from 0 to 23. It provides a measure of expectancy across many, varied situations and has been used in a great number of investigations.

3. The Rathus Assertiveness Schedule (RAS) (Appendix D).

Developed by Rathus (1973), this scale measures assertiveness or "social boldness". The 19 item version of this scale was used, in which the items are scored on a 6-point Likert-type format from -3 to +3. Potential range of scores is -57 to +57 but, for the present study, to avoid negative scores, a constant of 50 was added to each score making the potential range -7 to +57 (although the actual range for this sample turned out to be +8 to +96). The scale is scored in the direction of assertiveness. Rathus (1973) reports a test-retest reliability of $r = .78$, $p < .01$ and criterion validities of between .33 and .62, with $p < .01$. Each of the 19 items used in the present study were shown to correlate significantly with the total score (p s $< .05$ or $< .01$).

4. The Sixteen Personality Factor (16PF) Questionnaire.

Appendix E provides descriptions of the first and second order factors of this inventory which consists of 187 items, each with a choice of three responses, designed to measure many of the basic human personality variables. Each subjects's raw scores are converted to standard scores (stens) based on the appropriate norm tables, for the 16 primary factors. The second order factors are computed by using various weights of selected primary factors (see Krug, 1981). For the present study the Form B version was administered and in order to

retain the greater variability, the scores for the second order factors were not reduced to sten scores.

Potential range of the scores, for each of the primary factors was 1 to 10, and for the second order factors, 10 to 100. However the range for the second order factors was exceeded in a few cases which occurred when the subject's pattern of sten scores was very extreme. As Cattell, Eber, and Tatsuoka (1970) explained, "best weights for estimation ... differ somewhat from one population or sample to another." (p. 126). The norm tables used were those for male and female college students.

5. A headache questionnaire was constructed (Appendix F), based on several questionnaires used previously in headache studies (Arena, Blanchard, Andrasik, & Dudek, 1982; Brewis et al, 1966; Ogden, 1952; Waters, 1974; Ziegler et al, 1977). The basic question was "Have you ever been subject to headache?" If the subject responded "Yes" then several further responses were required, intended to assist in determining the type of headache, its severity, frequency, possible antecedents, and changes since onset. If the subject responded "No" then no further information, other than the demographic information already provided, was required.

The headaches were classified into three types; migraine (including cluster), combined, and tension. The

classification was based on the Headache Symptom Questionnaire items of Arena et al. (1982), which were included in the present headache questionnaire. The classification was accomplished using the Discriminant Function Coefficients provided by Arena et al. Although accurate classification of only 68.42% of cases is claimed, this was considered acceptable for the present study as headache type was mainly used only as a covariate. To reduce the probability of including organically based headaches in the analysis of the relationships between the personality variables and the headache measures, headaches classified as "disabling", by the subjects themselves, were deleted.

Procedure

Subjects were recruited using "sign-up" sheets and arrangements made for the questionnaires and scales to be completed in groups of 20 to 50 students. At the start of each session the subjects were asked to carefully read the instructions, printed at the beginning of each of the scales and at the top of the first page of the headache questionnaire, before commencing. Instructions for completion of the 16PF were included separately. The subjects were advised that all responses would be treated confidentially and that names were not required on the testing materials. Any subject requesting his or her individual results, for each of the four scales (HLC, LC,

RAS, and 16PF) was provided with his or her raw scores and referred to the appropriate literature for interpretation.

CHAPTER 111a

Results

The results of the study are presented in two main parts: first, the statistics describing the sample in relation to the number and type of headache, other psychosomatic symptoms and factors precipitating headaches; second, the analyses used to determine the relationship of the personality variables to headache. Within each of these parts various data and analyses will be reported. Prior to the main parts, a brief section concerning the cases in the data analysis is presented.

Cases in the Data Analysis

For the data shown in Tables, 3, 4, 5, and 6, the number of subjects (222) represents all those who completed the Headache Questionnaire. For Table 3, four subjects were discarded because they did not fully complete the information required to classify the type of headache. In order to keep the total number of subjects equal at 218, information relating to these four subjects was deleted not only from Table 3C but also from 3A and 3B. For the remaining analyses a further 23 sets of scores were discarded, reducing the total to 195, either because the scores were found to be "outliers" on two or more scales (12 sets), or the subject had classified himself into the "disabling" headache category (11 sets). A score was considered to be an outlier when its point,

as plotted by pairs of variables (e.g. LC by RAS or LC by ANX), was clearly discrepant with the majority of points on the scatter plot. (See Tabachnick & Fidell, 1983). The "disabling" headache cases were discarded as they appeared to be the most likely to contain severe, organically based headaches, which were not considered relevant to this study.

All independent variables were examined for normality and skewness of distribution, and found to be within acceptable limits. Type of headache was found to be highly skewed, with severity and frequency mildly skewed. However, as type of headache, frequency and severity were skewed in the expected direction (approx 80 percent of the sample reporting headache, with tension the most frequent type) transformations of the data were not considered necessary.

1. Statistics Describing the Sample

A. Severity, Frequency and Type of Headaches

Table 3 provides information about the severity, frequency, and type of headaches, both for the original sample and the sample after deletions were made, as described earlier. The numbers and percentages are shown separately for men and women. Overall, approximately 82 percent reported experiencing headache, but 27 percent of men reported "no headache" compared to 14 percent of women. Within the five levels of headache frequency, the

Table 3

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A. Number and Percentage of Subjects Classified into Severity of Headaches, Showing Men and Women Separately

Severity.	Number		Percentage		Total	Percentage
	Men	Women	Men	Women		
Nil	18(17)	21(21)	26.9(27.9)	13.9(15.7)	39(38)	17.9(19.5)
Mild	22(21)	62(60)	32.8(34.4)	41.1(44.8)	84(81)	38.5(41.5)
Severe	24(23)	60(53)	35.8(37.7)	39.7(39.5)	84(76)	38.5(39.0)
Disabling	3(0)	8(0)	4.5(0)	5.3(0)	11(0)	5.0(0)
Totals	67(61)	151(134)	100(100.0)	100(100.0)	218(195)	100.0(100.0)

B. Number and Percentage of Subjects Classified into Frequency of Headache, Showing Men and Women Separately

Frequency	Number		Percentage		Total	Percentage
	Men	Women	Men	Women		
Nil	18(17)	21(21)	26.9(27.9)	13.9(15.7)	39(3)	17.9(19.5)
Less than Yearly	1(1)	2(2)	1.5(1.6)	1.3(1.5)	3(3)	1.4(1.5)
Yearly	9(8)	17(16)	13.4(13.1)	11.3(11.9)	26(24)	11.9(12.3)
Monthly	26(24)	55(47)	38.8(39.3)	36.4(35.1)	81(71)	37.1(36.4)
Weekly	13(11)	56(48)	19.4(18.0)	37.1(35.8)	69(59)	31.7(30.3)
Totals	67(61)	151(134)	100(100)	100(100)	218(195)	100.0(100.0)

C. Number and Percentage of Subjects Classified into Types of Headaches, Showing Men and Women Separately

Type	Number		Percentage		Total	Percentage
	Men	Women	Men	Women		
Nil	18(17)	21(21)	26.9(27.9)	13.9(15.7)	39(38)	17.9(19.5)
Migraine (including Cluster)	5(5)	16(13)	7.5(8.2)	10.6(9.7)	21(18)	9.6(9.2)
Combined	10(8)	32(26)	14.9(13.1)	21.2(19.4)	42(34)	19.3(17.4)
Tension	34(31)	82(74)	50.7(50.8)	54.3(55.2)	116(105)	53.2(53.9)
Totals	67(61)	151(134)	100(100)	100(100)	218(195)	100.0(100.0)

NOTES

1. Numbers in parentheses represent the sample size after outliers and disabling headaches were deleted, with the corresponding percentages.

2. Some percentages may not sum exactly to 100 due to rounding.

largest number of men and women reported monthly headaches (approximately 37 percent), closely followed by those reporting weekly headaches (approximately 32 percent). Within this category (weekly headaches), are 37.1 percent of the female subjects, compared to 19.4 percent of the men. According to Table 3C, the majority of the subjects (approximately 53 percent) suffered from tension headaches, with combined headaches and migraine headaches ranking second and third. However as the method used to classify the headaches is only 68 percent accurate (see "Method" section), these statistics may therefore be misleading and no weight is placed on them.

B. Factors Precipitating Headache

The ranking of the factors thought to precipitate headaches is shown for men and women combined and for men and women separately, in Tables 4A, B, and C. Clearly considered to be the most important factors are "Mental Stress" and "Mental and/or Physical Exhaustion", both chosen by 79.7 percent of men and women. Overall, 86.4 percent of women indicated that they considered mental stress to be the most likely to precipitate headaches, while 76 percent of men chose mental and/or physical exhaustion. "Too little sleep" was chosen as a precipitating factor by 77.5 percent of the men and women, making it the next most popular choice. On average, women chose 6.05 of the factors each out of 18

Table 4

Precipitating Factors by Rank Order, with Number of Times ListedA. Men and Women (n = 182^a)

Factor	Number of Times Listed	Percentage of Subjects
Mental Stress e.g. Anxiety or Worry	145	79.7
Mental and/or Physical Exhaustion	145	79.7
Too Little Sleep	141	77.5
Eyestrain	99	54.4
Hunger	95	52.2
Menstruation	72	39.6
Alcohol and/or Drugs	62	34.1
Heat	60	33.0
Smoking	47	25.8
Too Much Sleep	45	24.7
Certain Foods	31	17.0
Hypertension	30	16.5
Exercise	25	13.7
Excitement	23	12.6
Unknown	20	11.0
Flashing Light	18	9.9
Other	8	4.4
Constipation	5	2.7

Table 4

B. Men only (n = 50^a)

Factor	Number Times Listed	Percentage of Subjects
Mental and/or Physical Exhaustion	38	76.0
Too Little Sleep	32	64.0
Eyestrain	32	64.0
Mental Stress e.g. Anxiety or Worry	31	62.0
Hunger	24	48.0
Heat	21	42.0
Alcohol and/or Drugs	21	42.0
Too Much Sleep	11	22.0
Smoking	10	20.0
Exercise	10	20.0
Excitement	9	18.0
Certain Foods	7	14.0
Hypertension	6	12.0
Unknown	6	12.0
Flashing Light	5	10.0
Other	4	8.0
Constipation	1	2.0

Table 4

C. Women only (n = 132^a)

Factor	Number of Times Listed	Percentage of Subjects
Mental Stress e.g. Anxiety or Worry	114	86.4
Too Little Sleep	109	82.6
Mental and/or Physical Exhaustion	107	81.1
Eyestrain	99	75.0
Menstruation	72	54.5
Hunger	71	53.8
Alcohol and/or Drugs	41	31.1
Heat	39	29.5
Smoking	37	28.0
Too Much Sleep	34	25.8
Hypertension	24	18.2
Certain Foods	24	18.2
Exercise	15	11.4
Excitement	14	10.6
Unknown	14	10.6
Flashing Light	13	9.8
Constipation	4	3.0
Other	4	3.0

Note

a

Sample size before deletion of outliers, disabling headaches, and incomplete questionnaires. 19 men and 21 women reported "no headache" and are therefore not included in this sample.

possible while men chose 5.22 out of 17 possible.

