

**THE EFFECTS OF SUPPLEMENTARY MULTIVITAMINS
ON STRESS**

by

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SUMMARY

This study was undertaken with the objective of assessing whether the ingestion of a Multivitamin Complex with Calcium and Magnesium would be efficacious in reducing stress. Three hundred subjects who were suffering from stress were selected in Gauteng and Kwa-Zulu Natal, South Africa. The selection was based on a stress questionnaire. The subjects took a battery of tests and questionnaires to assess the level of the stress they were experiencing. A 30 day supply of effervescent tablets was given to all subjects - half placebos and half the vitamin supplement. These were randomly allocated. At the end of 30 days a further battery of tests were administered. The results were statistically analysed. It was found that both the placebo and the vitamin supplement proved beneficial but the Multivitamin Complex with Calcium and Magnesium had a greater effect in reducing and helping to manage stress.

KEY TERMS.

Stress Reduction; Stress Management; Multivitamin Complex with Calcium and Magnesium; Vitamin and Mineral Supplement; Nutritional Supplement; Diet; Vitamin Benefits; Placebo Effect; Healthy Lifestyle; Health Practices.

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CHAPTER 1

INTRODUCTION

This study is a component of larger study conducted by Professor Lourens Schlebusch, Department of Medically Applied Psychology, Faculty of Medicine, University of Natal, Durban. The study was designed to take place in both KwaZulu/Natal as well as Gauteng in South Africa. These two areas were selected as it was considered that they were two areas in South Africa currently (1996/7/8) experiencing high levels of stress. The writer participated in this study as a Research Assistant for the Gauteng Area.

1.1 BACKGROUND TO STRESS

This study considers the origins of stress including the many different stimuli which can cause stress, such as the physical environment, work, social demands and the individual's physical health and welfare, intellect and personality.

The results of the stress experienced may manifest in the form of psychosomatic disease such as unusual tiredness and/or feeling weak or faint, apathy, difficulty in relaxing and sleep disturbances. It may also result in nausea, indigestion, erratic bowel movements, feeling tight- chested and/or breathless for no reason, high blood pressure, excessive perspiration, headaches and sexual problems. Tics and nervous habits may develop, including nailbiting.

As well as psychosomatic diseases, there may be psychological illness that develops as a result of stress. This includes feelings of depression, lack of self-confidence, low self-esteem, helplessness, tension, anxiety, panic and phobias. There may be feelings of isolation from others and loneliness which will be exacerbated by the feeling that the individual is the constant subject of gossip and criticism and that no-one likes or understands them and that they have been neglected.

Behavioural reactions to stress may include anger, irritability, aggressiveness, emotional outbursts including crying for no reason. In addition stress may result in poor concentration, forgetfulness, poor problem solving and decision making as well as poor time-management. The appetite may be effected and the individual may make greater use of alcohol, nicotine, caffeine or medicines to help him or her cope.

In addition it appears that there may be a direct relationship between stress, behaviour and immunity in as much as stress may effect an individual and actually suppress the immune system. This may have short-term results such as the development of a cold or long-term changes such as the development or progression of cancer. To date the research has not finally established how much of the effect on the immune system is due to the stress and how much is due to unhealthy life practices, such as cigarette smoking, poor diet, alcohol consumption, excessive work and socio-economic status, which may have been instrumental in causing both the stress and the disease (Fawzy, 1995).

In order to cope with stress experiences, individuals may adopt many widely varying coping mechanisms and processes. They may adopt one of two approaches - either they may attempt to deal with the stressor in a task-orientated way or they may adopt a more defence oriented approach which aims to protect the individual from the effects of the stressor. In addition social support has an effect on the degree of stress experienced. These many different approaches will be considered in this study (Schlebusch, 1997a).

Recently there has been considerable interest in encouraging positive health practices which may help to alleviate and reduce stress in individuals. In particular there is a concentration on nutrition and vitamins as a possible means of helping to alleviate or reduce stress. This is where the main thrust of this study is directed. Good health is important in stress management (Schlebusch, 1997a). Poor dietary habits and insufficient or the wrong type of nutrition which results in inadequate vitamins and minerals will have a detrimental effect on the individual's health.

The Dictionary of Psychology (Reber, 1985, p736) defines stress as follows:

"1. Generally, any force that when applied to a system causes some significant modification of its form, usually with the connotation that the modification is a deformation or distortion. The term is used with respect to physical, psychological and social forces and pressures. Note that stress in this sense refers to a cause; stress is the antecedent of some effect.

2. A state of psychological tension produced by the kinds of forces or pressures alluded to above. Note that stress in this sense is an effect; stress is the effect of other pressures."

There have been a vast number of studies of the subject of stress, but despite this neither stress itself nor the semantic term "stress" have been clearly defined. In order to clarify the situation, this study will consider the word "stress" to refer to physical, social or psychological effects or symptoms of stress reactions experienced by an individual. The source or stimulus will be referred to as a "stressor".

1.2 ORIGINS OF STRESS

Stimuli that induce stress are multi-factorial and may be psychological, social, cultural or environmental. These factors will, in interaction with the individual's unique variables such as personality, perceived locus of control and coping mechanisms, as well as physical health, determine the amount of stress experienced by the individual and how this is manifested.

Many differing relationships between stressors and resultant physical and psychological symptoms of stress have been established and then subsequently abandoned. However, some consensus about the origins of stress has been reached. It is broadly accepted that the source of stress cannot be found in either the individual or in the environment but rather in the interaction between the two and that there is a relationship between the demands (stressors) and the coping ability of the individual which serves to either increase or reduce stress (Schlebusch, 1990).

Epstein and Katz (1992) undertook research to study coping ability, stress, productive load and symptoms. They specifically distinguished between self-produced and externally produced stressors and concluded that stressors that have been self-produced contribute a very high proportion of all total stress experienced. The concept of 'productive load' was introduced to distinguish demands that do not contribute to stress and symptoms. They developed the *Constructive Thinking Inventory* which showed a considerable overlap with the *Hardiness Scales* which were originally part of the *Personal Views Survey* developed by the Hardiness Institute (1985). Coping ability and health related outcomes are inversely related to experienced negative affect.

Coping ability may be considered to be the ability to solve problems and accept challenges in normal life. This may involve emotional experiences such as failure, success, feelings of acceptance or rejection. Negative emotions have been shown to have a major influence on coping ability. The outcomes of coping ability will effect success in work and social relationships and achievements as well as the psychological and physical well-being of the individual. External stressors may cause distress and strain but internal stressors created by the individual, as well as personality factors may have the same negative effect and may indeed contribute to a high proportion of the total stress experienced by an individual (Epstein & Katz, 1992).

As with private and social life, individuals in the business community are also subject to external stressors as well as self-produced stressors. They may experience stress because of individual personality characteristics or demands from the work itself or environmental stressors or indeed,

they may be exposed to extreme stressors in their private lives which are quite divorced from the work environment. However, housewives, children and many others including the unemployed may also be subject to stress either because of environmental stressors or internal individual personality traits that contribute to their stress.

Isolating the major source of stress is not of vital importance for this study, as its main goal is to ascertain whether stress symptoms, irrespective of their origin, will be reduced by the ingestion of additional vitamins and minerals.

1.3 REACTIONS TO STRESSORS

Canon (1939) described reaction to stressors as "fight or flight" - typical not only of animals but also of humans. An individual subjected to the influence of a stressor is faced with a two-fold task. In the first instance they must do something about the threat from the stressor and secondly they must protect themselves from harm, whether physical or psychological. The reaction may be one of "fight" when the individual attempts to handle the situation and ward off the threat. On the other hand they may opt for the defence of "flight" where they try and avoid the stressor or threat by adopting an alternate approach to the problem, ignoring it or in some way avoiding the issue.

There may be both cognitive and psychological reactions to the perceived stressor. Reactions of the individual may reduce and counteract the threat or they may be mal-adaptive. Reactions may include *denial* of the situation, *intellectualisation* whereby the individual attempts to divorce the

problem from their emotional experience and thereby avoid emotional involvement or *repression* by which the individual endeavours to exclude the stress from their consciousness. It is, of course, possible for an individual to employ more than one approach. Reactions to stress are not solely intellectual or psychological as the mind may have a great influence over the reactions of the body.

It has been proven that there are chemical and physical changes that take place in the body in order to mobilise defences against a perceived threat. Activation of the brain results in neuronal and hormonal responses which stimulate the production of adrenaline and other hormones. This results in an increased heart and metabolic rate, the re-routing of blood to areas that have higher demands in times of stress and conversion of fats and other nutrients to glucose, which in turn raises the blood sugar level. An example would be that just prior to a traffic accident, all bodily processes not immediately required to deal with the crisis would be slowed down, whilst muscle tone and energy would increase to endeavour to deal with the situation (Schlebusch, 1990).

1.4 STRESS AND THE ENVIRONMENT

The environment includes both the physical ambience and also social demands that may cause or exacerbate existing stress levels in an individual. Initially (Lazarus, 1966) emphasised major life events and changes which were assumed to cause stress. Subsequently, Kanner, Coyne, Schaefer and Lazarus (1981) compared the effect of major life events with that of the "daily hassles and uplifts" of normal life. *'Hassles are the irritating, frustrating, distressing demands that to some*

degree characterise everyday transaction with the environment (Kanner et al., 1981, p. 3). They developed the *Hassles and Uplifts Scale* and found this to be a better predictor of psychological stress than the number of major life events the individual may have experienced. However, major life events can themselves create continuing hassles. Hassles were better predictors than uplift but the uplifts did have a certain effect, particularly with women.

1.5 PHYSICAL STRESS

Selye's (1976) initial experiments on stress concentrated on physical stessors and their manifestations such as the '*inability to eat or keep still, accelerated pulse rate, increased blood pressure ... and sweat secretion*' (p. 173). These were characteristics of both distress (stemming from negative events) and eustress (demands placed by positive events) but it is distress that is most likely to cause medical problems. He enumerated a three phase response - the General Adaptation Syndrome (GAS). The first stage was one of alarm and mobilisation, the second a stage of resistance, and finally exhaustion and disintegration if the body's resources are depleted and the individual can no longer mobilise coping strategies to fight with. At this stage, if the stress is not managed or alleviated it will result in organic damage or psychosomatic illness. The results of stress on the individual's health may be specific or may transfer and expand into other aspect of ill-health and disorders. There is a general lowering of resistance.

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Later, psychosocial stimuli received more attention. Selye (1976) maintained that once coping and resistance fail, and the stressor cannot be managed or escaped from, the disintegration leads to disorganisation, and behavioural collapse and physical, social or psychological breakdown.

Cohen, Kamarck and Mermelstein (1983) developed the *Perceived Stress Scale* to measure the degree to which life events are appraised as stressful, in order to examine how perceived stress may be etiologic regarding disease and behavioural disorders.

1.6 STRESS AND EMOTION

Stress and emotion covers three main areas of interest, viz. anxiety, anger and curiosity. Spielberger, Sarason, Kulscar and Van Heck (1991), originally edited the series called *Stress and Anxiety* but with the increase in research and developments in behavioural medicine and health psychology, it was decided to change the name of the series to *Stress and Emotion*.

Stress may produce quite severe symptoms which may subsequently in themselves cause additional stress to the individual making it difficult to separate the initial stimulus from the secondary stimulus (Lazarus & Folkman, 1986). A very common reaction is when stress results in insomnia. The individual then becomes stressed by lack of sleep and by fear of not being able to sleep. The whole situation develops into a vicious circle.

There is no clear and final list of all varieties of stressors and their severity ratings - individual reactions and proclivities must be taken into account. The identification of stressors in stress studies seems to vary according to the particular study and the theoretical bent of the specific researcher. For an example of how the identification of the source of stress can vary depending on the current beliefs of the researcher, we refer to the earlier mentioned example of Lazarus (1966) who initially believed that major life events were a prime source of stress and focused much of his early research on the reactions of individuals to major events that had occurred in their lives. Subsequently, Kanner, Coyne, Schaefer and Lazarus (1981) focused far more attention on the effects of "daily hassles and uplifts" and how these contributed to the stress being experienced by the individual and concluded that the constant seemingly minor hassles and uplifts were more likely to cause stress to the individual than major events.

No matter what the source or origin of the stress, it may become a major problem which may effect individuals intellectually, physically or behaviourally. Both physical and psychological health problems may develop. Stress may not only contribute to the development of health problems but also to the exacerbation and maintenance of these problems. This in turn may have severe interactional and social effects to the detriment of society in general.

1.7 OBJECTIVES OF THE STUDY

There have been different strategies and techniques developed to assist individuals to cope with stress. Recently there has been considerable emphasis placed on health practices and a healthy lifestyle with adequate and if possible, optimum nutrition (Schlebusch, 1997a).

Unfortunately, modern lifestyles often leads to an inadequate diet with insufficient basic nutrients. This particularly refers to vitamins and minerals which may not be consumed in adequate quantities and also may not be stored in the body. In addition, an individual suffering from stress will burn up more nutrients, thus requiring additional nutrients to satisfy their energy requirements. The brain which is constantly active makes enormous demands on the nutritional supply and may be effected by a lack of nutrition.

The main objective of this study is to assess whether the ingestion of additional vitamins and minerals, over and above the normal diet, would lead to a reduction in stress. To this end it is intended to assess what effect an intervention with a *Multivitamin Complex with Calcium and Magnesium* might have on the stress levels of individuals.

The intervention of the *Multivitamin Complex with Calcium and Magnesium* will be assessed with regard to the benefits that may accrue to the individual as a result of the reduction in stress levels. If meeting nutritional demands reduces stress, this will put the individual in a better position to take control and manage their stress by utilising other coping techniques.

Benefits may include the following -

- * A reduction of stress symptoms, including tension, fears, depression, impairment of intellectual functioning, lack of concentration, poor memory, fatigue and other physical complaints such as insomnia, muscular spasm, stress related illness.
- * Increased productivity at work
- * Improved social functioning
- * Improved psychological well-being.
- * An overall improvement in the individuals' quality of life.

All assessments done in this study were of a psychological nature and did not include any medical procedures such as blood tests to assess the actual chemical content of the blood or the availability of nutrients to the individual.

1.8 PRESENTATION

Chapter 2 gives a brief report on some of the literature covering stress theory, research and developments that have occurred over a number of years.

Chapter 3 states the hypotheses and gives information regarding the selection of subjects for this project and the methodology employed in the execution thereof.

Chapter 4 gives details of the tests and questionnaires utilised in the execution of this study.

Chapter 5 advises the results of statistical analysis of the tests and questionnaires.

Chapter 6 incorporates a discussion on the results and give a conclusion.

CHAPTER 2

THEORY AND RESEARCH

Over the years there has been considerable research and numerous studies into different stressors and their origins, the varying manifestations of stress and a search for coping techniques and treatments that are efficacious in reducing the effects of stressors on the individual. This chapter serves to investigate some of this background research.

2.1 SOCIAL STRESS

Levine and Scotch (1970) gave an overview of stress research at that time. They did emphasise the problem that existed with many researchers using the term "stress" to refer to different conditions. The authors' own interest seems to have focused on social stress. Pervin and Lewis (1978, pp 320/1) reviewed previous stress research, but also sought to '*break with certain past perspectives and evolve a more fruitful way of thinking!*'. They were particularly concerned that future research should concentrate on '*a relational view of person and environment*'.

Marvin K Opler wrote on the cultural induction of stress (in Appley and Tumbull, 1967) and studied the stress that could be caused by extreme fear among people, in this case Nigerians, with a strong belief in the power of curses. This is certainly a situation that exists in South Africa, particularly among the less sophisticated rural people. He also looked at cultural differences between groups and also cultural breakdown as a previously marginalised race group become

assimilated into the dominant culture. Hugo Dries (1973) studied stress and anxiety in Zaire. He stated that he found 'more stress, frustration, anxiety and aggressiveness in modern than in traditional Africans' which he put down to the additional demands because of trying to 'accommodate two contrasting ways of life which puts an enormous psychological pressure upon the African individual. This is a possible source of stress in South Africa in 1998 with the vast increase in urbanisation and concomitant unemployment and changes in the business community brought about by affirmative action.

Schlebusch (1990) also covers all the changes in the social environment in developing African countries as well as more universal sources of stress such as personal relationships, divorce, abuse of women and children, sexual fears, specifically demanding occupations and life events such as bereavement, job changes and illness.

Robert Kugelman (1992) took cognisance of the major life events that cause stress to humanity, such as bereavement, war and violence. However, he was concerned about the modern way of life that demands high expenditure of energy and is often lived in an alien environment where there is constant awareness of clock time and pressure to be productive. For people to be de-stressed, Kugelman feels they need to be in tune with their bodies and environment and to have solitude and time for metaphysical meditation and recuperation.

Schlebusch (1998) comments on the very severe stressors currently affecting the lives of individuals. There have been huge changes in society. Urbanisation and the population explosion has lead to overcrowding and more traffic on the road, pollution including the damaging effects of noise pollution, and escalation in all forms of violence both inter-personal and inter-group. In the

work environment there is often a fear of retrenchment. A major source of stress may also be termed '*Techno-stress*'. By this we refer to the constant developments in computers, cell phones and other technological equipment and the general knowledge explosion and the need for individuals to keep up to date with developments (Schlebusch, 1998).

2.2 PERSONALITY

Like "stress", "personality" seems to be a term that has an enormously wide and differing number of definitions. Individual authors appear to select the meaning that suits their theory best. The best that can be said is that it is something inherent to the individual and their identity and personal characteristics. It is often indicative of a way of behaving and reacting that is fairly stable over time and events.

When it comes to reaction to stress, Coleman, Butcher and Carson (1984) point out that certain characteristics such as immaturity and maladjustment prior to the stressful situation and also poor habitual ways of managing problems, lower the individual's resistance to stressful events. Symptoms may involve intense anxiety, denial, repression, apathy, depression and the lowering of ethical standards. Not only does the individual's personality effect their reaction to stressors but also the speed with which they will recover from the stress reaction.

Holahan and Moos (1985) undertook a study which looked at *Life stress and health: Personality, coping and family support in stress resistance*. Their results seemed to indicate that personality played a major role in distinguishing between people who experienced depression or physical symptoms and those that did not seem to become stressed. The personality characteristics

involved included hardness, being easy-going and self-confidence. Within the business setting, stress-resistant men are more self-confident, energetic and ambitious.

Miller (1987) also considered the effect of personality processes on behavioural strategies in response to stressors. She considered what she termed monitors (information seekers) and blunters (distracters). The results indicated that high monitoring and low blunting were accompanied by high arousal and anxiety whereas low monitors and high blunting appeared to enable the person to relax more in the face of threat. In a similar study Miller, Brody and Summerton (1988) showed that high monitors were not only more anxious but also more demanding and slower to recover from either physical or psychological problems. Mediators and buffers may also influence the efficacy of coping.

Rhodewalt and Zone (1989) undertook a study of depression and illness in hardy and non-hardy women and felt that the non-hardy women were more depressive and viewed their life experiences negatively. It was actually this negative affect that was stress-engendering rather than any specific life event that had occurred.

Type A personalities are characterised by excessive drive and competitiveness, a sense of time urgency, inappropriate ambition and high personal demands often with concomitant anger and aggression. They are seldom satisfied with themselves. Type A behaviour patterns have been associated with cardiovascular disease and hypertension. Further research has indicated that although anger, hostility and aggression could be viewed as emotional reactions to stress, they were also the specific aspect of Type A behaviour most likely to contribute to myocardial infarction and other heart conditions. (MacDougall & Dembroski, 1985). Shafer (1992)

quotes a number of studies which indicate that it is the hostility component of Type A behaviour that contributes to heart conditions, blocked arteries and elevated cholesterol.

2.3 MEDICAL, PHYSIOLOGICAL AND PSYCHOLOGICAL DISEASES

Initially it was considered that psychological factors, including stress, could be considered to affect medical conditions and physiological disorders. Gradually it came to be recognised that stress could also be regarded as etiologic in causing psychological illness, for example in the case of post-traumatic stress disorder and acute stress disorder. Davidson and Baum (1986) felt that there were substantive links between symptoms of chronic stress and symptoms of post-traumatic stress. The difference may be one of intensity.

Many studies have linked stress to the development of life threatening diseases such as myocardial infarctions and arterial restriction and diseases such as cancer and Chronic Fatigue Syndrome (Kruesi, Dale & Straus, 1989). In addition the development of human immunodeficiency virus (HIV) has been negatively linked to experienced stress and psychological affect and so indeed has the recovery rate from surgery. Locke, Kraus, Leserman, Hurst, Heisel and Williams (1984) indicated that stress and psychiatric symptoms had an effect on '*natural killer cell activity, a parameter of cellular immune function*'. (p. 441)

Byrne and Whyte (1986) studied the impact of life events and found that patients with MI were not characterised by higher cumulative estimation scale score of impact, nor by higher average

scores than patients without MI. The differences appeared to be related to the patient's personal judgement of the emotional and affective impact of events that had occurred.

Schlebusch has found stress to significantly effect immunity, which in addition to the above illnesses has proven to be a major factor in the development of pulmonary diseases such as asthma and has had a significant negative effect on individuals suffering from chronic renal failure. Whilst it cannot be said to be a disease, one of the most tragic results of stress is suicide which seems to be a growing phenomenon in South Africa among all races and all age groups (Schlebusch, 1990).

Suicide and parasuicide is often directly attributable to stress but, in addition, causes further stress and misery for the families involved. This seems to be a phenomena that is on the increase particularly among young people. As many schools with the new South African rationalisation policies, no longer have counsellors, the young people have even had this form of support removed. There also seems to be an increase in suicidal behaviour among black South Africans and the statistics may be higher than is known, due to under-reporting. In South Africa the current shift is towards managed health care systems and it is essential to include in this every effort to prevent suicide in all age groups. (Schlebusch, 1998).

Glaser and Kiecolt (1994) covers many different studies and experiments on both animals and humans that investigate the effect of stress on the immune system. Some of the work on psychoneuroimmunology is very new and the editors concluded that although psychological stress can lead to adverse immunological changes, the intensity and duration of the illness are, in part, the product of the prior status of the individual's immune system. This will in turn depend on genetics, age, lifestyle, exposure to unhealthy influences and other relevant factors.

2.4 COPING

External stressors do not have the same effect on all individuals. The degree to which a stimulus will engender stress is partly a matter of how individuals perceive the threat to their well-being or thwarting of some goal and partly a question of their coping abilities and whether they foresee themselves as being able to control the situation and cope with the problem.

On a question of vulnerability, something which may be perceived as a threat and cause stress on one occasion, may have little or no effect on another occasion. Lazarus (1981) felt that this might in part be due to a series of minor hassles which have a cumulative effect.