C. Other Psychosomatic Symptoms

Table 5 gives a breakdown of the number of other psychosomatic symptoms listed, within the levels of severity of headache (no headache, mild, severe, and disabling) also showing men and women separately. Table 6 provides the results of t tests comparing the means for the number of psychosomatic symptoms by level of headache severity. Of the six comparisons, two were significant : no headache with disabling headache (t (12.1) = -2.65, $p < .05$), and mild headache with disabling headache (t (11.1) = -2.42, $p < .05$). Two other comparisons approached significance : no headache with severe headache (t (127) = -1.87, $p = .06$), and mild headache with disabling headache (t (11.1) = -1.96, $p = .07$). The overall mean number of other psychosomatic symptoms was 1.14, with a standard deviation of 1.27 and a range of 0 to 5. For women only, the mean number of psychosomatic symptoms was 1.27, with a standard deviation of 1.29 and for men the mean was 0.88, standard deviation 1.06. The difference between these means for men and women was significant with t (220) = -1.96, $p < .05$. Within the levels of severity the only significant difference between men and women was in the severe headache category (t (78.1) = -2.50, $p < .05$). A Pearson Product-Moment Correlation of .22 ($p < .01$) between headache severity and number of

Table 5

Number of Other Psychosomatic Symptoms Listed,
Shown Separately for men and women Within Levels
of Severity of Headaches (n = 222 ; 69 men, 153 women)

<u>1. No Headache (n = 40; 19 Men, 21 Women)</u>			
	<u>Men</u>	<u>Women</u>	<u>Total</u>
	13	21	34
Mean per Subject	0.68	1.00	0.85
Number Listing Any	8	12	
<u>2. Mild Headache (n = 82; 23 Men, 59 Women)</u>			
	<u>Men</u>	<u>Women</u>	<u>Total</u>
	20	61	81
Mean per Subject	0.91	1.16	1.01
Number Listing Any	11	34	
<u>3. Severe Headache (n = 89; 24 Men, 65 Women)</u>			
	<u>Men</u>	<u>Women</u>	<u>Total</u>
	21	92	113
Mean per Subject	0.88**	1.42	1.27
Number Listing Any	17	43	
<u>4. Disabling Headache (n = 11; 3 Men, 8 Women)</u>			
	<u>Men</u>	<u>Women</u>	<u>Total</u>
	6	20	26
Mean per Subject	2.0	2.5	2.36
Number Listing Any	2	8	

** Means for men and women significantly different at $p < .05$

Table 6

Comparison of Means for Number of Psychosomatic Symptoms
By Levels of Severity of Headache

Level No	Level of Severity	Mean Number of Symptoms	N	Significant Differences (Level to Level)
1	No Headache	0.85	40	1-4*
2	Mild	1.01	82	2-4*
3	Severe	1.27	89	Nil
4	Disabling	2.36	11	4-1* 4-2*

* Significant at $p < .05$

psychosomatic symptoms was found, indicating that as headache severity increased the number of other psychosomatic symptoms reported also tended to increase.

2. Relationship of the Personality Variables to Headache

To investigate the relationship of the personality variables to headache severity and frequency, the following analyses were undertaken. First for all the variables, the means, standard deviations, minimum and maximum values are presented, followed by Pearson Product-Moment Correlations. Then Locus of Control, Assertiveness, Anxiety, Frequency and Severity of Headache, were dichotomized, using median splits (see Appendix G) and chi square tests performed. The results of t tests on all variables examining sex differences and differences between the dichotomized levels of frequency and severity are presented next. The three dichotomized personality variables were then examined for relationships by combining them. First, after ANOVA analyses, multiple comparison procedures were used to test for significant differences between the means of the eight combinations, when measured on headache frequency and severity. Secondly, using the FUNCAT procedure (SAS, 1982), the observed frequency of those with headache and those without headache, within each of the combinations, was compared to the expected frequency, using chi square tests. Multiple Regression analyses were then performed

with the three personality variables and sex as the predictors, and frequency and severity as the criterion variables. Finally, mention will be made of two other analyses, including a MANCOVA with the personality variables as independent variables, the headache measures as dependent variables, and the sex of the subject as a covariate. Discriminant Function analyses were also performed using the three personality variables as predictors of headache frequency and severity.

A. Means, Standard Deviations, Minimum and Maximum Values

Table 7 presents this information for all the personality variables and both measures of headache, based on the reduced sample of 195. These statistics are presented for men and women separately as well as together. Anxiety was shown to have a higher than expected mean for the total sample at 65.95, assuming a mean of 55 (5.5 in stens) is normally expected. (T tests between men and women are shown in Table 11A). Overall, the mean frequency (FREQ) of headache of 3.57 and mean severity (SEV) of 2.21 indicated that the tendency was for most of the subjects to have a headache every few months or so of mild severity. However, as shown in Table 3, approximately 67 percent of the sample reported either monthly or weekly headaches (FREQ of 4 or 5), so the mean frequency is rather misleading.

Table 7

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A. Means, Standard Deviations, and Minimum and Maximum Values of All Variables. (n = 195)

Variable Name	Mean	Standard Deviation	Minimum	Maximum
HLC	35.04	5.56	21	49
LC	11.28	4.00	1	20
RAS	48.23	17.38	8	96
TYPE	3.06	1.19	1	4
Anxiety (ANX)	65.95	16.72	22	105
Extraversion (EXTRA)	56.43	18.25	10	101
Tough Poise (TP)	61.01	18.75	20	115
Independence (INDEP)	56.58	17.52	15	112
<u>16 PF Factors</u>				
A	5.50	1.85	1	10
B	4.65	1.82	1	10
C	4.42	1.92	1	10
E	5.84	1.93	1	10
F	6.13	2.02	2	10
G	5.23	1.82	1	10
H	5.32	1.95	1	10
I	5.65	2.01	1	10
L	6.69	2.02	1	10
M	5.33	1.68	1	10
N	5.23	2.00	1	10
O	6.54	1.68	1	10
Q1	5.18	2.07	1	10
Q2	6.20	2.16	1	10
Q3	5.61	1.83	2	10
Q4	6.36	1.72	3	10
Frequency (FREQ)	3.57	1.44	1	5
Severity (SEV)	2.21	0.75	1	3

Table 7

B. Means, Standard Deviations, Minimum and Maximum
 Values of All Variables, Showing Men and Women
 Separately (n = 195; 61 men, 134 women)

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Variable Name	Mean		Standard Deviation		Minimum		Maximum	
	Men	Women	Men	Women	Men	Women	Men	Women
HLC	33.57	35.70	5.29	5.58	23	21	49	49
LC	10.36	11.70	4.16	3.87	2	1	19	20
RAS	52.92	46.09	16.40	17.45	16	8	86	96
TYPE	2.84	3.16	1.31	1.22	1	1	4	4
ANX	64.54	66.66	15.92	17.23	27	22	96	105
EXTRA	56.82	56.25	19.65	17.65	22	10	90	101
TP	53.41	64.47	19.48	17.41	20	23	105	115
INDEP	58.98	55.49	17.74	17.37	24	15	101	112

16 PF Factors

A	5.57	5.47	1.94	1.82	2	1	10	10
B	4.77	4.60	2.04	1.71	1	1	10	8
C	4.34	4.46	1.98	1.89	1	1	10	8
E	5.93	5.79	2.05	1.88	2	1	10	10
F	6.21	6.10	2.24	1.91	3	2	10	10
G	5.13	5.28	1.69	1.88	1	1	9	10
H	5.43	5.28	2.12	1.87	1	2	10	9
I	5.92	5.53	2.33	1.84	1	1	10	10
L	6.59	6.74	2.18	1.95	1	1	10	10
M	5.79	5.12	1.73	1.62	1	2	10	10
N	5.26	5.21	1.93	2.04	2	1	10	10
O	6.41	6.60	1.54	1.73	3	1	10	10
Q1	5.84	4.89	2.02	2.03	3	1	10	10
Q2	6.41	6.10	2.40	2.05	1	1	10	10
Q3	5.54	5.63	1.58	1.94	2	2	9	10
Q4	6.48	6.31	1.76	1.70	3	3	10	10
FREQ	3.18	3.75	1.50	1.37	1	1	5	5
SEV	2.10	2.26	0.81	0.71	1	1	3	3

B. Pearson Product-Moment Correlations

Table 8 shows the significant correlations between the measures of headache, the personality variables, sex, and type of headache, for men and women together, and also separately. The 16 primary or "first order" factors of the 16PF were dropped from most of the subsequent analyses as they were considered well represented within the four "second order" factors of Anxiety (ANX), Extraversion (EXTRA), Tough Poise (TP), and Independence (INDEP). Also as these second order factors are more broadly based they were considered to be generally more useful, in this study. As indicated in the tables, ANX had the greatest number of significant correlations and apart from type of headache (TYPE), was the only variable related to FREQ and SEV. The Health Locus of Control (HLC) scores were also dropped from further analyses as they were not considered useful in this study, being related only to the Locus of Control (LC) scores, and to the sex of the subject. Further, EXTRA, TP, and INDEP were dropped as none of them were significantly correlated with the headache measures and seemed largely to duplicate the contribution of RAS. These variables were therefore considered superfluous, in this study.