Cronkite and Moos (1984) conducted a study on predisposing moderating factors such as social status, indicated by using measures of education and ethnicity, and prior functioning which took into account '*depressed mood, physical symptoms and alcohol consumption*' (p378). They concluded these not only contributed to the amount of stress experienced but also to subsequent functioning. They also concluded that women are more vulnerable to stressful circumstances than are men. They examined self-esteem and coping responses. It seemed that among married couples it was not only the individual's functioning and coping that had an effect but also the spouse's symptoms and coping responses (Cronkite & Moos, 1984).

Goodhart (1985) conducted an interesting study associated with positive and negative thinking about stressful event outcomes. It seemed that people's subjective interpretation had a very

marked effect on the psychological results of an event. It appeared that the effects of negative thinking transferred to other situations and was influential over time. For some reason the effects of positive thinking were advantageous in the specific circumstances but not as lasting in their effect. Possibly it is just the '*absence of negative thinking*' that is '*more beneficial*' (Goodhart, 1985, p. 230).

As stress research made further progress it was proven that the effects of the original stressor could be altered by the mediating role of perceptual and cognitive processes and be influenced by the coping skills of the individual (Spielberger, Sarason, Kulcsar and Van Heck, 1991). Nezu and Ronan (1985) were in agreement with this finding and Nezu (1986) in a subsequent study found a strong link between stress as a result of negative life events and anxiety.

Lazarus (1976) felt that individual coping response was influenced by how they perceived the stressor and their own abilities to cope and manage the situation or whether they felt hopeless. Folkman, Lazarus, Dunkel-Shetter, De Longis and Rand (1986) conducted a study concerned with the relationship between cognitive appraisal and coping. They looked at primary appraisal which was concerned with how the individual saw the initial stressor or threat and then secondary appraisal which was the individual's assessment of the coping options open to them. They concluded that in order to understand the coping process and both long and short term adaptation, '*both intra-individual and interindividual approaches are needed*' (Folkman and Lazarus, 1986, p. 1002).

Folkman and Lazarus (1988) undertook a further study on *Coping as a Mediator of Emotion* and came to the conclusion that planful problem-solving may have a salubrious effect on the emotional

response, whereas other forms, such as confrontive coping and distancing, may make things worse.

CP

Locus of control (Rotter, 1966), learned helplessness (Seligman, 1975), hardiness (Kobasa, 1979), optimism (Scheier and Carver, 1985) and the individual's self-appraisal of their problem solving skills (Heppner, Baumgardner & Jackson, 1985) are all concepts that have been shown to influence the ability of an individual to cope with stressors.

Rotter (1966) developed the locus of control concept. This was concerned with whether the individual considered they were in control of themselves and the environment or whether they felt that the control was outside their realm of influence. Whether locus of control had a major influence on the ability to cope with stressors and avoid the development of physical or psychological illness appears uncertain. Prokop (1991) felt that belief over control over health and illness specifically were more efficacious than more global measures.

Seligman (1975) initially felt that 'learned helplessness' arose as a result of repeated exposure to uncontrollable stressors. Subsequently, Abramson, Seligman and Teasdale (1978), proposed that learned helplessness developed when individuals attributed the uncontrollability of environmental influences to their personal incompetence. Either way an individual suffering from learned helplessness feels themselves less able to cope with stressors.

Kobasa (1979) held that *hardiness* was a belief in one's capacity to influence or control events. The individual who perceived themselves as competent would be more likely to cope with stressful situations.

Scheier and Carver (1985) undertook research among students. It seemed that those students who were the most optimistic regarding their expectations of the outcome of any problematic situation such as assessments at the end of a semester, were less prone to suffer physical symptoms and were better able to adapt to stressful encounters, than the students who were less optimistic. The optimistic students seemed better able to focus on ways of coping with stressors.

Antonovsky believed that what he called a 'sense of coherence' was the critical factor that distinguished individuals who became ill and those that did not, when subjected to stress. The sense of coherence had three aspects, viz. comprehensibility which '*is a sense that life is ordered, consistent, makes sense*'; manageability which may imply a strong locus of control but may also '*include a faith in God, in other people, or in such competent experts as doctors*' and the meaningfulness of their life worlds (Antonovsky, 1984, pp. 6/7).

Heppner, Baumgardener and Jackson (1985) felt that the individual's self-appraisal of their abilities as well as depression and attributional styles effected their problem solving skills and their ability to cope with external stressors.

Carver, Scheier and Weintraub (1989) developed a multi-dimensional coping inventory - the Ways of Coping Scale. There are two major differences in the ways individual may try to cope with stressors in their lives. Problem focused coping tries to do something to remove, alleviate or alter

the source of stress. These active coping strategies are typical of people with a high self-esteem and an internal locus of control. Emotion focused coping is directed towards reducing stress and negative affect experienced as a result of the stressor and is common among individuals who feel they cannot do anything about the stressor but must endure it as best they can. These two basic coping styles are not mutually exclusive and individuals may vary the coping strategy they select according to circumstances. The type of coping response that an individual selects is not a clear indication of the style of coping they are following. For instance, they might seek social support to assist in removing the stressor (problem focused coping) or alternately, as an emotional outlet and support (emotion focused coping).

Individuals vary in the way in which they attempt to cope with and solve or alleviate the problem of stress. Individuals may employ physical, cognitive and behavioural methods to try and manage a specific stressful stimulus. Coping may include many diverse aspects such as defence, denial, re-framing. All of these methods may be either healthy or unhealthy depending on the situation.

Robert McCrae (1984) felt that the coping mechanism used by an individual varied according to the type of stressor - a loss might be met with faith or fatalism, whereas a challenge might lead to perseverance and positive plans and actions or self-adaptation and humour. In 1986 McCrae studied the effects personality had on the coping mechanism employed and its ultimate effectiveness. He concluded that more effective ways of coping resulted in greater positive outcomes and well-being.

2.5 SOCIAL SUPPORT

Cobb (1976) described social support as having a moderating effect. Cobb stated that he had focused on the interaction of social support and environmental stress. While stating that '*adequate social support can protect people in crisis from a wide variety of pathological states*', he also noted that there were '*enough negative findings to make it clear that social support is not a panacea*' (Cobb, 1976, pp. 310/311).

Van Staden (1984) reflected that in the event of major natural, health or socio-political disasters there is an extant form of social support simply because the loss and the trauma associated with the stressors are shared by many other people and this helps all to cope. Saegert (1976) quotes '*environmental qualities for example complexity, neighbourhood quality, noise and pollution and social qualities for example. interpersonal indifference and distrust, social overload, anti-social threats*' as possibly contributing to stress. It would seem possible that the reverse would also apply and that positive environmental and social qualities would act as a support to reduce stress experienced (Van Staden, 1984). EF

In 1988 Constanza, Derlega and Winstead in their study on the *Effects of Conversational Topics on Coping with Stress among Same-sex Friends*, concluded that the interaction could either help or hinder. Problem solving talk and unrelated talk seemed to be beneficial whereas conversation involving talking about feelings and emotions did not reduce stress. CP

2.6 STRESS IN THE WORK ENVIRONMENT

Stress in the business environment is certainly nothing new. Organisations have themselves set out causes of stress and possible solutions. The *Institute of Directors*, London put out a publication in 1958 looking at health problems of directors which endeavoured to take a broad view and look at individual aspects both medical and temperamental and at the environment and nature of administrative stress as well as solutions and ways of avoiding stress reactions and staying healthy. They advocated a balanced diet, exercise, managing the work load, ensuring } sufficient rest; sleep and holidays are considered to be mandatory. } 73

Kearns wrote *Stress in Industry* for the *Care and Welfare Library* with a particular approach that assumed a '*conflict...between organisational needs and those of people*'. With the current extreme interest in noise, air and other forms of pollution, it is interesting to read his statement that an '*activity may turn into a stress reaction either as a result of exposure to the few forces which are harmful in themselves, or more often as a result of the intensity of otherwise normal stimuli which are set at intolerable levels*' (Kearns, 1973, p. 33/4). Another very telling comment from this little booklet is '*It is really quite amazing how much resistance to change is possible within an institution and how irrational - apparently - and how regressive resistance can be*' (p. 47). Once more one is faced with the question - Why when people are aware of the benefits of a certain course of action, is it so difficult to motivate them to follow this regimen?

As early as 1964 Harry Levinson wrote *Executive Stress* which set out many of the causes of stress in the workplace. Executives in managerial positions would feel themselves bound to work

long hours and would not have a balanced life and devote sufficient time to their homes and families. They would have insufficient rest and relaxation and/or exercise and would feel themselves to be in a position where they could not afford to take holidays. The executive would not have a balanced diet - they would either skip meals or alternately, have food that was too heavy whilst entertaining customers or clients. Consumption of alcohol could become a problem. More than thirty years later we still seem to have much the same problems and no final all-encompassing solution. Whilst businessmen may pay lip-service to the ideas of delegation and ensuring they live a balanced life-style, very often they do not act on what they know to be the healthier approach to their jobs.

Marshall and Cooper (1979) published *Executives Under Pressure*. They specifically looked at the interface between executives and their wives and made the statement '*Most wives accept and many actively support the domination of their joint lives by their husband's work*' (Marshall & Cooper, 1979, p. 94). With changing social conditions it would be interesting to know if this statement could still be made with any degree of authority?

The Stresses of Work by McDonald and Doyle (1981) was one of the early studies to take an interest in what has come to be known as Health Psychology. They quote the World Health Organization (WHO) who defined occupational health as:

The promotion of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of

the worker in an occupational environment adapted to his/her physiological and psychological condition. (p 1)

The major implications of this definition that they accentuate is that '*health is more than being not ill*', '*health involves not only physical aspects ... but also having a healthy and satisfying mental and social life*' and work should be '*adapted to meet each worker's needs, skills and aspirations*' (McDonald and Doyle, 1981, p. 1).

Karasek and Theorell (1990) published *Healthy Work: Stress; productivity and the reconstruction of working life*. The first part of the book deals with the psychosocial work environment, health and well-being and looks at stress-related illness. The second part is concerned with health, productivity and the reconstruction of working life. It looks at political and economic changes and studies the problems of workers in the modern world where technological changes have meant the re-designing of certain jobs and the creation of new occupations which demand time for training of individuals to become re-established. These changes can provoke a great deal of stress. The book sets out '*guidelines for the redesign of work by examining the productivity implications of (the) psychosocial model of work*' (Karasek and Theorell, 1990, p. xii).

Shafer(1992) in *Stress Management for Wellness* has a chapter entitled *Managing job stress and preventing burnout*. It may not be easy for some individuals to manage and prevent stress in the work place but Shafer gives a comprehensive list of sources of stress which certainly indicate aspects that need attention. Some of these will be discussed below.

Within the actual structure of the organisation, a hierarchy that keeps power and decision-making centralised and does not allow for input and participation from workers, will increase stress. So will production line work which is repetitive and where the workers do not feel that their contribution is meaningful. Any shift work leads to stress which is exacerbated because it disrupts family and social life.

The actual demands of the job need to be carefully monitored. Uncertainty about what is required and inadequate training, as well as overload and underload may all contribute to stress apart from more obvious aspects like career insecurity, sexual harassment and poor relationships with colleagues and managers. Lack of encouragement of creativity and independent thought will also increase the stress experienced.

A Nigerian study which focused specifically on entrepreneurship and felt that in this situation some of the sources of stress are loneliness, total immersion in the business, manpower problems, the need for achievement, inability to delegate, Type A personality and possibly fear that their business will not survive. Many of these stressors are similar or the same as those experienced by individuals in managerial positions (Akande, 1992). Roberts writing on burnout and the requirement of support, made the suggestion that '*team approaches may enable shared responsibility, reduce isolation and create supportive networks*' (Roberts, 1986, p.197).

Brookes and Kaplan investigated the effect of the office environment and space planning and felt that increased noise level, loss of privacy and visual distractions caused employees to complain and that the '*physical environment does affect human behaviour and perception*' (Brookes & Kaplan, 1972, p. 373).

Hanson (1989) mentions additional sources of possible stress. One is the great demands made on some individuals by travel and work trips. Public speaking can also be experienced by some individuals as very stressful and another major problem is the "workaholic". Not only does he not have time for himself but this may also lead to neglect of the family and concomitant feelings of guilt.

Commuting stress is also on the increase. Some of the factors are '*noise, crowding, heat, noxious fumes, time pressures, aggressive commuters, traffic jams, excessive speed, inconsiderate pedestrians, etc.*' In addition there is a constant increase in motor vehicle accidents which result in costly medical bills and often, in an increase in stress (Schlebusch, 1998c, p. 279).

In 1993, Leatz co-operated with Stolar in writing *Career Success/Personal Stress* - an easy-to-read book that seems to make sense. In the prologue she writes '*This book is for all stressed-out working people who are struggling to achieve successful careers (not just jobs) and maintain some semblance of a personal, family and social life*'. It is a most comprehensive book which looks at stress in the business environment and how to manage and control the stress and achieve some stability. There is a medical input from Stolar who not only enumerates the illnesses normally associated with stress but also other ailments where stress can cause or exacerbate the condition, for example headaches, allergies, upper-respiratory infections, skin problems and gastrointestinal problems. Leatz deals with such problems as panic attacks and sexual problems, family life and life as a single person and loneliness. Her solutions and approaches to stress management are clear and detailed and would probably appeal to most stressed-out career people as being sensible, easy to follow and manageable.

SJKW

2.7 BURN OUT

Chronic stress can lead to burnout - a progressive condition leading to mental and physical exhaustion. The typical picture is of an enthusiastic and committed individual who gradually seems to be less involved and becomes detached from work - '*absenteeism mounts, relationships become troubled*'. If intervention is to be successful it must not only return the individual to full productivity but must also restore their morale and self-esteem (Shafer, 1992, p. 452/3).

There may be physical signs of burnout such as '*exhaustion and fatigue, being unable to shake a lingering cold, suffering from frequent headaches and gastrointestinal disturbances, sleeplessness and shortness of breath*'. Behavioural signs may be '*quickness to anger and instantaneous irritation and frustration*' as well as crying easily, a suspicious attitude, risk taking behaviour, excessive use of tranquillisers or barbiturates. Thinking may become rigid and inflexible and the individual resists any form of change and may become withdrawn and depressed (Freudenberger, 1974, p. 160/1).

Maslach and Jackson isolated three sub-scales to assess burnout. These were emotional exhaustion, depersonalisation and personal accomplishment which covered '*a tendency to evaluate oneself negatively, particularly with regard to one's work*' (Maslach & Jackson, 1981, p. 99).

Nowack and Pentkowski (1995) undertook a study into *Lifestyle habits, substance use and predictors of job burnout in professional working woman*. The results indicated that '*high levels*

of self-reported substance use (smoking, drinking, other drugs) were significantly associated with poor overall lifestyle practices and eating/nutritional habits' but not 'significantly associated with measures of daily hassles or job burnout'. There were a number of methodologic problems with this study so that before the results can be accepted, further research is needed in the area (Nowack & Pentkowski, 1995, p. 29).

2.8 REDUCING STRESS IN THE WORK ENVIRONMENT

Stress in the workplace not only takes a high toll of human happiness and well-being but is also counter-productive to the actual functioning of the organisation. Under-productivity, absenteeism and ill-health as well as theft and sabotage will all effect profits, as will worker turnover, particularly if money has been spent on training.

If assessment of employees indicates high levels of stress in some individuals, it will benefit the organisation to try and reduce these stress levels. Organisational characteristics and job demands can possibly be modified. In addition it might be possible to encourage workers to take exercise by offering membership to gyms as a 'perk' or even holding gym classes as the place of business during some lunch hours. Also, management should try and ensure that everyone has sufficient time off to relax and to spend time with friends and family. This might entail reorganising work loads or even hiring additional staff.

2.9 SOUTH AFRICA IN 1998

In the post-apartheid era there have been many changes in the whole fabric of society in South Africa. Whilst the breakdown of racial barriers may have reduced stress in many cases, it has also brought an increase in stress as individuals endeavour to come to terms with the 'New South Africa'.

The Truth and Reconciliation Commission was established to try and restore good relationships between the State and the citizens of the country as well as between past perpetrators of violence and their victims. In the past individuals have been subjected to '*major harassment (both politically and personally)*'. However, testifying at the Truth and Reconciliation Commission has in many instances not decreased stress but has led to an increase in feeling of bitterness and increased stress. Psychologists who endeavoured to treat and assist individuals have also themselves become overwhelmed and '*showed signs of 'compassion fatigue' and needed support*' (Schlebusch, 1998c).

Another aspect of life in South Africa which is a subject of great concern, is the increase in substance abuse. Apart from the well-known and researched problems associated with alcohol and nicotine abuse as well as illegal drugs, individuals, in an effort to cope with stress, may turn to self-medication and prescription drugs. This can cause severe health problems, both physical and mental, which may only come to the attention of 'care-givers' when it is too late to prevent harm or reverse the condition. Many of the warnings of the dangers of such abuse remain 'hidden' from the public in '*scientific literature or in small print in package inserts*' (Schlebusch, 1998).

In addition there seems to be an increase in illegal, stronger and more damaging and dangerous drugs, entering the country.

2.10 POSITIVE HEALTH PRACTICES

Most people are aware that they need sufficient calories for health and energy but should avoid becoming overweight. Many studies have shown the potential negative effects of diets containing excess sugar, too much salt, fats high in cholesterol and excessive alcohol. Hanson (1989) makes the point that organisations with cafeterias are in a very good position to assist their staff to have good nutritional meals.

In a study which looked at the *Effects of environmental demands, stress and mood on health practices*, it was established that stress not only effects the health and bodily systems of the individual but at the same time may have the result of making the individual actually decrease positive health practices '*including exercise, nutrition, self-care and vehicle safety*' and increase negative practices such as substance abuse and smoking (Griffin, Friend, Eitel and Lobel, 1993, p. 646). Mothersborough, Herrmann and Warland (1993) noted that perceived time pressure could have a negative effect on recommended dietary practices but this was less likely when basic knowledge of nutrition was high. This implies that consumer education regarding desirable eating habits will be beneficial and will reduce the likelihood of time pressure having negative results.

Rosenbluh (1984) looked at the association between depression, anxiety and sleep problems in *NB* relation to the post-traumatic stress syndrome and felt nutrition played a major role in reducing

the stress experienced. He felt that Vitamin E and B, as well as iron, zinc, magnesium and folate (necessary to process Vitamin B-12) were some of the key nutrients needed for mental health.

There does not seem to be agreement as to whether sufficient vitamins and minerals can be obtained from a modern diet or whether these should be supplemented. It is hoped this study may contribute some knowledge regarding the relationship between vitamins and stress.

Rose (1992) gives a detailed picture of what may be considered healthy and unhealthy eating habits and also enumerates the negative effects of excessive alcohol or coffee consumption. However, when it comes to vitamin supplements he points out many serious ill-effects from the abuse of vitamins and he quotes Charles Marshall (1983) who documented the hidden dangers of vitamin abuse by overdose. He claims that '*megavitamin therapy can produce dangerous side effects*' and is '*largely a waste of money*' (Rose, 1992, p. 385).

It does seem that supplying vitamins has become a major industry and there is not always much research into what is really beneficial. Shermach (1995) in Marketing News wrote '*Putting the men into vitamins*' and asks '*Why should men take a vitamin made for women?*' This appears to be nothing more than a marketing ploy for something called 'Mega-men - a nutritional supplement'.

Hermelin (1993) quotes the nutritionist Joan Horbiak in *The Food-Stress Link*. Horbiak felt that by eating a balanced diet with the correct balance of carbohydrates, proteins and fats it would be possible to combat stress without additional supplements. She also commented that having sufficient water and non-caffeinated fluids is vital to avoid stress.

NR

On the reverse side Bradfield and Fones (1984) in a study they undertook on burnout felt that whilst there might be sufficient and even excessive amounts of carbohydrate, protein and fat consumed, more than 52% of their subjects were short of fibre and of micronutrients as compared with the recommended daily allowance. This was particularly noticeable when it came to a measurement of vitamins, calcium, magnesium and iron, all of which '*micronutrients are felt to be critical in helping the body combat stress*' (Bradfield & Fones, 1984, p. 502) *MR*

Lettko and Meuer (1990) undertook a study entitled '*Vitamin B-induced prevention of stress-related immunosuppression*'. It was a double blind clinical study and was undertaken with patients undergoing operations. Both groups showed initial anxiety but the individuals treated with Vitamin B seemed to handle the stress better, showed less immunosuppression and subsequently were less depressed and in a better psychic and physical state than those who received the placebo. *H3*

Kathi (1994) in *Home Care* wrote an article representing the findings of the Joint Commission on Accreditation of Healthcare Organisations which was specifically oriented towards nutrition care for patients. He felt there must be a multi-disciplinary approach and that the patients needs must be carefully screened and care must be taken with the preparation, distribution and administering of products which should be handled by appropriate individuals and that there should be assessment of the patients ongoing health and the efficacy of any nutritional care.

Spillman (1990) did a survey of food and vitamin intake by university students experiencing stress, in order to survey the consumption of comforting foods and vitamin supplements by

college students in response to stressful conditions. The results were that '*carbohydrates were most often used as comforting foods for both men and women*' and both men and women reported taking vitamins or increased amounts of vitamins under stress (Spillman, 1990, p. 502).

Blaun (1996) in Psychology Today (May/June 1996) has reviewed much of the latest research on what is called nutritional neuroscience and is concerned with nutrition, vitamins, neurochemicals and necessary hormones and elements in the diet and its possible effect on the brain. He states '*the brain is an extremely metabolically active organ, making it a very hungry one*' (p35). He quotes a 1994 study by Glueck and colleagues on the effect of high triglycerides (linked to saturated fats), high total cholesterol and low HDL or 'good' cholesterol on serious depression and hostility. Lowering triglycerides led to a significant reduction in depression and hostility. However, Carol Greenwood has isolated certain fatty acids that are absolutely crucial for a proper development and healthy maintenance of the brain, called the N-3 and N-6 fatty acids. Certain of the currently popular oils such as sunflower oil are high in N-6 acids but have no N-3's - such a lack of balance can have serious side-effects. Fish is specifically rich in N-3 fatty acids. Neurotransmitters are also manufactured from amino-acids.

Schlebusch (1998c) underlined the importance of adequate nutrition in maintaining health and the ability to combat stress. Stress may in turn actually deplete the essential nutrients in the body and one of the main organs to suffer is the brain with its high and constant demands for adequate nutrition. Periods of stress may also lead to a reduced appetite, as the body feels that the energy is urgently needed elsewhere. Another response to stress may be excessive eating and frequently of the wrong types of food which do not supply essential vitamins and nutrients and may actually '*contain substances that mimic the stress response*'.