Although TYPE had significant correlations with FREQ and SEV, this was largely due to the method of coding employed. As "no headache" was coded "1" for TYPE, FREQ,

and SEV alike, this spuriously elevated the correlations between them. Univariate ANOVAS were performed, with FREQ, SEV, LC, RAS, and ANX used in turn as the dependent variables, and the four levels of TYPE as the independent variable. These analyses were not significant for LC, RAS, or ANX and multiple comparison tests revealed no significant differences between the means of the four levels of TYPE (no headache, migraine, combined, and tension). Although the ANOVAs were significant for FREQ and SEV (due to the coding method), multiple comparisons showed no significant differences between the means of levels 2, 3, and 4 of TYPE. These results indicated that TYPE was not an important variable in this study, as the type of headache experienced by the subject had no relationship to his or her scores or ratings, on any of the personality variables or headache measures.

Some of the main findings shown in Table 8 are :

- (1) Sex of the subject was related to scores on the LC in that women tended to be more external than men. Women also tended to be less assertive (on the RAS), and have more frequent headaches.
- (2) LC was related to RAS and ANX in that a more external score on the LC was related to a less assertive score on the RAS and to greater anxiety, as reported by the ANX score of the 16PF.
- (3) As ANX increased FREQ and SEV increased also.

Table 8

A. Pearson Product-Moment Correlations for Variables
with Significant Correlations (n = 195)

	SEX ^a	HLC	LC	RAS	TYPE	ANX	EXTRA	TP	INDEP	FREQ
HLC	.18**									
LC	.16*	.26**								
RAS	-.18**	00	-.33**							
TYPE	00 ^b	00	00	00						
ANX	00	00	.37**	-.47**	00					
EXTRA	00	00	00	.50**	00	-.34**				
TP	.27**	00	00	.35**	00	-.22**	.40**			
INDEP	00	00	00	.52**	00	-.29**	.26**	.30**		
FREQ	.18**	00	00	00	.74**	.15*	00	00	00	
SEV	00	00	00	00	.68**	.16*	00	00	00	.76**

Table 8

B. Pearson Product-moment Correlations for Variables
with Significant Correlations, Women only (n = 134)

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	HLC	LC	RAS	TYPE	ANX	EXTRA	TP	INDEP	FREQ
LC	.20*								
RAS	00	.31**							
TYPE	00	00							
ANX	00	.43**	-.44**	00					
EXTRA	00	00	.49**	00	-.30**				
TP	00	00	.50**	00	-.23**	.56**			
INDEP	00	00	.54**	00	-.25**	.21**	.40**		
FREQ	00	00	00	.71**	00	00	00	00	
SEV	00	00	00	.64**	.19*	00	00	-.20*	.72**

C. Pearson Product-moment Correlations for Variables
with Significant Correlations, Men only (n = 61)

	HLC	LC	RAS	TYPE	ANX	EXTRA	TP	INDEP	FREQ
LC	.31**								
RAS	00	-.32**							
TYPE	00	00	00						
ANX	00	00	-.54**	00					
EXTRA	00	00	.56**	00	-.44**				
TP	-.30**	00	.26*	00	-.27*	00			
INDEP	00	-.27**	.44**	00	-.39**	.36**	00		
FREQ	00	00	00	.79**	00	00	00	00	
SEV	00	00	00	.74**	00	00	00	00	.82**

* Significant at $p < .05$

** Significant at $p < .01$

NOTES

^a Men were coded as "1"; women as "2"

000 denotes a non-significant correlation

However, this relationship was not very strong overall, with $r = .15$, $p < .05$ for FREQ, and $r = .16$, $p < .05$ for SEV.

Finally, Table 9 provides the significant correlations when frequency of headache was held to the weekly category. Because of the smaller sample size, some correlations that were significant before with the full sample, became non-significant. However assertiveness (RAS) became the variable with the greatest number of significant correlations and the only one that correlated significantly with either of the headache measures. This suggests that, for those with the most frequent headaches, being more assertive is related to being less anxious, more internal, and having less severe headaches.

C. Chi-Square Tests

Chi-square tests were performed on each of the pairings of the dichotomized variables LC, RAS, ANX, FREQ and SEV, to investigate whether the observed cell frequencies were significantly different from the expected frequencies. These tests provided an overall chi-square statistic for each of the ten pairings, which indicated whether or not a significant difference existed somewhere between the observed and expected frequencies found in the four cells. Further chi-square tests were then performed to determine which of the four cell frequencies differed significantly from the

Table 9

Pearson Product-Moment Correlations for Variables with
Significant Correlations, for Weekly Headaches Only (n = 59)

	SEX	HLC	LC	RAS	TYPE	ANX	EXTRA	TP	INDEP	FREQ
HLC	00 ¹									
LC	00	00								
RAS	00	00	-.31**							
TYPE	00	00	00	00						
ANX	00	00	.42**	-.45**	00					
EXTRA	00	00	00	.42**	00	-.30*				
TP	.26*	00	00	.48**	00	-.28*	.52**			
INDEP	00	00	00	.40**	00	00	00	00		
FREQ	- ²	-	-	-	-	-	-	-	-	-
SEV	00	00	00	-.28*	00	00	00	00	00	-

* Significant at $p < .05$

** Significant at $p < .01$

NOTES

1. 00 denotes a non-significant correlation
2. Correlations between FREQ and other variables are not provided as FREQ was held to one level

expected frequency. Median splits were made for each of these variables (as shown in Appendix G), but because the scales involved whole numbers, the group sizes above and below the median were not exactly equal. The results, shown in Table 10, revealed significant differences, from the expected cell frequencies, for four of the pairings.

(1) LC by RAS. Significantly more subjects were found in the two cells representing internal/more assertive and external/less assertive.

(2) LC by ANX. Significantly more subjects were found in the two cells representing internal/lower anxiety and external/higher anxiety.

(3) RAS by ANX.. Significantly more subjects were found in the two cells representing less assertive/higher anxiety and more assertive/lower anxiety.

(4) FREQ by SEV. Significantly more subjects were found in the two cells representing more frequent/more severe headaches and less frequent/less severe headaches.

These results confirmed the findings of Table 8, again suggesting that internal subjects tended to be more assertive and lower in anxiety, and that external subjects tended to be less assertive and higher in anxiety.

Table 10

Chi-Squares for Each of the Pairings of the Dichomized Variables LC, RAS, ANX, FREQ, and SEV (n = 195)

Variable	Chi-Square Value
LC by RAS	5.75**
LC by ANX	10.50**
LC by FREQ	0.06
LC by SEV	1.24
RAS by ANX	22.98**
RAS by FREQ	0.32
RAS by SEV	1.49
ANX by FREQ	0.58
ANX by SEV	0.99
FREQ by SEV	98.53**

** Significant at $p < .01$

D. Student T Tests

The results of t tests performed on all the variables, by SEX, by FREQ and by SEV, are shown in Table 11. In Table 11A women are shown to be significantly more external and higher on TP, while men are significantly more assertive, less practical (Factor M of the 16PF) and more experimenting (Factor Q1 of the 16PF). By frequency of headache (Table 11B), dichotomized into no headache, less than yearly, and yearly headaches vs. monthly and weekly headaches, women are shown to report more frequent headaches. Further, those with more frequent headaches are more likely to have a greater severity of headache, be more apprehensive (Factor O of the 16PF), and be more tense (Factor Q4 of the 16PF). Table 11C dichotomizes severity of headache into no headache vs. mild and severe headaches. Using these categories, women are shown to report headaches that are significantly more severe than for men (or men tend to report that they have no headaches more often than women). Those with headaches tend to be more apprehensive and those without headaches tend to be more self-sufficient (Factor Q2 of the 16PF).

Table 12 shows the means for frequency and severity of headache for each of the dichotomized variables, LC, RAS, and ANX. T tests were performed and revealed no significant differences between the two means, for each of the variables, on either FREQ or SEV.

Table 11

T Tests Showing Variables with Significant DifferencesA. By Sex (n = 61 for men; n = 134 for women)

Variable Name	T Value	DF	Direction of Difference
HLC	** -2.51	193.0	Women higher
LC	* -2.19	193.0	Women higher
RAS	** 2.58	193.0	Men higher
TP	** -3.96	193.0	Women higher
FREQ	** -2.37	193.0	Women higher
M	** 2.61	193.0	Men higher
Q1	** 3.03	193.0	Men higher

B. By Frequency of Headache, Dichotomized into - Group 1:
No Headache, Less than Yearly, and Yearly Vs. Group 2:
Monthly and Weekly (n = 65 for Group 1 and 140 for Group 2)

Variable Name	T Value	DF	Direction of Difference
SEX	* -1.98	193.0	Group 2 higher (Women higher frequency)
SEV	** -9.72	92.7	Group 2 higher
O	* -2.04	105.5	Group 2 higher
Q4	* -2.24	193.0	Group 2 higher

C. By Severity of Headache Dichotomized into - Group 1, No
Headache VS Group 2, Mild and Severe Headaches (n = 38 for
Group 1 and 157 for Group 2)

Variable Name	T Value	DF	Direction of Difference
SEX	* -2.00	193.0	Group 2 Higher
O	* -2.03	193.0	Group 2 Higher
Q2	* 2.23	193.0	Group 1 Higher

* Significant at $p < .05$

** Significant at $p < .01$

Table 12

Table of Means for FREQ and SEV by the Dichotomized Variables LC, RAS and ANX

Variable	N Level		FREQ Mean	Level	SEV Mean
LC	103	1	3.57	1	2.19
	92	2	3.57	2	2.23
RAS	101	1	3.55	1	2.26
	94	2	3.59	2	2.16
ANX	96	1	3.46	1	2.16
	99	2	3.68	2	2.26

NOTE

No significant differences between the two means for each of the variables, were found, using t tests.

E. Multiple Comparison Tests

First, a MANCOVA (a multivariate analysis of variance with a covariate), was performed using the General Linear Models procedure (SAS, 1982), with frequency and severity of headache as dependent variables, SEX as a covariate, and LC, RAS, and ANX as independent variables. Multiple comparison tests between the means of the eight combinations of the three dichotomized personality variables (LC, RAS, and ANX), were then performed. The results are shown in Table 13A. No significant differences were found for headache frequency. For headache severity only the mean of the internal, less assertive and more anxious combination (Number 2) was found to be significantly different from more than one of the other combination means. This combination, however, was not significantly different from the combination of external, more assertive and more anxious (Number 1). Overall, these results do not reveal any clear differences between any of the combinations, when measured on headache frequency or severity.

After ANOVA analyses, with each of the variables used, in turn, as the dependent measure (for exploratory purposes), further multiple comparisons were made between the means of the combinations. Table 13B shows the results when ANX was used as the dependent measure with LC, RAS, and FREQ as independent variables. The highest

Table 13

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Means for FREQ, SEV, and ANX, for the Eight Combinations
of the Dichotomized Variables (n = 195)

A. Means for FREQ and SEV

COMBINATION NUMBER	N	LC	RAS	ANX	FREQ Mean	SEV Mean	COMBINATIONS WHERE MEANS DIFFER AT .05 LEVEL	
							FREQ	SEV
1.	17	2	2	2	4.05	2.41	NIL	NIL
2.	27	1	1	2	3.76	2.48	NIL	2-3 2-4 2-7
3.	14	1	2	2	3.62	2.00	NIL	3-2
4.	44	1	2	1	3.55	2.11	NIL	4-2
5.	19	2	2	1	3.48	2.16	NIL	NIL
6.	41	2	1	2	3.47	2.15	NIL	NIL
7.	18	1	1	1	3.39	2.11	NIL	7-2
8.	15	2	1	1	3.27	2.33	NIL	NIL

B. Means for ANX

COMBINATION NUMBER	N	LC	RAS	FREQ ^a	ANX Mean	COMBINATION WHERE MEANS DIFFER AT .05 LEVEL							
1.	34	2	1	2	79.22	1-2	1-3	1-4	1-5	1-6	1-7	1-8	
2.	22	2	1	1	70.31	2-1	2-6	2-7	2-8				
3.	32	1	1	2	69.89	3-1	3-6	3-7	3-8				
4.	27	2	2	2	66.70	4-1	4-7	4-8					
5.	13	1	1	1	65.86	5-1	5-7	5-8					
6.	9	2	2	1	57.42	6-1	6-2	6-3					
7.	20	1	2	1	55.80	7-1	7-2	7-3	7-4	7-5			
8.	38	1	2	2	55.32	8-1	8-2	8-3	8-4	8-5			

NOTE

a For FREQ = 1, n = 64; For FREQ = 2, n = 131.

mean for ANX (Number 1) involved those who were external, lower in assertiveness and who had more frequent headaches (see Appendix G for details of the dichotomy used for FREQ). However more frequent headaches also occurred when ANX was at its lowest. In this case (Combination Number 8), the subjects tended to be internal and more assertive in contrast to external and less assertive as found in Combination Number 1. Other analyses, using LC and RAS as the dependent measures, in turn, and substituting SEV for FREQ as an independent variable, did not reveal any clearly interpretable results.

F. Response Frequencies for the Eight Combinations of the Dichotomized Variables, LC, RAS, and ANX

The FUNCAT procedure (SAS, 1982) was used to measure the frequency counts for each of the eight combinations. As Table 14 shows, the largest number of subjects were found in the two groups which included internal, more assertive, and less anxious subjects (Combination Number 1) or external, less assertive, and more anxious subjects (Combination Number 2). The distribution of the frequency counts for the eight combinations was approximately normal, with the largest number of subjects falling into the categories that would be expected to be more frequent, based on findings by earlier researchers. For example those who are less anxious may be expected

Expected Frequencies (With Probabilities in Parenthesis) for the Eight Combinations of the Dichotomized Variables IC, HAS, and ANX, by Frequency of Headaches

COMBINATION NUMBER	IC	HAS	ANX	(A) GROUP 1	(B) GROUP 2	TOTAL GROUP 1 AND GROUP 2
1	1	2	1	15 (.34)	29 (.66)	44
2	2	1	2	15 (.37)	26 (.63)	41
3	1	1	2	7 (.26)	20 (.74)	27
4	2	2	1	6 (.32)	13 (.68)	19
5	1	1	1	6 (.33)	12 (.67)	18
6	2	2	2	3 (.18)	14 (.83)	17
7	2	1	1	7 (.47)	8 (.53)	15
8	1	2	2	5 (.36)	9 (.64)	14
TOTALS				64 (.33)	131 (.67)	195

NOTES

(A) Group 1 consists of No Headache, Less than Yearly and not Yearly Headaches.

(B) Group 2 consists of Monthly and Weekly Headaches.

to be more assertive and internal, whereas those who are more anxious would be less likely to be internal and more assertive (Combination Number 8). Accounting for the different frequencies in this way suggests that the number of subjects in each combination was a function of something other than headache frequency. Therefore the most appropriate way to investigate whether any of these combinations was significantly related to headache frequency, was to compare the frequencies of less vs. more frequent headache, within each combination. Chi square tests were used to test whether any of the observed frequencies differed significantly from the expected. (For ease of comparison, proportions are also shown in Table 14). The expected proportion was .33 (64/195) for Group 1, consisting of no headache, less than yearly, and yearly headaches; and .67 (131/195) for Group 2, consisting of monthly and weekly headaches. No significant differences were found, for any of the combinations, in this regard.

Table 15 shows the frequency of responses for the eight combinations measured by severity, dichotomized in two different ways. Table 15A has Group 1, consisting of no headache and mild headache vs. Group 2, consisting of severe headaches. Table 15B has Group 1 consisting of no headaches vs. Group 2, consisting of mild and severe headaches. Table 16 shows the same two dichotomies of

Table 15

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Response Frequencies (With Probabilities in Parenthesis) for the Eight Combinations of the Dichotomized Variables LC, RAS and ANX, By Severity of Headaches

A. Group 1 consists of No Headaches and Mild Headaches : Group 2 Consists of Severe Headaches

COMBINATION NUMBER	LC	RAS	ANX	GROUP 1	GROUP 2	TOTAL GROUP 1 AND GROUP 2
1.	1	2	1	30(.68)	14(.32)	44
2.	2	1	2	26(.63)	15(.37)	41
3.	1	1	2	11(.41)	16(.59)	27
4.	2	2	1	11(.58)	8(.42)	19
5.	1	1	1	12(.67)	6(.33)	18
6.	2	2	2	8(.47)	9(.53)	17
7.	2	1	1	7(.47)	8(.53)	15
8.	1	2	2	11(.79)	3(.21)	14
TOTALS				116(.595)	79(.405)	195

B. Group 1 consists of No Headaches : Group 2 Consists of Mild and Severe Headaches

COMBINATION NUMBER	LC	RAS	ANX	GROUP 1	GROUP 2	TOTAL GROUP 1 AND GROUP 2
1.	1	2	1	9(.20)	35(.80)	44
2.	2	1	2	9(.22)	32(.78)	41
3.	1	1	2	3(.11)	24(.89)	27
4.	2	2	1	5(.26)	14(.74)	19
5.	1	1	1	4(.22)	14(.78)	18
6.	2	2	2	2(.12)	15(.88)	17
7.	2	1	1	3(.20)	12(.80)	15
8.	1	2	2	3(.21)	11(.79)	14
TOTALS				38(.195)	157(.805)	195

Table 16

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Response Frequencies (With Probabilities in Parentheses) for the Eight Combinations of the Dichotomized Variables, LC, RAS and ANX Showing Men and Women Separately

A. By Severity of Headaches

Group 1 Consists of No Headaches : Group 2 Consists of Mild and Severe Headaches

COMBINATION NUMBER	LC	RAS	ANX	GROUP 1		GROUP 2		TOTAL	
				MEN	WOMEN	MEN	WOMEN	MEN	WOMEN
1.	1	2	1	5(.31)	4(.14)	11(.69)	24(.86)	16	28
2.	2	1	2	3(.30)	6(.19)	7(.70)	25(.81)	10	31
3.	1	2	2	2(.22)	1(.20)	7(.78)	4(.80)	9	5
4.	2	2	1	1(.13)	4(.36)	7(.87)	7(.64)	8	11
5.	1	1	2	1(.17)	2(.10)	5(.83)	19(.90)	6	21
6.	2	2	2	1(.20)	1(.08)	4(.80)	11(.92)	5	12
7.	1	1	1	3(.75)	1(.07)	1(.25)	13(.93)	4	14
8.	2	1	1	1(.33)	2(.17)	2(.67)	10(.83)	3	12
TOTALS				17(.28)	21(.16)	44(.72)	113(.84)	61	134

B. By Frequency of Headaches

Group 1 Consists of No Headache, Less than Yearly and Yearly Headaches : Group 2 Consists of Monthly and Weekly Headaches

COMBINATION NUMBER	LC	RAS	ANX	GROUP 1		GROUP 2		TOTAL	
				MEN	WOMEN	MEN	WOMEN	MEN	WOMEN
1.	1	2	1	7(.44)	8(.29)	9(.56)	20(.71)	16	28
2.	2	1	2	5(.50)	10(.32)	5(.50)	21(.68)	10	31
3.	1	2	2	3(.33)	2(.40)	6(.67)	3(.60)	9	5
4.	2	2	1	2(.25)	4(.36)	6(.75)	7(.64)	8	11
5.	1	1	2	1(.17)	6(.29)	5(.83)	15(.71)	6	21
6.	2	2	2	2(.40)	1(.08)	3(.60)	11(.92)	5	12
7.	1	1	1	3(.75)	3(.21)	1(.25)	11(.79)	4	14
8.	2	1	1	3(1.00)	4(.33)	0(-)	8(.67)	3	12
TOTALS				26(.43)	38(.28)	35(.57)	96(.72)	61	134

headache severity separately for men and women. Chi-square tests were performed and no significant differences, for any of the combinations on Tables 15 or 16, were found between the observed and expected frequencies of lesser or greater severity. However these non-significant findings may be partly due to the small number of counts, especially for male subjects, found in some cells. It seems clear though that any effect for the three personality variables, even with a larger sample, would be fairly weak.