Whilst the addition of vitamin-like supplements has proved efficacious in the treatment of individuals where there is a known shortage, such as in the case of the aged or Alzheimer sufferers, there are as yet no final research results on whether supplements would be of benefit to the brain development of individuals who are not suffering from a shortage. A possible exception is with regard to Choline which was researched by the National Academy of Science in 1995. It seems to increase performance, both mental and physical and improves memory and reaction times as well as regulating levels of arousal and anxiety which are major players in the brain's response to stress. Choline is found in egg yolks, organ meats, legumes and lecithin but it would seem that supplementary amounts may be beneficial without side effects. Research at the University of Virginia found that Glucose is important for brain function and that a Glucose drink specifically targeted at the brain is available in the UK and may soon become available in the USA. The B Vitamins have a profound effect on the brain and even marginal deficiencies of B Vitamins can cause EEG disturbances and inhibit mental performance. When discussing the damage caused by free radicals, it has been said that the brain is more susceptible than other organs and a daily supplement of Vitamin E is recommended as the body's natural antioxidant, as well as a diet rich in fruit and vegetables. Lipoic acid has also been singled out as an antioxidant. In many instances the researchers into mineral and vitamin and mineral supplements feel that the recommended daily allowances are really the minimum required for maintenance of health. However, investigation into the benefits of much higher amounts of the vitamins and minerals which may not only enhance brain performance but may even repair previous damage, has been limited.

2.11 STUDIES WITH A MULTIVITAMIN PLUS CALCIUM AND MAGNESIUM

There were three previous studies undertaken in Europe and Russia. Popovic (1993) undertook a research study under the title *Neurotrop Vitamin-Mineralstoff-Kombination in der Stress-Therapie*. Subsequently, Willemsen, Petchot-Bacque, Alleaume, Suter, Ring and Carroll (1997) completed a study in Europe, *A double-blind placebo controlled study of the effects of an oral multivitamin combination with calcium and magnesium on psychological well-being and cardiovascular reactions to stress in healthy young male volunteers*. In the same year Vein, Filatova, Selishchev, Ponomarenko, Bolkov, Mironov, Schmyrev, Zaets and Bolotina (1997) completed a study which was originally published in Russian and then translated, *Efficacy and safety of the vitamin preparation Berocca during chronic stress*. The conclusions drawn were that subjects experiencing stress and who exhibited stress related symptoms, responded favourably to the administration of a Multivitamin Complex with Calcium and Magnesium.

2.11 CONCLUSION

It is strongly felt that it is not sufficient to isolate causes or factors that contribute to stress in either the individual or the environment. Of greater importance is the development of practical approaches to try and improve the situation and reduce and prevent stress.

This study will concentrate on individuals who register on the *Berocca Stress Index* as being stressed. It is hypothesised that lack of vitamins may contribute to this condition and therefore the intake of a supplementary source of vitamins should decrease the stress experienced.

The personal habits and general lifestyle of individuals may appear obviously destructive and damaging or they may seem to be healthy. However, it is suggested that even an apparently balanced diet may not be supplying all the essential nutrients and vitamins that the individual requires, thereby increasing vulnerability to stress. The individual will therefore benefit from a supplementary source. Furthermore, it is hypothesised that current life demands may combine with individual traits to exacerbate the stress experienced. The result of this stress is that more vitamins and minerals are burnt up than would be the case in less stressful situations.

Should a vitamin and mineral supplement prove to be effective in reducing stress, this would be a most cost-effective way of improving the quality of life on individuals and increasing their overall well-being and productivity as well as positive social interaction.

CHAPTER 3

METHOD

The current study was undertaken to assess the effects of Multivitamin Complex with Calcium and Magnesium on a South African population that exhibited signs of stress. The study extended over the period from 1st June 1997 until the end of January, 1998.

Subjects were selected according to certain established criteria mentioned below.

A target of approximately 300 acceptable subjects was set, half each for the Gauteng area and Kwa-Zulu Natal area. The division eventually ended with 149 for Gauteng and 151 for Kwa-Zulu Natal. The reason for this slight discrepancy was because of individuals who dropped out during the course of the study and had to be replaced.

3.1 HYPOTHESES

1. Stress, as measured by the psychometric assessments during the study, will improve following the use of a Multivitamin Complex plus Calcium and Magnesium.

2. The subjects will themselves report a significant improvement in their subjective feelings of stress, following the use of a Multivitamin Complex plus Calcium and Magnesium.

3.2 INCLUSION/EXCLUSION CRITERIA FOR SUBJECTS OF THIS STUDY.

The following six criteria were applied in the selection of subjects.

3.2.1. Subjects must be English literate.

3.2.2. Subjects should give an indication of an elevated stress level. This was to be assessed by a pre-study screening test.

3.2.3. Subjects should range in age between 18 and 65 years.

3.2.4. Subjects may be of either gender.

3.2.5. Subjects must not, at the time of the study, be suffering from any medical condition that could be considered to be contributing to or causing higher than normal stress levels.

3.2.6. Subjects will be excluded from the study should they develop any acute illness or have to undergo surgery for any complaint within seven days of entry into the study.

3.2.7. Subjects should not be currently suffering from any psychological or psychiatric disorder or being treated with any psychotropic medication or undergoing therapy or any alternative form of management for stress or stress related problems. Should subjects

commence with other stress management techniques, therapy or medication including courses of vitamins or micro-nutrients during the course of the study, this will exclude them from the study.

3.2.8. Females who are pregnant or breast feeding, or within one month after post partum, are excluded from the study.

3.3 PRE-STUDY SCREENING

Before individuals were accepted as subjects, they had to qualify by indicating that they were suffering from stress. This was achieved by pre-study screening on a questionnaire developed by Professor Lourens Schlebusch, Department of Medically Applied Psychology, Faculty of Medicine, University of Natal (1996/7). (See Appendix A.) This questionnaire is based on the Diagnostic and Statistical Manual of Mental Disorders IV (DSM IV) clinical index of symptoms. However, as this is in the nature of a pilot study there are no reliability or validity assessments published as yet although it is intended that this will in due course be published in a peer reviewed scientific journal.

This questionnaire is a self-assessment procedure covering the subjective assessment of the individual of their own reactions to stress and covers physical reactions (18 categories) psychological reactions (27 categories) and behavioural reactions (42 categories) as enumerated. The subject was asked to make a tick if they experienced the symptom often, at least once a week

or more) and a cross if they experienced it sometimes (less than weekly, but at least monthly). If the patient scored over three points in any one category, it was assumed they were showing an unhealthy response to stress in that particular category and therefore qualified as suitable candidates for the study. It was, of course, quite possible for the subject to score three or more in all the categories. In addition, this exercise would probably have made the subjects more aware of their own specific and unique reactions to stressors.

If subjects were found suitable and were prepared to be included in the study after being informed of what this entailed, they were issued with a subject number, based on the number printed on the container of the tablets (Multivitamin Complex plus calcium and magnesium) with which they were to be issued.

3.4 INFORMED CONSENT

Prior to being accepted, all individuals were required to sign an Informed Consent form, thus giving written, informed consent. (See Appendix B)

The procedure to be undertaken was described to the subject in simple language and terms and in detail and the research assistant, viz. myself had to ensure that they clearly understood what was entailed.

The subjects were advised that it was not expected or anticipated that there would be any physical or psychological detrimental side-effects or complications from either the tablets or their participation in the study. The subjects were also advised that they were free to withdraw from the study at any time. Such withdrawal would not prejudice them in any way and they would not suffer any disadvantage as far as an opportunity for further care was concerned either at the time or in the future. In addition the subject were informed that it was hoped the study might bring benefits for stress management both for the individual and in general for other individuals in the future.

3.5 SUBJECT SELECTION

All subjects selected were literate and fluent in English even if this was not necessarily their first language.

The subjects for the Gauteng study were all willing participants and were largely drawn from the northern areas of Johannesburg and in the majority of cases were employed. They were initially approached by the researcher because of personal acquaintance and thereafter, very often by "word of mouth" with individual subjects recommending other possible candidates for the study. This means it was an opportunistic, non-random sample.

It was initially contemplated to approach a large organisation and request permission to approach their staff members. This idea was later dropped because it was felt it might contaminate the

results in some way and it would be better to get a more general cross-section of individuals with a wide variety of occupations. They were mostly from the middle-class economic category although there were a few exceptions. (See Table 3.1.)

Age groups and gender divisions were approximately evenly distributed although no definite effort was made to ensure equality in these categories.

Of the individuals initially approached, six were deemed unsuitable for inclusion in the study, either because they failed to meet the inclusion/exclusion criteria on the basis of age (N=2) or because they were suffering from psychological disorders and were taking medication which precluded them being subjects for the study (N=4). Other individuals were not willing to participate for different reasons. Individuals expressed an antipathy to "taking medication" (N=3), or were against the idea of psychological testing (N=4) and two individuals did not know if they would be in the area for long enough to complete the study (N=2), while three individuals stated they were just "not interested" (N=3).

Seven individuals who agreed to participate in the research, failed to qualify as they did not show sufficiently high stress levels. This seemed a low percentage but is possibly attributable to the general lifestyle in Johannesburg and Gauteng.

The following table details the variables of the individuals randomly selected for inclusion in the Gauteng area of study.

TABLE 3.1 BIOGRAPHIC AND DEMOGRAPHIC CHARACTERISTICS OF SELECTED GAUTENG SUBJECTS.

1.	Gender	30% Male	70% Female
2.	Race	4% Black	96% White
3.	Age Category.		%
	18 - 20 years	6	
	21 - 24 years	8	
	25 - 29 years	12	
	30 - 34 years	12	
	35 - 39 years	12	
	40 - 44 years	24	
	45 - 49 years	6	
	50+ years	20	
4.	Marital Status		%
	Married	48	
	Remarried	2	
	Single	30	
	Divorced	16	
	Separated	3	
	Widowed	1	
5.	Employment Status		%
	Full-time	84	
	Part time	10	
	Retired	2	
	Home-maker	2	
	Unemployed due to stress	0	
	Unemployed for other reason e.g. student	2	
6.	Number of children		%
	None	36	
	One	13	
	Two	36	
	Three	14	
	Four	1	

3.6 THE INTERVIEW

Subjects were all interviewed in person on an individual basis

Of the original 100 individuals selected as suitable subjects, the majority were interviewed in their own homes (N=49) or some other place they selected as suitable such as a friend's home or some public place where they felt they had "time to relax" and answer the questions (N=21). In a small proportion of cases, interviews were conducted at the respondent's place of work but largely this was found unsuitable and there was a consideration that it might increase the subject's level of stress (N=13). Some individuals chose to come to the researcher's home as this was more suitable or convenient for them (N=17). Wherever the initial interview was conducted, the follow up interview was conducted in the same environment.

The initial interview consisted of the administration of a semi-structured biographical questionnaire. (See Appendix C.)

This was followed by the administration of tests and questionnaires which will be discussed later in this chapter. These were designed to give an indication of the current level of stress being experienced by the subject and the effect this was having on their physical, emotional, behavioural and cognitive well-being. An open-ended questionnaire was included to endeavour to uncover the main source/sources of stress.

It was obviously of the greatest importance that each subject should be absolutely clear as to what was required of them and the meaning of any terms or names with which they might not be familiar. This meant that the length of the interviews varied considerably, particularly if the individual concerned was unsure of the precise meaning of some of the terminology. The result was that certain individuals felt it was "too long".