G. Multiple Regression Models

To examine the relationships between headache frequency and severity, as dependent variables on one side, and a linear combination of the three personality variables and sex, as predictors on the other, multiple regression analyses were performed. Table 17 presents the results of the analysis with headache frequency as the dependent variable. The model was significant (R^2 of .06, $p < .05$) and SEX had a significant amount of unique variance ($sr^2 = .033$, $p < .01$) as did ANX ($sr^2 = .022$, $p < .05$). Without LC and RAS partialled out the variance for ANX was slightly lower ($r^2 = .019$, $p = .07$). This suggests that LC and RAS were suppressing ANX somewhat, although the amount of change is small (.003). The multiple regression with SEV as the dependent variable, was not significant.

Table 17

Summary Table for the Multiple Regression Analysis Showing the Relationship of SEX, ANX, LC, and RAS to Headache Frequency

Source	DF	SS	MS	F	R ²
Model	4	24.20	6.05	3.06	0.061
Error	190	375.62	1.98	(p=.018)	
Total	194	3.99.82			

Semi-Partial Correlations Squared (sr²)

SEX	=	.033**
ANX	=	.021*
LC	=	.000
RAS	=	.007

* Significant at $p < .05$

** Significant at $p < .01$

To investigate whether a sample consisting of the seemingly most pathological headache group would show stronger relationships, those cases with weekly frequency of headache were selected. The result of this analysis is shown in Table 18. The R^2 of .109 was not significant and although RAS approached significance ($sr^2 = .057$, $p = .06$), none of the variables had a significant unique variance with headache severity.

H. Other Analyses

The following analyses were also performed:

- (1) MANCOVA and ANOVA. With FREQ and SEV as dependent variables, LC, RAS, and ANX as independent variables (coded for levels as shown in Appendix G), and SEX as a covariate, the MANCOVA was not significant. No overall significant effect for LC X RAS X ANX was found, although this interaction approached significance when tested using Wilks' Criterion ($F(2,185) = 2.24$, $p = .10$). Two univariate ANOVAs were performed and a significant effect for SEX was found, with FREQ as the dependent variable ($F(1,186) = 6.42$, $p < .01$). The LC X RAS X ANX interaction was significant with SEV as the dependent variable, ($F(1,186) = 3.95$, $p < .05$) and this was investigated further as reported earlier under "Multiple Comparison Tests".
- (2) Discriminant Functions. An attempt was made to discriminate between the five levels of headache

Table 18

Summary Table for the Multiple Regression Analysis
Showing the Relationship of LC, RAS, ANX, and
SEX to Headache Severity, for Weekly Headaches
Only (n = 59)

Source	DF	SS	MS	F	R ²
Model	4	1.532	0.383	1.65	.109
Error	54	12.502	0.232	(p=.17)	
Total	58	14.034			

Semi-Partial Correlations Squared (sr²)

LC	=	.019
RAS	=	.057
ANX	=	.009
SEX	=	.011

frequency using LC, RAS, and ANX as predictors. Only 38 percent accuracy was obtained and the discriminant function analysis failed to correctly classify any of the cases in the no headache, less than yearly, and yearly headaches categories. Discrimination between the three classes of severity, using the same three variables, was 47 percent accurate overall, with most misclassifications being made on the "no headache" level. The results of these analyses suggest that knowing a subject's locus of control, level of assertiveness and anxiety, does not lead to a reliable prediction of headache frequency or severity.

Summary of Results

1. Results Describing the Sample

Approximately 82 percent of the total sample reported experiencing headache, with 37.1 percent reporting monthly headaches and 31.7 percent reporting weekly headaches. A higher proportion of men (26.9%) reported no headaches, compared to women (13.9%) and a higher proportion of women (37.1%) reported weekly headaches, compared to men (19.4%). Approximately 53 percent of all subjects were classified as having tension type headaches, but as the method used to classify headaches is only 68.2 percent accurate, no weight should be placed on the findings concerning headache type.

The factors listed most frequently by the total

sample as precipitating headache were, "mental stress" and "mental and/or physical exhaustion". Approximately 80 percent of the men and women listed these two factors, closely followed by the factor "too little sleep". The most popular choice for women was "mental stress" (86.4%) and for men "mental and/or physical exhaustion" (76.0%).

On average, women reported significantly more "other psychosomatic symptoms" than men, with a mean of 1.27 symptoms compared to 0.88 symptoms for men ($t(220) = -1.96, p < .05$). By level of severity, the no headache and mild headache levels both differed significantly from the disabling headache level ($ps < .05$). The comparisons of the no headache level to the severe headache level and mild headache to disabling headache, both approached significance with ps of .06 and .07, respectively. The correlation between headache severity and the number of other psychosomatic symptoms was .22 ($p < .01$), which indicated that as headache severity increased the number of symptoms reported also tended to increase.

2. Results Concerning the Relationship of the Personality Variables to Headache

(1) Relationship of LC to Headache

No significant correlations were found between LC and FREQ or SEV. When LC was dichotomized and measured on headache frequency and severity, t -tests showed that the means of the internal group were not significantly

different from the means of the external group. Chi square tests for differences between the observed and expected cell frequencies of LC and FREQ, and LC and SEV, were also not significant.

(2) Relationship of RAS to Headache

Although no significant correlations were found between RAS and FREQ or SEV when the whole sample was used, RAS did have a significant correlation with SEV ($r = -.28, p < .05$) when the sample consisted only of subjects with weekly headaches. When RAS was dichotomized and measured on headache frequency and severity no significant differences were found between the means of the less assertive group and the more assertive group, using t tests. Chi square tests between the observed and expected cell frequencies of RAS and FREQ, and RAS and SEV were not significant.

(3) Relationship of ANX to Headache

The Pearson product-moment correlations between ANX and FREQ of .15 ($p < .05$), and ANX and SEV of .16 ($p < .05$), indicated that as frequency and severity of headaches increased, reported anxiety tended to increase also. When correlations were obtained for men and women separately, only the correlation between ANX and SEV for women was significant ($r = .19, p < .05$), so this relationship did not seem very robust. Using t tests, no significant differences between the means of the less

anxious group and the more anxious group, of the dichotomized variable ANX, were found, when measured on headache frequency and severity.

(4) Relationships Between LC, RAS, and ANX

As indicated by significant Pearson Product-Moment correlations, an external score on the LC was related to a less assertive score on the RAS and to higher anxiety as indicated by the ANX score of the 16PF. It was also noted that the largest number of subjects (44) fell into the internal, more assertive, and less anxious group, closely followed by the external, less assertive, and more anxious group (41 subjects). The distribution of the frequency counts for the eight combinations was seen to be approximately normal, with the greatest number of subjects found in the combinations which were expected to be more frequent, based on findings by other researchers.

(5) Relationship of the Combinations of LC, RAS, and ANX to Headache

None of the means of the eight combinations of the three personality variables, were found to be significantly different, when FREQ was used as the dependent measure. When SEV was the dependent measure only one combination, internal, less assertive, and more anxious, had a mean that was significantly different from more than one of the other combination means. This combination had the highest mean for SEV, but was not

significantly different from the next highest mean, which was the external, more assertive, and more anxious combination. Although the two highest combination means for SEV both included subjects reporting higher anxiety, the combination with the lowest mean for SEV also included subjects with higher anxiety. No clear relationship between the eight combinations and headache severity or frequency, was therefore demonstrated. Chi-square tests were used to test for significant differences between the observed and expected frequencies of groups, within each of the combinations. The groups were either dichotomizations of the severity measures or of the frequency measures. No significant differences were found for any of the combinations, in this regard.

A multiple regression analysis revealed a significant relationship between the three personality variables (LC, RAS, and ANX) and frequency of headache, only when the sex of the subject was included as a predictor. With FREQ as the dependent variable, SEX and ANX contributed a significant amount of unique variance to the total variance of FREQ. Also, it was found that LC and RAS suppressed ANX somewhat. With SEV as the dependent variable, the three personality variables, and SEX as predictors, the multiple regression was not significant.

CHAPTER 1V

Discussion

The main purpose of the study was to examine the relationship between three personality variables, locus of control, assertiveness and anxiety, and headache frequency and severity. Only anxiety is shown to be significantly related to headache, although the relationship is rather weak. However, there are several significant relationships between the personality variables themselves. It appears that these personality variables are not very useful in the prediction of headache frequency or severity, either combined or individually. The first part of this chapter will discuss this further and offer an explanation for the findings. The second part will compare the findings concerning headache incidence, type, and precipitating factors, with those in the existing literature and discuss some related issues.

1. Relationships of the Personality Variables to Headache

The search for a "headache personality" has continued for many years, with conflicting findings and conclusions. In terms of the two main types of headache, Bakal (1975), in his literature review, concluded there was no definitive migrainous personality, and Friedman (1979) found that no specific personality was in evidence.

for tension headaches. Yet the idea persists that people who suffer from frequent and severe headaches are somehow "different" from others, in terms of personality characteristics.

Neuroticism and depression have been two personality characteristics frequently connected to headache activity. As discussed earlier, studies have provided evidence to support these relationships although they are far from conclusive. Also the research mainly involved headache patients, who may well have had more pervasive personality disorders than, for example, university students. These findings then, may not be particularly useful or relevant in headache research dealing with non-patient populations.

Another important area in the search for a relationship between personality variables and headache, is that of anxiety. It is a common belief that anxiety is related to headache, and headache is generally assumed to be one of the physiological manifestations of anxiety. It would seem then, that the relationship between anxiety and headache should be a strong one. In the present study, anxiety is shown to have some relationship to headache, but this relationship is rather weak. Several other researchers (e.g. Andrasik et al., 1982; Arena et al., 1984), also using self-report measures of anxiety, have found either no relationship between anxiety and

headache, or only a weak one. In the present study however, some evidence was found which suggests that a subject's perceived locus of control and level of assertiveness may affect the amount of anxiety reported.

Previous studies have shown that subjects with a more external locus of control, tended to report more anxiety (e.g. Carter, 1983; Lefcourt, 1981; Ray & Katahn, 1968, Watson, 1967). Assertiveness has also been linked to reduced anxiety (Brooks & Richardson, 1980; Waksman, 1984), and Waksman, 1984 also found that an internal locus of control was related to reduced anxiety. The present study confirms these findings and also shows a relationship between internal locus of control and higher assertiveness. Pearson Product-Moment correlations between the three personality variables (LC, RAS, and ANX), indicate that subjects who tend to be internal and more assertive also tend to report less anxiety.

Possibly then, anxiety would be more strongly related to headache if the effect of locus of control and assertiveness was taken into account. This proposition is partly borne out by the finding that anxiety has a significant amount of unique variance with headache frequency and yet does not contribute significantly when LC and RAS are included. (See Table 17). Using the 16PF measure of anxiety then, does not seem particularly useful in predicting headache frequency or severity. In

fact, any self-report measure of anxiety would be influenced by the subject's reluctance or willingness to admit to it. The subject may not be accurately reporting his or her level of anxiety, as it may be affected by the level of assertiveness and/or perceived locus of control.

Although significant correlations exist between reported anxiety and the measures of headache, no significant differences were found on headache severity or frequency, between the two groups representing lower and higher anxiety. (Although, as shown in Table 12, the more anxious group does have higher mean scores for both frequency and severity of headache). In other words, the level of reported anxiety does not have a strong effect on the frequency or severity of headaches.

The effect of locus of control alone is not strong enough to differentiate between headache activity. Neither is the effect of assertiveness, although it may be a factor in those reporting the most frequent headaches (see Table 18). However, as previously discussed, a relationship between reported anxiety and headache does exist and may be moderated by the subject's assertiveness and locus of control. It seems that when a subject is internal and more assertive, he or she is more likely to report lower anxiety, than when external and less assertive. Keeping in mind the positive correlation between anxiety and headache, it is interesting to note

from Table 14, that the two combinations with the greatest number of more frequent headache sufferers, include both less anxious subjects (Combination Number 1), and more anxious subjects (Combination Number 2). This is also the case for headache severity (see Table 15). Further, in the group which reported weekly headaches ($n = 59$), the largest number of subjects (13) were internal, more assertive, and less anxious. This combination was followed closely by the 12 subjects classified as external, less assertive, and more anxious.

A possible explanation for these findings is that subjects who are internal and assertive are denying the full extent of their anxiety, although their level of headache activity is at least equal to those subjects who admit to more anxiety and are external and less assertive. Although the present study found some evidence to support this explanation, further research is needed. Using galvanic skin responses (GSR) as a measure, the physiological arousal of the two groups, one being internal, more assertive, and reporting less anxiety, and the other external, less assertive and reporting more anxiety, could be compared. If the two groups are found to have similar levels of physiological arousal, in some stress inducing event, then this would support the explanation that internal, more assertive subjects may be denying their reported anxiety, but are

physiologically anxious.

Utility of the HLC in Headache Research

The study also suggests that the HLC is not a useful measure in headache research. Its discriminant validity, in relation to Rotter's LC Scale, is demonstrated by the correlation between the two scales of .26, ($p < .01$). This finding is similar to that of Wallston et al. (1976) who found a correlation of .33, ($p < .01$), between the HLC and the LC. It may be that a scale designed to specifically measure health expectancies is too limited to be of use with such a widespread complaint as headache. The LC taps locus of control beliefs across a wide variety of situations and was generally found to be more useful because of its significant correlations with some of the other personality variables.

Relationships Between the 16PF Factors and Headache

The study also provides the opportunity to examine relationships between the headache measures and all the 16PF factors. Only two of the primary factors have significant correlations with the headache measures (O and Q4), and both of these account for a large part of the second order factor ANX. These correlations indicate that those subjects who report more frequent and severe headaches tend to worry more and be more tense than those reporting either no headaches or less severe and frequent headaches. Tests between the no headache and headache

subjects also revealed a significant difference in Factor Q2, indicating that non-headache sufferers tend to be more self-sufficient and resourceful.

The "traditional" belief that higher intelligence is related to more frequent and severe headaches, particularly to migraine, receives no support from the present study. The Pearson Product-Moment correlations between Factor B and headache frequency and severity are actually close to zero. Although Factor B is not a full scale intelligence test, it is commonly accepted as being a reliable brief measure of intelligence, so this finding appears valid. Further, the correlation between Factor B and RAS, although not significant ($r = .13$, $p = .06$), suggests that subjects with higher intelligence tend to be more assertive. As assertiveness is shown to have a significant negative correlation with headache severity, for subjects with weekly headaches (see Table 9), this would seem to further contraindicate the premise that more frequent headaches are associated with higher intelligence.

Relationship Between Sex of the Subject and Headache

The best predictor of headache frequency found in this study is the sex of the subject. Women are clearly shown to report more frequent headaches than men, and SEX is found to have a significant effect when used as a covariate in a MANCOVA with FREQ as one of the dependent

variables. The finding that women report more headaches, is a common one in headache research (see Table 1). As suggested by Ziegler et al. (1977) it may be that "menstrual migraine" accounts for some of this difference. The present study offers some support for this explanation with "menstruation" listed as a precipitating factor by 54.5 percent of women (see Table 4). Of course it may be that, as a group, men are also less willing to admit to headaches, possibly as an unconscious way to maintain an image of themselves as the "stronger sex".

Summary

The weak relationship between anxiety and headaches found in the present study and often mentioned in the literature, may be due to the denial of reported anxiety by subjects who are internal and more assertive and yet report substantial headache activity. These subjects may nevertheless be at least as anxious, physiologically, as those who are external, less assertive, and report more anxiety, assuming headache activity is a valid measure of physiological arousal to stress. Further research could provide additional evidence to support or reject this explanation, by measuring physiological arousal to a stress inducing stimulus, using GSR techniques. The group which reports less anxiety and is internal and more assertive could be compared to the group which is

external, less assertive and reports more anxiety. If the two groups are shown to have similar levels of physiological arousal, then the explanation offered for the findings in the present study would be supported.

2. Findings Describing the Sample

A. Headache Frequency and Severity

Generally, the present study has similar findings to several earlier studies, in terms of headache incidence. (See Table 1). In particular, the findings of Ziegler et al. (1977) correspond closely to those of the present study, for total incidence. (83.7% found by Ziegler et al., 82% in the present study). However, other studies based on college student samples (Hicks & Campell, 1983; Hicks & Kilcourse, 1983; Ogunyemi, 1984), have indicated a lower incidence of headache, than the present study. These differences may be partly due to the type of question posed to the respondent. The present study asks the same question as Ziegler et al. (1977), which is: "Have you ever been subject to headache?" The two studies by Hicks and his colleagues asked: "Do you have tension or migraine headaches often?_ sometimes?_ never ?_." Ogunyemi asked: "Do you suffer from recurrent headache occurring without associated illness such as fever, rigors, yellow eyes, abdominal pain or cough?" The questions posed by Hicks and also by Ogunyemi, would seem to have a tendency to illicit fewer affirmative

responses. For instance, the respondent may have suffered from a type of headache which was not to be included in the study (e.g. headaches due to infections or allergies) or the respondent may have erred, on the conservative side, in his or her interpretation of "recurrent" or "sometimes". In the case of the Ogunyemi study, there may also be the possibility of cultural or racial differences in headache incidence.

Certainly the type of question asked will have an effect on the headache incidence reported and has to be taken into account when comparing studies. Nevertheless, it appears that the incidence of headache is increasing (see Table 1) and this may be more support for the involvement of stress in headache. With increasing competition, both in the work place and between men and women in general, and the faster pace of modern life, the amount of stress in the environment has also increased. It would seem that if we expect to avoid stress related disorders such as headaches, the development of coping skills is critical, as is research into the etiology of these disorders.

The present study also indicates that a substantial number of the subjects (47.6%) consider their headaches to be either severe or disabling. Also, about 32 percent experience weekly headaches. As shown by the strong positive correlation between headache severity and

frequency ($r = .76$, $p < .01$), those who rate their headaches as more severe tend to experience them more frequently. The present findings then, seem to be in fairly close agreement with the general population studies shown in the literature (e.g. Turner, Stone & Stone, 1979; Ziegler et al., 1977). and re-emphasize not only the pervasive nature of headache, but also the subjective perception of it as a substantial source of pain and misery.

B. Headache Type

In relation to types of headache, the findings of the present study indicate that the type of headache (i.e. migraine, tension, or combined), has no effect on: the reported severity or frequency of headache. This finding is at variance with many other studies (e.g. Andrasik et al., 1982; Cohen & McArthur, 1981; Thompson, 1982), which have found migraine headaches to be the most severe (or intense) and tension headaches to have the most frequent rate. However, as pointed out earlier, the method of classification used (based on Arena et al., 1982), has only a 68 percent accuracy rate and therefore cannot be considered very exact. Nevertheless, this method of classification has value in that it would seem to be more reliable than the judgment of a lone experimenter. Also it is certainly less costly, in terms of time and money, than employing the services of one, or

more, expert headache diagnosticians.

Further, the present study does not show any significant differences between either the three headache types or the headache sufferers vs. the non-headache subjects, when measured on the three personality variables. It seems then that the type of headache experienced by the subject has no relationship to his or her level of assertiveness, amount of anxiety, or locus of control. However, other researchers have not found this to be the case (e.g. Anderson & Franks, 1981), with a fairly consistent finding being that tension headache subjects are more anxious than migraineurs.