At the interview the subject was given a 30 days supply of the Multivitamin Complex plus Calcium and Magnesium or a placebo. These are effervescent tablets. The subjects were instructed to take the tablet in a glass of water in the morning and not to take them in the afternoon or at night in case the ingestion of vitamins should interfere with their sleep.

Each subject was requested to retain all empty containers and return them to the researcher. (This proved to be a problem as frequently the subject reported that some of the containers had been mislaid or thrown away). In addition the subjects were asked to keep a "diary" which simply required that they tick each day that they took a pill. The majority of subjects seemed to be content to take tablets every day and did not "forget". Again, possibly, the subjects were "educated" to believe that vitamin pills, are efficacious.

The subjects were also informed that if they should experience any adverse effect that they felt were attributable to the treatment, they should immediately contact the researcher. Such adverse effects would immediately and accurately be reported to the Research Supervisor and the Pharmaceutical Company. However, no adverse effects were anticipated.

Such adverse effects as did occur were somewhat nebulous in character such as feelings of fatigue and/or headaches but the three subjects who mentioned fatigue all stated that it improved after a few days. One individual withdrew because she stated she could not afford to feel "so tired at work". Another individual stated she developed "puffy eyes" whilst taking the tablets and therefore she withdrew from the study and yet another subject felt the tablets caused her to suffer from indigestion due to the acidity and she also withdrew.

At the end of the 30 days there was a follow-up interview within 5 days of completion of the tablets. This second post-test interview was slightly shorter than the first as it excluded the biographical questionnaire and the subjective questionnaires regarding what the subject felt to be their main sources of stress - it was felt these would apply as much to the second interview as the first. Of course, if there had been any major event which occurred in the subject's life during the 30 days in question, this would be noted.

Whilst all the tests and questionnaires enumerated were administered by the researcher as part of the team involved in the broader research study, I will not be reporting the results of all these tests but will concentrate on the specific tests which were the focus of my study in Gauteng. This includes the Psychological General Well-being Schedule, The Berocca Stress Index Survey, the Sources of Stress Questionnaire, the Hamilton Anxiety Rating Scale and the Visual Analogue Scale.

3.7 MULTIVITAMIN COMPLEX PLUS CALCIUM AND MAGNESIUM

In total the Multivitamin Complex plus Calcium and Magnesium contained seven vitamins of the B-Complex group, Vitamin C, Calcium and Magnesium. The product has been developed by the Pharmaceutical Company as a nutritional support for individuals and it is hoped that this will assist them to cope with high levels of stress by supplementing the body's store of vitamins and minerals when these are sub-optimal or depleted.

The contents of the product are -

Vitamin B ₁	15 mg
Vitamin B ₂	15 mg
Nicotinamide	50 mg
Vitamin B ₆	10 mg
Calcium-d-Pantothenate	25 mg
d-Biotin	150 µg
Vitamin B ₁₂	10 µg
Vitamin C	1000 mg
Calcium	100 mg
Magnesium	100 mg
Salt	40 mg
Sweetener (Aspartame/D-Mannitol)	
Colourant (Apocarotenal)	
Preservative	None
Sugar-free	

Each container contained information regarding the dosage, the method of administration, storage instructions and expiry date.

In addition, each of the containers issued for this research contained a protocol number and a subject number. The subject number was entered on every page of the tests and questionnaires completed by each subject.

3.8 DESIGN

3.8.1 RANDOMISATION AND BLINDING

In order to avoid subject attributes both known and unknown, contaminating the results of this study, and thereby to increase the validity of statistical comparisons in the study, a system of randomisation was employed. As each qualified individual became a subject in the study, they were assigned the next consecutive number on the product container. This could contain a Multivitamin Complex with Calcium and Magnesium or it could contain a placebo. The researcher was never allowed access to this information as to which container had placebos and the information was stored only at the Pharmaceutical Company offices and therefore there was no possibility of the researcher wittingly or unwittingly passing on information to the subject as to whether they were taking a placebo or a genuine nutritional supplement.

3.8.2 PLACEBO

The Pharmaceutical Company developed a placebo as close as possible to the genuine tablets in colour, appearance and behaviour (effervescence.) These were packed in an identical manner in identical containers. Only the numbers (registered solely with the Pharmaceutical Company) would indicate which were placebos.

3.8.3 POST-TREATMENT ASSESSMENT

Following the administration of 30 days of the tablets another identical battery of tests and questionnaires was completed by each subject. The initial Biographic and Demographic form was excluded..

3.9 TESTS AND QUESTIONNAIRES

Each subject had their own separate book of tests and questionnaires which incorporated the following -

An open letter to willing participants.

A Biographic/Demographic information questionnaire.

The Informed Consent Form.

A copy of the original stress assessment.

All the relevant tests and questionnaires which will be discussed hereunder.

3.9.1. OPEN LETTER TO PARTICIPANTS

This was an open letter from Professor Lourens Schlebusch on the first page of the booklet, addressed to the participants. It informed them of the purpose of the study, and assured them that they were '*free to decline to participate or to withdraw at any time without suffering any disadvantage or prejudice to treatment*'. They were also assured of confidentiality. (See Appendix D.)

3.10 TESTS AND QUESTIONNAIRES

3.10.1 NEOROPSYCHOLOGICAL BATTERY

3.10.1.1. Rey Figure

The figure (drawing) is handed to the subject with the request that they copy it onto a blank sheet of paper. The only encouragement permitted is to say to the subject '*Just draw it as nearly like this one as you can*'.

This is followed by the Rey Figure Immediate Recall. The original figure is removed and the subject is requested to draw the figure again from memory. If they have difficulty the researcher may say "*If you can remember something but are not sure where it went I want you to put it where you think it went*".

At the end of all the other tests and questionnaires, the patient is asked to draw the figure again. This will be 30 minutes to one hour after the Immediate Recall. The only prompt may be '*It was a large figure with a lot of lines*'

3.10.1.2. Narrative Prose Memory Test

The researcher reads the patient a simple story with the request that when it is finished the subject tell it back to the researcher in as much detail as possible. A very few elementary prompts may be given but there is no credit for any prompts given.

The patient's recall is scored by ticking in a vertical column all the main points and details that are mentioned in the re-telling of the story. If the subject says something that seems to cover the main gist of the story but is said in different ways, this may be written down in the subject's own words.

Once more, at the end of all the other tests, the subject is asked to tell the story again in as much detail as possible. The scoring is done in the same manner as with the initial recall.

3.10.1.3 Rey Auditory Verbal Learning Test

A series of 15 random words are read to the subject with the request that they then say as many back to the researcher as they are able to remember. They are assured that it is not important in what order the words are repeated they must just try and remember as many as they can.

The accuracy and order of responses is recorded by numbering on a response sheet.

This trial is repeated five times with the researcher reading the same list of words and the subject being requested to repeat as many words as they can remember, in any order, and including all the words said previously.

Trial six consists of a list of different words which are read once only, and the subject is asked to repeat them.

In Trial 7 the researcher requests the subject to once again repeat as many of the words from the *first* list as they can remember.

Delayed recognition occurs 30 minutes to one hour later. The researcher reads a list of 30 words, which includes those in the first list as well as other words either similar in meaning or sound. The subject is requested to say "Yes" if the words was in the first list and "No" if it was not.

3.10.1.4. Post-test Administration of Neuropsychological Battery.

The same tests with different pictures, stories and words were repeated in the post-test interviews after the 30 days on a Multivitamin Complex with Calcium and Magnesium. A comparison will then be possible between the two tests to assess cognitive impairment and neuropsychological dysfunction.

3.10.2. RECENT LIFE CHANGES

The subject was requested to indicate on a list of events, those that had occurred in their lives over the past two years. These should be categorised according to the six month period in which they occurred although of course they could have occurred in more than one six month period or none at all.

The subjects listed covered Health, Work, Home and Family, Personal and Social, Financial and Violence. The last category was included as it was felt it might prove to be particularly applicable within the South African context.

3.10.3 DAILY HASSLES AND UPLIFTS SCALE.

This scale was included due to the consideration that stress is not always a result of major event or situation in an individual's life but may indeed be a result of the accumulation of daily *hassles* (things that annoy or bother the individual and make them upset or angry) and *uplifts* (things that make one feel good, joyful, glad or satisfied).

The questionnaire lists things that may be hassles or uplifts in daily life or may be both.

The subject was asked to mark each item on a range from 0 (none or non-applicable) to 3 (a great deal) on both sides, i.e. both as a hassle and an uplift.

3.10.4. PERCEIVED COPING INCAPACITY SCALE.

This consists of nine items which the subject was asked to score on a scale from '5' indicating they strongly agreed with the statement to '1' which indicated they strongly disagreed. The items covered subjective feelings and impressions regarding making decisions, coping, and general feelings of capability.

3.10.5. LIFE ORIENTATION TEST - REVISED VERSION.

As with the previous test the subject was requested to score items from "Strongly Agree" to "Strongly Disagree". The statements were largely concerned with assessing the individual's degree of optimism, extroversion and ability to relax.

3.10.6. PSYCHOLOGICAL GENERAL WELL-BEING SCHEDULE

This self-administered questionnaire was developed by Harold J. Dupuy, 1977, for the US Health and Nutrition Examination Survey to give '*a brief but broad-ranging indicator of subjective feelings of psychological well-being and distress*' (McDowell and Newell, 1996, p.206). In an unpublished paper by Dupuy, he comments that it reflects the subjects '*inner personal state*' rather than external conditions.

The Psychological General Well-being Schedule consists of 22 questions on physical, psychological, emotional and behavioural situations, with the intention of screening for both quality of life and life satisfaction.. There are six potential answers for each question and the subject is requested to tick the one they think most nearly applies to them. It includes both positive and negative questions, and covers the dimensions of anxiety, depression, general health, positive well-being, self control and vitality. Each item has the same time frame, viz. '*during the past month*' (McDowell & Newell, 1996, p.125).

This evaluation of themselves by the subject gives an indication of their mental state as well as how they perceive their control and quality of life.

Reliability: Test-retest reliability coefficients undertaken in three separate studies, yielded coefficients between 0.68 and 0.85. Internal consistency was reported to be over 0.90.

Validity: The average correlation of the GWB with depression scales was 0.69; with anxiety scales 0.64 but with '*reports of stress at home and at work*', the correlation ranged from 0.17 to 0.59 (McDowell & Newell, 1996, p.127/8).

A number of the subjects commented that they found this an interesting exercise as it made them think in depth about themselves and their circumstances as well as the impact self-perceived stress was having on their well-being.

3.10.7 VISUAL ANALOGUE SCALE

The subjects were requested to rate the present intensity of their stress on a continuum, 10 cm long, with 10 divisions from '*No stress*' to '*The most extreme stress imaginable*'.

The Visual Analogue Rating Scale (VAS) is a Likert type scale has been used from 1974 onwards. Originally it was used by Huskisson during the 1970's as a rating scale for the severity of pain. However, as stated by McDowell and Newell (1996), there is '*no reason why a*

VAS could not be applied in measuring other dimensions' and they go on to say they 'have long been used in several areas of psychological measurement'.

VAS have been used in both horizontal formats (as in this study) and vertical formats. The correlation between the two main forms of the scale are generally high.

Reliability: Scott and Huskisson looked at the repeatability of VAS referring to pain and came up with a correlation of 0.99 between scores (McDowell & Newell, 1996, p. 237).