Overall, the present study suggests that classifying headaches into the categories proposed by the Ad Hoc Committee on Classification of Headache (1962), is not very useful. One group of researchers (Bakal, Kaganov, & Demjen, 1983) have suggested that a more useful way to classify headaches would be to view, "headache symptoms along a continuum of severity". (p.54). Bakal et al. also state that this view is "gaining recognition as a viable alternative to the traditional method of headache classification". (p.45).

C. Precipitating Factors

As shown in Table 4, the psychological aspects of headache are well recognized by the subjects. It may be that this population (introductory psychology students)

is more sophisticated, in terms of psychological knowledge, and it would be interesting to compare these findings with those from a general population. The most frequently listed precipitating factors are, "Mental Stress, Mental and/or Physical Exhaustion, and Too Little Sleep. These factors seem to be interrelated. Too little sleep could certainly be a factor in exhaustion and mental stress can result in sleeping problems, which in turn can lead to exhaustion. The vast majority of the subjects list several factors as precipitating agents and it may be, as suggested by Ogunyemi (1984), that this indicates a constitutional predisposition to "muscular and vascular disturbances by a host of external and internal factors". (p.130).

D. Other Psychosomatic Symptoms

The finding that the number of other psychosomatic symptoms reported by subjects with headache, is greater than the number reported by non-headache subjects, is in agreement with Andrasik et al. (1982). Although the present study does not show significant differences between all the levels of severity on this measure, the trend is consistent. This suggests that headache sufferers may be predisposed to psychosomatic disorders of various kinds, and therefore that headache may not be a unique symptom but one of several which together form a "psychosomatic syndrome". If this is the case then it

may not be possible to distinguish between subjects who suffer from different psychosomatic disorders, in terms of personality characteristics.

As found with headache incidence, sex differences are also readily visible, with women reporting a greater number of other psychosomatic symptoms, on average.

Either women are more willing to admit to symptoms than are men, or women do actually experience more symptoms. The present study does not attempt to resolve this issue, but it may be that locus of control is a factor in these sex differences. Women are generally more external than men and, as Lefcourt (1981) has suggested, those with a more external locus of control are more likely to report symptoms of stress. Presumably, this is because externals feel helpless with regard to influencing what happens to them and are therefore more likely to acknowledge the presence of symptoms beyond their control. However, Lefcourt's suggestion is not borne out by the present study, as externals are not shown to report significantly more frequent or severe headaches, than internals.

Summary

The present study has similar findings, for headache incidence, to earlier studies of the general population. However, when compared to some other studies of headache incidence in university populations, the present findings

show headache to be more prevalent. These differences may be partly due to the type of question posed to the respondent. It appears that, over time, headache incidence has been increasing and this may be due to increased sources of stress in the modern environment. The study emphasizes the pervasive nature of headache and its perception as a substantial source of pain and misery.

Headache type does not have any effect on either headache frequency or severity, or on the scores obtained on the personality scales. These findings are at variance with many other studies and may be due to the fairly low accuracy claimed for the method of classification used.

The three most frequently listed precipitating factors seem to be interrelated. Too little sleep can be a factor in exhaustion and mental stress can lead to sleeping problems, which in turn can result in exhaustion.

The number of other psychosomatic symptoms reported is greater for headache sufferers, than for non-headache sufferers. It appears that headache sufferers may be predisposed to various kinds of psychosomatic disorders and this suggests that headache may not be a unique symptom, but one of several, which together form a "psychosomatic syndrome".

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Descriptions of Headache Types.

(Based on the Ad Hoc Committee on Classification of Headache, 1962).

1. Vascular headaches of the migraine type.

Recurrent attacks with a wide variation in frequency, intensity and duration. Usually unilateral in onset and sometimes associated with nausea, vomiting and prodromal symptoms (e.g. visual, sensory or motor disturbances).

Cranial arteries become distended and dilated and the pain is usually experienced as "throbbing" or "pulsating".

This category includes cluster headaches (those attacks occurring in closely packed groups separated by long remissions) and lower face headaches.

2. Tension or muscle-contraction headaches.

Widely varied in intensity, frequency and duration, associated with contraction of the scalp or neck muscles.

Usually bilateral, the pain is often experienced as "aching", "tight", or "band-like".

3. Combined headache.

Combinations of migraine type with tension type, co-existing in the attack.

4. Headaches associated with nasal discomfort.

Not due to allergies or gross anatomic defects.

5. Psychogenic headaches.

No physical basis for the pain and the prevailing clinical disorder is a delusional or conversion reaction.

6. Other.

Includes headaches due to systemic infections, hypertension, poisoning, organic disorders, (such as tumors), and diseases of ocular, aural, sinus and nasal, dental, or other cranial structures.

HEALTH LOCUS OF CONTROL SCALEINSTRUCTIONS

INDICATE YOUR AGREEMENT OR DISAGREEMENT TO EACH OF THE FOLLOWING STATEMENTS BY USING THE CODE BELOW.

1. STRONGLY DISAGREE
2. QUITE STRONGLY DISAGREE
3. DISAGREE
4. AGREE
5. QUITE STRONGLY AGREE
6. STRONGLY AGREE

- ___ 1. If I take care of myself, I can avoid illness.
- ___ 2. Whenever I get sick it is because of something I've done or not done.
- ___ 3. Good health is largely a matter of good fortune.
- ___ 4. No matter what I do, if I am going to get sick I will get sick.
- ___ 5. Most people do not realize the extent to which their illnesses are controlled by accidental happenings.
- ___ 6. I can only do what my doctor tells me to do.
- ___ 7. There are so many strange diseases around that you can never know how or when you might pick one up.
- ___ 8. When I feel ill, I know it is because I have not been getting the proper exercise or eating right.
- ___ 9. People who never get sick are just plain lucky.
- ___ 10. People's ill health results from their own carelessness.
- ___ 11. I am directly responsible for my health.

ROTTER LOCUS OF CONTROL SCALE

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INSTRUCTIONS-

CIRCLE EITHER STATEMENT a. OR b. FOR EACH PAIR. SELECT THE ONE THAT YOU MORE STRONGLY BELIEVE TO BE THE CASE AS FAR AS YOU'RE CONCERNED.

1. a. Children get into trouble because their parents punish them too much.
b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
b. There will always be wars, no matter how hard people try to prevent them.
4. a. In the long run people get the respect they deserve in this world.
b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
5. a. The idea that teachers are unfair to students is nonsense.
b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
6. a. Without the right breaks one cannot be an effective leader.
b. Capable people who fail to become leaders have not taken advantage of their opportunities.
7. a. No matter how hard you try some people just don't like you.
b. People who can't get others to like them don't understand how to get along with others.
8. a. Heredity plays the major role in determining one's personality.
b. It is one's experiences in life which determine what you're like.
9. a. I have often found that what is going to happen will happen.
b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
b. Many times exam questions tend to be so unrelated to course work that studying is really useless.
11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
b. Getting a good job depends mainly on being in the right place at the right time.
12. a. The average citizen can have an influence in government decisions.
b. This world is run by the few people in power, and there is not much the little guy can do about it.
13. a. When I make plans, I am almost certain that I can make them work.
b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.
b. There is some good in everybody..
15. a. In my case getting what I want has little or nothing to do with luck.
b. Many times we might just as well decide what to do by flipping a coin.
16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
b. By taking an active part in political and social affairs the people can control world events.
18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
b. There really is no such thing as "luck."
19. a. One should always be willing to admit mistakes.
b. It is usually best to cover up one's mistakes.
20. a. It is hard to know whether or not a person really likes you.
b. How many friends you have depends upon how nice a person you are.
21. a. In the long run the bad things that happen to us are balanced by the good ones.
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
22. a. With enough effort we can wipe out political corruption.
b. It is difficult for people to have much control over the things politicians do in office.
23. a. Sometimes I can't understand how teachers arrive at the grades they give.
b. There is a direct connection between how hard I study and the grades I get.
24. a. A good leader expects people to decide for themselves what they should do.
b. A good leader makes it clear to everybody what their jobs are.
25. a. Many times I feel that I have little influence over the things that happen to me.
b. It is impossible for me to believe that chance or luck plays an important role in my life.
26. a. People are lonely because they don't try to be friendly.
b. There's not much use in trying too hard to please people, if they like you, they like you.
27. a. There is too much emphasis on athletics in high school.
b. Team sports are an excellent way to build character.
28. a. What happens to me is my own doing.
b. Sometimes I feel that I don't have enough control over the direction my life is taking.
29. a. Most of the time I can't understand why politicians behave the way they do.
b. In the long run the people are responsible for bad government on a national as well as on a local level.

RATHUS ASSERTIVENESS SCHEDULE
INSTRUCTIONS

INDICATE HOW CHARACTERISTIC OR DESCRIPTIVE EACH OF THE
FOLLOWING STATEMENTS IS OF YOU BY USING THE CODE BELOW

+3 VERY MUCH LIKE ME
+2 RATHER LIKE ME
+1 SLIGHTLY LIKE ME
-1 SLIGHTLY UNLIKE ME
-2 RATHER UNLIKE ME
-3 VERY UNLIKE ME

- ___ 1. I have hesitated to make or accept dates because of "shyness".
- ___ 2. When the food served at a restaurant is not done to my satisfaction, I complain about it to the waiter or waitress.
- ___ 3. I am careful to avoid hurting other people's feelings, even when I feel that I have been injured.
- ___ 4. When I am asked to do something, I insist upon knowing why.
- ___ 5. To be honest, people often take advantage of me.
- ___ 6. I often don't know what to say to attractive persons of the opposite sex.
- ___ 7. I will hesitate to make phone calls to business establishments and institutions.
- ___ 8. I would rather apply for a job or for admission to a college by writing letters than by going through with personal interviews.
- ___ 9. I find it embarrassing to return merchandise.
- ___ 10. I have avoided asking questions for fear of sounding stupid.
- ___ 11. During an argument I am sometimes afraid that I will get so upset that I will shake all over.
- ___ 12. I avoid arguing over prices with clerks and salesmen.
- ___ 13. If someone has been spreading false and bad stories about me, I see him (her) as soon as possible to "have a talk" about it.
- ___ 14. I often have a hard time saying "No".
- ___ 15. I tend to bottle up my emotions rather than make a scene.
- ___ 16. I complain about poor service in a restaurant and elsewhere.
- ___ 17. Anyone attempting to push ahead of me in a line is in for a good battle.
- ___ 18. I am quick to express an opinion.
- ___ 19. There are times when I just can't say anything.