Validity: Correlations done between the VAS and other applicable questionnaires and ratings were between 0.75 and 0.91 (McDowell & Newell, 1996, p. 237).

Subjects were then asked to rate their '*Usual intensity of stress*' on a similar scale which was divided in to time periods viz. morning, noon, afternoon, evening and sleep. This particular exercise assisted the individual subject to assess their own personal reactions to stress and certain individuals commented that it resulted in their having greater insight into what was causing some of their major stress.

3.10.8. BEROCCA STRESS INDEX SURVEY

This Berocca Stress Index Survey (1993) was developed by a large pharmaceutical company, Roche Products (Pty) Ltd, by an in-house team and has a copyright. The survey consists of 53 descriptive phrases covering the subjects possible feelings, emotions, problems and behaviour.

The subjects are first requested to go through the list as quickly as possible and tick all the words or phrases which describe how they have been feeling over the past 3 to 4 days. Then they are asked to repeat the exercise and tick only the *main* things they feel have applied to them generally over the past one to two months. (See Appendix E)

3.10.9 SOURCES OF STRESS

In this exercise the subject was requested to list the five most common stressors in their lives, such as an event, a situation or a person and to give a reason as to why they perceive the stressor as being stressful and causing a stress reaction. (See Appendix F)

They were then asked to score how the stressors interfered with their activities from 'Continuously' to 'Never' as regards the three categories of work, family chores and relaxation.

Finally, they were requested to answer the following two question.

A breakdown of the number of subjects who selected each of these categories will be given in the next chapter under 'Results'.

3.10.10. HAMILTON ANXIETY RATING SCALE.

The patient's condition is rated on various categories, both psychological and physical on a simple five point scale according to instructions. They should feel free to describe their condition in their own way. In addition, the interviewer rates behaviour during the interview. It is intended '*to assess the severity of the ... condition*'.

- | | |
|---|--|
| 0 | Not present - Not present |
| 1 | Mild - Occurs irregularly and for short periods of time. |
| 2 | Moderate - Occurs more constantly and of longer duration requiring considerable effort on part of patient to cope with it. |
| 3 | Severe - Continuous and dominates patients life. |
| 4 | Very severe - Incapacitating. |

There are brief descriptions given under each category as to what features are included under the heading, thereby minimising confusion as to what is meant by the terms. The categories are as follows -

- 1 Anxious Worries, anticipation of the worst, fearful anticipation, irritability.

A breakdown of the number of subjects who selected each of these categories will be given in the next chapter under 'Results'.

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| 4 | Very severe - Incapacitating. |

There are brief descriptions given under each category as to what features are included under the heading, thereby minimising confusion as to what is meant by the terms. The categories are as follows -

- 1 Anxious Worries, anticipation of the worst, fearful anticipation, irritability.

2. Tension Feelings of tension, fatigueability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax.
3. Fears Of dark, of strangers, of being left alone, or animals or traffic, of crowds.
4. Insomnia Difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors.
5. Intellectual (Cognitive) Difficulty in concentration, poor memory
6. Depressed Loss of interest, lack of pleasure in hobbies, depression, early waking, diurnal Mood swing.
7. Somatic (Muscular) Pains and aches, twitchings, stiffness, myoclonic jerks, grinding of teeth, unsteady voice, increased muscular tone.
8. Somatic (Sensory) Tinnitus, blurring of vision, hot and cold flashes, feelings of weakness, prickling sensation.
9. Cardiovascular Tachycardia, palpitations, pain in chest, throbbing of vessels, fainting feelings, Symptoms missing beat.
10. Respiratory Pressure or constriction in chest, choking feelings, sighing, dyspnea. Symptoms
11. Gastro-intestinal Difficulty in swallowing, wind, abdominal pain, burning sensations, Symptoms abdominal fullness, nausea, vomiting, borborygmi, looseness of bowels, loss of weight, constipation.
12. Genito-urinary Frequency of micturition, urgency of micturition, amenorrhea, menorrhagia, Symptoms development of frigidity, premature ejaculation, loss of libido, impotence.

13. Autonomic Symptoms. Dry mouth, flushing, pallor, tendency to sweat, giddiness, tension headache, raising of hair.
14. Behaviour at Interview. Fidgeting, restlessness or pacing, tremor of hands, furrowed brow, strained face, sighing or rapid respiration, facial pallor, swallowing, belching, brisk tendon jerks, dilated pupils, exophthalmos.

The Hamilton Anxiety Scale is not utilised to assess panic attacks but rather generalised anxiety, the patient's condition at the time of the interview and during the previous few days.

'Total scale scores are interpreted as follows: 0-5, no anxiety; 6-14 minor anxiety; 15 or more, major anxiety' (Bech, 1993, p. 47).

Reliability: This is given as between 0.78 and 0.96 (Bech, 1993).

Validity: This is between 0.70 and 0.90 (Bech, 1993).

3.11 POST-TREATMENT ASSESSMENT

Following the administration of 30 days of the tablets, a virtually identical battery of tests and questionnaires was completed by each subject. The only exclusions were the initial Biographic and Demographic form and the Recent Life Changes questionnaire.

CHAPTER 4

RESULTS

4.1 STATISTICAL ANALYSES

These were done in conjunction with the institute for Biostatistics of the Medical Research Council, Durban.

In the Analysis, Group 1 indicates the participants who took the Multivitamin Complex with Calcium and Magnesium (N=151), and Group 2 indicates the placebo group (N=149). As mentioned there was a slight discrepancy in the number of participants in each group. This was caused by a few individuals dropping out of the project. The replacements could not be directly allocated to the experimental or placebo groups as the content of the tablets was kept secret.

Descriptive statistics consisted of the calculations of averages and standard deviations, and percentages for continuous data and frequencies and percentages for categorical data.

Within group comparisons were performed to assess changes from pre- to post- intervention.

Student's paired t-test was used for continuous data while McNemar's Chi-square test was used for binary data.

Differences between the two study groups were assessed with relation to baseline parameters and pre- to post- difference scores, using unpaired t-tests.

(In accordance with international thinking, I have elected to use the period to indicate the decimal point, rather than the comma more normally used in South Africa.)

The significance level was set at 0.05.

95% confidence intervals were calculated where appropriate.

4.1.1. DEMOGRAPHIC PARAMETERS.

The demographic variables are reflected in the following tables. As will be noted, the differences between the experimental and control groups were not significant and they were therefore comparable. No adjustment was required.

TABLE 4.1 - DIVISION OF GROUPS BY PROVINCE.

Group 1			
	KZN	Gauteng	Total
Frequency	75	76	151
Percentage	49.67	50.33	
Group 2			
	KZN	Gauteng	Total
Frequency	75	74	149
Percentage	50.34	49.66	

Sample Size = 300.

Chi-square; DF = 1; Value = 0.013; Probability = 0.908 (not significant)

(KZN = Kwa-Zulu Natal)

TABLE 4.2 - GENDER DISTRIBUTION.

Group 1

	Male	Female	Total
Frequency	45	106	151
Percentage	29.80	70.20	

Group 2

	Male	Female	Total
Frequency	51	98	149
Percentage	34.23	65.77	

Sample Size = 300

Chi-square; DF = 1; Value = 0.675; Probability = 0.411 (not significant).

TABLE 4.3 - AGE DISTRIBUTION.

Group 1

Years	18-20	21-24	25-29	30-34	35-39	40-44	45-49	56-65	Total
Frequency	4	16	23	29	19	31	6	23	151
Percentage	2.65	10.60	15.23	19.21	12.58	20.53	3.97	15.23	

Group 2

Years	18-20	21-24	25-29	30-34	35-39	40-44	45-49	56-65	Total
Frequency	4	13	24	19	24	18	17	29	149
Percentage	3.36	8.72	16.11	12.75	16.11	12.08	11.41	19.46	

Sample Size = 300

Chi-square; DF = 7; Value = 12.497; Probability = 0.085

TABLE 4.4 - ETHNIC DISTRIBUTION.

Group 1

	White	Black	Coloured	Asian	Total
Frequency	124	4	5	18	151
Percentage	82.12	2.65	3.31	11.92	

Group 2

	White	Black	Coloured	Asian	Total
Frequency	132	3	2	12	149
Percentage	88.59	2.01	1.34	8.05	

Sample Size = 300

Chi-square; DF=3; Value = 2.865; Probability = 0.412

TABLE 4.5 - DIVISION OF GROUPS BY MARITAL STATUS.

Group 1

	Married	Re-married	Single	Divorced	Separated	Widowed	Total
Frequency	85	5	43	13	2	2	151
Percentage	56.95	3.31	28.48	8.61	1.32	1.32	

Group 2

	Married	Re-married	Single	Divorced	Separated	Widowed	Total
Frequency	85	3	37	16	2	6	149
Percentage	57.05	2.01	24.83	0.74	1.34	4.03	

Sample Size = 300

Chi-square; DF = 5; Value = 3.253; Probability = 0.661

TABLE 4.6 - DIVISION OF GROUPS BY EMPLOYMENT STATUS.

Group 1

	Full time	Part time	Retired	Home-maker	Unemployed	Total
Frequency	119	19	4	2	7	151
Percentage	78.81	12.58	2.65	1.32	4.64	

Group 2

	Full time	Part time	Retired	Home-maker	Unemployed	Total
Frequency	120	17	5	3	4	149
Percentage	80.54	11.41	3.36	2.01	2.68	

Sample size = 300

Chi-square ; DF = 4; Value = 1.231; Probability = 0.873

4.1.2 Data Analysis Methodology

4.1.2.1 Sources of Stress

Huysamen (1985) states 'Descriptive statistics is concerned with the description and/or summarisation of the data obtained for a group of individuals' (p. 3). The reason a descriptive analysis was utilised in the case of Sources of Stress was to give a holistic impression of what individual's in the Gauteng area felt to be their dominant and most persistent sources of stress. These could be the result of subjective perception, situational demands or external pressures.

Obviously with an open-ended question, there were literally hundreds of different sources of stress given. These numerous different sources were converted into 12 basic categories. These categories have then been converted into percentages and subsequently arranged in rank order to enable the reader to easily establish the salience regarding which psychosocial factors were perceived by the participants, as contributing most to their stress.

TABLE 4.7 - SOURCES OF STRESS IN GAUTENG.

Rank Order	Category	Percentage
1	Finance	21.02 %
2	Work	21.02 %
3	Family (Parents/ siblings)	12.74 %
4	Personal Homelife (Marital, Children)	8.92 %
5	Loneliness	7.00 %
6	Own health	6.37 %
7	Crime/violence/safety	6.37 %
8	Other relationships	5.73 %
9	Concern for family future/children	3.82 %
10	Studies	3.18 %
11	Traffic/Driving	1.91 %
12	Concern re own future	1.91 %

Percentages were computed to two decimal places.

4.1.2.2 PSYCHOLOGICAL GENERAL WELL-BEING SCHEDULE.

The following table indicates the pre-post differences between the experimental group (taking a Multivitamin Complex with Calcium and Magnesium) and the control group (taking a placebo) on the Psychological Well-being Scores. Included are the averages and the standard deviations and the p-values.