Descriptions of the 16PF Factors
(Based on Catell, Eber, and
Tatsuoka, 1970)

LOW SCORE DESCRIPTION	PRIMARY FACTORS	HIGH SCORE DESCRIPTION
RESERVED, Detached, Critical, Aloof	A	OUTGOING, Warmhearted, Easy- Going, Participating
LESS INTELLIGENT, Concrete Thinking	B	MORE INTELLIGENT, Abstract- Thinking, Bright
AFFECTED BY FEELINGS, Emotionally Less Stable, Easily Upset	C	EMOTIONALLY STABLE, Faces Reality, Calm, Mature
HUMBLE, Mild, Accommodating, Conforming	E	ASSERTIVE, Aggressive, Stubborn, Competitive
SOBER, Prudent, Serious, Taciturn	F	HAPPY-GO-LUCKY, Impulsively Lively, Gay, Enthusiastic
EXPEDIENT, Disregards Rules, Feels Few Obligations	G	CONSCIENTIOUS, Persevering, Staid, Moralistic
SHY, Restrained, Timid, Threat-Sensitive	H	VENTURESOME, Socially Bold, Uninhibited, Spontaneous
TOUGH-MINDED, Self-Reliant, Realistic, No-Nonsense	I	TENDER-MINDED, Clinging, Over- Protected. Sensitive
TRUSTING, Adaptable, Free of Jealousy, Easy to Get Along With	L	SUSPICIOUS, Self-Opinionated, Hard to Fool
PRACTICAL, Careful, Conventional, Regulated by External Realities, Proper	M	IMAGINATIVE, Wrapped up in Inner Urgencies, Careless of Practical Matters, Bohemian
FORTHRIGHT, Natural, Artless, Unpretentious	N	SHREWD, Calculating, Wordly, Penetrating
SELF-ASSURED, Confident, Serene	O	APPREHENSIVE, Self-Reproaching, Worrying, Troubled
CONSERVATIVE, Respecting Established Ideas, Tolerant of Traditional Difficulties	Q1	EXPERIMENTING, Liberal, Analytical, Free-Thinking
GROUP-DEPENDENT, A "Joiner" and Sound Follower	Q2	SELF-SUFFICIENT, Prefers Own Decisions, Resourceful
UNDISCIPLINED SELF-CONFLICT, Follows Own Urges, Careless of Protocol	Q3	CONTROLLED, Socially Precise, Following Self-Image
RELAXED, Tranquil, Unfrustrated	Q4	TENSE, Frustrated, Driven, Overwrought

Appendix E continued

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LOW SCORE DESCRIPTION

SECOND ORDER
FACTORS

HIGH SCORE DESCRIPTION

EXTRAVERSION

INTROVERTED

EXTRAVERTED

ANXIETY

LESS ANXIOUS,
Adjusted

MORE ANXIOUS

TOUGH POISE

SENSITIVE, Emotional,
Subjective

TOUGH POISE, Alert,
Cheerful, Objective

INDEPENDENCE

DEPENDENT, Subdued

INDEPENDENT

PLEASE COMPLETE ALL RELEVANT QUESTIONS

Thank you for your participation. This survey is being made in order to determine the incidence and types of stress indicators existing in students at the University of Windsor. In particular it is mainly intended to examine the correlation between how stress is handled and headache symptoms. All information is confidential and will be used for statistical data only.

Colin Jones, Graduate Student,
Department of Psychology, University of Windsor.

INSTRUCTIONS

1. Mark "X" in the appropriate box.
2. Where additional information is requested please be brief and accurate.
3. Some questions have more than one answer. In such cases mark an "X" by EACH answer which applies.
4. Please fill out the questionnaire as completely as you can.

SECTION A

Sex	"X"	Marital Status	"X"	Year in University	"X"	Faculty	"X"
1. Male		1. Single		1. First		1. Arts	
2. Female		2. Married		2. Second		2. Social Science	
Age		3. Separated		3. Third		3. Science & Math	
		4. Divorced		4. Fourth		4. Engineering	
Place of Birth		5. Other		5. Graduate		5. Education	
						6. Graduate	
Do you also have a full or part time job? (In addition to being a student)				1. Yes		7. Law	
				2. No		8. Business	
Last 5 digits of I.D. No.				If so please state your occupation		9. Human Kinetics	
Number of years you have been a resident of Canada							

SECTION B

Are you often or regularly troubled with...?		"X"	Would you describe yourself as...		"X"
1. Pounding of the heart?			1. Anxious?		
2. Feeling dizzy?			2. Competitive?		
3. Insomnia? (Can't sleep)			3. A good planner?		
4. Diarrhea, indigestion, stomachache?			4. Motivated to succeed?		
5. Nightmares?			5. Misunderstood by others?		
6. Frequent colds, asthma, hayfever?			6. Prefer to avoid problems?		
Have you ever been subject to headache?			7. Impressed by status/rank?		
(If "no" carry on to next questionnaire. If "yes" answer all remaining questions		1. Yes		8. Cooperative?	
		2. No		9. Wanting sympathy?	

SECTION C

How long do most of your headaches last?		"X"	About how many headaches do you have? (Insert number)	
1. Less than 1 hour			1. per week	
2. 1 to 6 hours			2. OR per month	
3. 6 to 12 hours			3. OR per year	
4. 12 to 24 hours			4. OR less than 1 per year	
5. 1 day or longer				

SECTION C (CONTINUED)

Would you describe your headaches as...					"X"												
1. Rendering you completely unable to perform your work. (Disabling)																	
2. Allowing you to carry on some work but with difficulty. (Severe)																	
3. Not interfering with daily activities - a nuisance. (Mild)																	
<p><u>Note</u> You may experience more than one type of headache, in this case please mark an "X" by each answer which applies</p> <p>Have your headaches caused loss of time from school or work?</p> <table border="1"> <tr> <td>1.</td> <td>Yes</td> <td></td> </tr> <tr> <td>2.</td> <td>No</td> <td></td> </tr> </table> <p>Have you ever consulted your doctor about your headaches?</p> <table border="1"> <tr> <td>1.</td> <td>Yes</td> <td></td> </tr> <tr> <td>2.</td> <td>No</td> <td></td> </tr> </table>						1.	Yes		2.	No		1.	Yes		2.	No	
1.	Yes																
2.	No																
1.	Yes																
2.	No																
Please answer the following 16 questions by placing an "X" in the appropriate boxes.																	
	NEVER	IN-FREQUENTLY	SOME-TIMES	USUALLY	ALWAYS												
1. I awaken with headaches.																	
2. My headache ends within 24 hours																	
3. I have sudden attacks of headaches																	
4. My headache is worse at the end of the working day																	
5. My headache is throbbing or pulsating																	
6. My headache can be described as a feeling of tightness or external pressure on my head (band-like or cap-like)																	
7. My headache begins on one side of my head																	
8. My headache starts in the neck, shoulder or back of the head																	
9. My headache is associated with visual changes like seeing stars, blind spots, double vision and/or intolerance to light																	
10. I have nausea and/or vomiting with my headache																	
11. My headache gets worse if I strain, cough or lift things																	
12. My headache is better if I can loosen up my neck muscles																	
13. Aspirin, Anacin, Bufferin, Excedrin, Tylenol and similar drugs relieve my headache																	
14. I take a prescribed medication to prevent a full-blown headache attack																	
15. My headache starts during periods of relaxation																	
16. My headache starts during periods of stress.																	

Which of the following do you think bring on your headaches? ("X" any number that are relevant)			
	"X"		"X"
1. Mental and/or physical exhaustion		10. Constipation	
2. Heat		11. Flashing light	
3. Hunger		12. Eye strain	
4. Certain foods		13. Smoking	
5. Mental stress e.g. anxiety or worry		14. Hypertension	
6. Excitement		15. Too little sleep	
7. Exercise		16. Too much sleep	
8. Alcohol and/or drugs		17. Unknown	
9. Menstruation		18. Other (describe here)	
<p>At what age did your headaches first begin? ("X" the appropriate box)</p> <p>1. Before age 15 ☐ 2. Age 15 to 24 ☐ 3. 25 years and over ☐</p>			
Since your headaches began have they increased in severity? ("X" either "Yes" or "No").		1. Yes	
		2. No	
Since they began have they increased in frequency? ("X" either "Yes" or "No")		1. Yes	
		2. No	
Have any of your blood relatives suffered from... ("X" either "Yes" or "No")			
		YES	NO
Severe headaches or migraine		1.	
Headache with nausea		2.	
Headache similar to mine		3.	
<p>If so please state which relative(s) (E.g. mother, sister etc.).</p> <p>_____</p>			
<p>Are there any other important aspects of your experience of headache that have been overlooked by this questionnaire?</p> <p>_____</p>			

Appendix G.

Median Splits for Each of the VariablesVariable. If $<$ this value then Level 1, if $\geq$ then Level 2

LC ^b	12
RAS	48
ANX	65
FREQ ^a	If FREQ = 1, 2, or 3 then Level = 1, else Level = 2
SEV ^a	If SEV = 1 then level 1, else Level = 2

Notes

^a These variables were also dichotomized at different levels, depending on the analysis they were involved in. Cases where a different dichotomy was employed are shown in each table.

^b If level 1 then LC is referred to as "internal", if level 2 referred to as "external".

VITA AUCTORIS

1971 Emigrated to Canada from Wales with my wife and two daughters.

1983 Bachelor of Arts Degree (Honors Psychology) from The University of Western Ontario. (Completed part-time whilst in full-time employment).