**TABLE 4.8 - THE SIGNIFICANCE OF CHANGES IN PSYCHOLOGICAL
GENERAL WELL-BEING.**

Group	Pre-scores	Post Scores	Pre-Post	p-values
			Differences	
Experimental (N 151)	Mean 60.50 $s = 15.37$	Mean 76.94 $s = 15.31$	Mean - 16.43 $s = 17.37$	0.0001
Placebo Group (N 149)	Mean 65.48 $s = 17.54$	Mean 77.14 $s = 15.10$	Mean -11.66 $s = 15.88$	0.0001
Between Group Comparison				0.0136

Both the experimental and the control group showed a significant improvement after one month of treatment.

The group taking the Multivitamin Complex with Calcium and Magnesium improved by 27.16%.

The group taking the placebo improved by 17.81%.

The experimental group therefore showed 9.35 % greater improvement than the placebo group.

4.1.2.3. BEROCCA STRESS INDEX SURVEY

The following table indicates the results on the Berocca Stress Index after one month of treatment with a Multivitamin Complex with Calcium and Magnesium as compared to the control group over the same period who were given a placebo.

Table 4.9 - THE SIGNIFICANCE OF CHANGES IN THE BEROCCA STRESS INDEX SURVEY.

Group	Pre-scores	Post-scores	Pre-Post	p-values
	Differences			
Experimental (N 151)	Mean 54.62 s = 26.17	Mean 33.98 s = 21.64	Mean 20.64 s = 24.41	0.0001
Placebo (N 149)	Mean 50.69 s = 23.70	Mean 35.12 s = 20.27	Mean 15.56 s = 23.74	0.0001
Between Group				0.0344
Comparison				

Included are the averages, the standard deviations and the p-values.

The groups taking the Multivitamin Complex with Calcium and Magnesium improved by 37.79%.

The group taking the placebo improved by 30.70%

The experimental group showed a 7.08% greater improvement than the control group.

4.1.2.4. HAMILTON ANXIETY RATING SCALE

**TABLE 4.10 - THE SIGNIFICANCE OF THE HAMILTON ANXIETY SCALE PRE-
POST- TEST DIFFERENCES.**

Group	Pre-scores	Post-Scores	Pre-Post Differences
Experimental (N 151)	Mean 16.15 $s = 8.09$	Mean 9.40 $s = 5.83$	Mean 6.75 $s.Y.X. = 0.59$ $DF = 295.2$
Placebo (N 149)	Mean 14.58 $s = 9.05$	Mean 9.97 $s = 6.85$	Mean 4.60 $s.Y.X. = 0.65$ $DF = 298.0$
Between Group Comparison	(Based on t-test)		p = 0.0148

CHAPTER 5

DISCUSSION AND CONCLUSION.

5.1 DEMOGRAPHIC PARAMETERS

There are only brief comments needed regarding the demographic parameters of the participants in the Gauteng province. The research concentrated on adults and the majority of these were employed, either part or full time. The ethnic division unfortunately did not truly reflect the multi-cultural aspects of the population of South Africa. This is more fully commented on under "Limitations of this study".

One surprise results to the researcher was regarding the division of the group according to marital status. We are so continually informed that at least 66% of marriages end in divorce, that it was anticipated that approximately two-thirds of the subjects would indicate they were divorced. This did not prove to be the case and there was a high proportion of married individuals as compared to re-married or divorced.

5.2 SOURCES OF STRESS

In this area also the rank order of sources of stress held some unexpected results. One is often led to feel that fear of crime and violence and concern for safety are of paramount importance in the citizens of Gauteng's lives. It was not anticipated that this category would only be a source of stress yielding 6.37%. The top two categories, both with 21.02 % were *Finance* and *Work*. Together these two categories made up over 42 % of the total sources of stress enumerated. In view of this result, it is reasonable to speculate that concentration on the work and financial environment are important fields for future stress research, at least in Gauteng.

Whilst much of the earlier research indicates that stress in the workplace is due to technological change and retraining individual workers (Karasek and Theorell, 1990); the structure of the organisation and the demands of the job (Shafer, 1992); isolation and lack of support (Roberts, 1986); guilt regarding neglect of the family (Hanson, 1980); and commuting stressors as well as time pressure (Schlebusch, 1998), one would anticipate that counter measure should deal with these stressors. However, the findings in this study indicate that more attention needs to be focused on the nutritional aspect of the worker's diets and possibly their psychological health as well as their work output would benefit from the diet being supplemented with a vitamin and mineral supplement.

53 RESULTS OF TESTS AND QUESTIONNAIRES.

As mentioned in the previous chapter, the results of the tests and itemised questionnaires all indicated a marked improvement in the level of stress experiences and feelings of anxiety. These results were achieved on the tests of objective assessment as well as questionnaires of subjective self-assessment. The results applied both to the control group (taking the placebo) and the experimental group (taking the Multivitamin Complex with Calcium and Magnesium).

The experimental group showed a greater level of improvement but nevertheless the placebo effect was very much in evidence.

5.3.1 PLACEBO EFFECT

The placebo effect has been very well researched over many years. As shown by theory, it refers to an observed effect, particularly in experiments concerned with the ingestion of drugs, when the effect cannot be as a result of the drug, as a placebo (a harmless, inactive substitute) was given instead. The positive results are considered to be of a psychological nature and are based on the individuals' belief that they are receiving treatment that will be beneficial to them. The individuals have faith in the curative powers of what they are taking and this *power of suggestion* results in a improvement. The placebo effect may be very powerful (Schlebusch, 1990).

This study was a double-blind study, meaning that neither the subjects, nor the person administering the procedure, were informed as to which were the placebo and which the genuine Multivitamin Complex with Calcium and Magnesium. This was done to guard against experimenter bias and to try and avoid preconceptions on the part of the subject regarding what could be expected from taking the Multivitamin Complex with Calcium and Magnesium.

The Hawthorne effect was named after the industrial plant where it was first observed. It is somewhat similar to the placebo effect. The Hawthorne effect states that anything new or innovative in the nature of procedures, methods and conditions will result in an improvement and show positive results, at least for a period of time. It is assumed the participant is enthusiastic about the innovation and therefore it is beneficial (Reber, 1985). This too could have been considered to have an influence in this study.

If one considers why, in this particular experiment, the placebo effect was so noticeable, it is necessary to re-consider stress per se. In Chapter 2 we saw that stress could be attributable to social and cultural conditions (Schlebusch, 1998), personality and coping abilities (Rhodewalt and Zone, 1989; Shafer, 1992) and the individuals personal beliefs regarding their coping skills (Spielberger, Sarason, Kulscar and Ven Heck, 1991). It could be affected by the degree of social support (Constanza, Derlega and Winstead, 1988) as well as the personal hardiness of the individual and adopting a generally healthy lifestyle (Griffin, Friend, Eitel and Lobel, 1993). However, stress remains primarily, by its very nature a subjective phenomenon. It results from

the individuals' feeling that the challenges they are faced with are to some degree, beyond their capabilities to manage. Their perceived stress is real and may cause great distress and problems to the individual. In view of this subjective assessment, one would expect that if the person's expectations are that they will feel better, less hopeless and less stressed, then that is probably precisely what will occur. Also, by feeling that they are 'taking charge' and managing their stress by, in this case taking the tablets, they feel more positive about themselves.

5.3.2 EXPERIMENTAL GROUP

Having taken due note of the positive placebo effect, it is nevertheless a fact that there was a greater improvement in the pre- post- test scores of the experimental group who were taking the genuine Multivitamin Complex with Calcium and Magnesium. As these were statistically significant findings, we can draw several conclusions.

It would seem that our modern way of life with hasty rushed meals and many processed foods, has resulted in the average diet being to some extent inadequate as far as multivitamins and other nutrients are concerned (Rose, 1992). This partial lack can contribute to feelings of stress as well as causing and exacerbating physical conditions, and taking supplementary multivitamins and nutrients can be beneficial in the management of stress (Schlebusch, 1998).

This study did not give any indication of any negative effects of taking a vitamin and mineral supplement, provided the supplement is taken in the correct dosages and appropriately applied. It

it is necessary to take the vitamin and mineral supplement daily as the body is not able to store certain vitamins. No doubt, as with almost any substance it is possible to take an "overdose" which could prove harmful.

Another factor may well be that if the individual feels better in themselves, they are then more open to and receptive to alternate forms of stress management. Perhaps there may be some encouragement to have more rest and relaxation, take exercise and in general, face problems and seek a reasonable solution to stressful situation. In general they may seek to follow a more healthy lifestyle. (Griffin, Friend, Eitel and Lobel (1993) include '*exercise, nutrition, self-care and vehicle safety*' in their list of desirable practices for a healthy lifestyle and comment on the negative effect of practices such as substance abuse and smoking.

In the work environment, it has been researched and documented that all the above health practices are desirable but also, the individual should endeavour to live a balanced life with sufficient time for sport, family and social commitments outside the office or work-place. This will not only contribute to productivity but will avoid "burn out" (Shafer, 1992).

It is hoped that the study will bring lasting benefits not only to the individuals involved in the study, but in general to all who are informed of the results. If the individual's belief system is activated to believe that taking additional multivitamins and nutrients has resulted in them feeling better and more able to cope, then hopefully this may bring permanent changes in their thinking and behaviour.

5.4 LIMITATIONS OF THE STUDY

A major limitation of this study in the South African context is that a very large percentage of the participants were of the white race group. For this reason it did not truly represent the multi-cultural make-up of the population of South Africa. There were difficulties in gaining access to a more representative sample of appropriate English literate subjects who conformed with the inclusion/exclusion criteria of the research design.

A suggestion is that a further study be undertaken in the future to try and establish if a supplementary Multivitamin Complex with Calcium and Magnesium would prove to be equally beneficial to all ethnic groups. There is a general change as more of the black population become urbanised and adopt a western culture. As the sample was a non-random one consisting mainly of white English-speaking subjects, the generalisation of the finding is limited.

5.5 CONCLUSION

There is a proven direct relationship between degrees of stress and physical and psychological disorders. It has many results including severe illness and possible mental breakdown, suicide, deterioration of the immune system and vulnerability to viral and bacterial attack, loss of

productivity in the workplace, troubled relationships and distress to the individual (Schlebusch, 1997).

If there is an easy and efficacious way to reduce the stress experienced by individuals, it behoves us to take it. This may result in increased personal confidence, self-esteem and improved social interaction and benefit, not only the individual, but all with whom they interact. Reduction of worker stress could also improve productivity in the workplace. This would not only benefit the individual business but also the economy in general and therefore the whole country.

The purpose of this study was twofold. It wished to establish the validity of the hypotheses as follows:

1. Coping with stress and the negative symptoms of stress (as measured by the psychometric assessments during the study) would improve following the use of a Multivitamin Complex with Calcium and Magnesium.
2. The subjects would themselves report a significant improvement in their subjective feelings of stress following the use of a Multivitamin Complex with Calcium and Magnesium.

Both these results have been demonstrated.

In addition, the results have a clinical value in that a psychologist can advise a patient showing signs of stress, that they should, after consultation with a medical practitioner, augment their diet with supplementary Multivitamins plus Calcium and Magnesium.

The evaluation of the impact of the treatment indicates that there has been a benefit derived from the intervention techniques. It substantiates that taking a Multivitamin Complex with Calcium and Magnesium will reduce stress and benefit the individual.

REFERENCES.

- Abramson, L.Y., Seligman, M.E.P., & Teasdale, J. (1978) Learned helplessness in humans: Critique and reformulation. Journal of Abnormal Psychology, 87, 49-74.
- Akande, A. (1992). Coping with entrepreneurial stress: A Nigerian case study. Leadership and Organizational Development Journal, 13(2), 27-32.
- American Psychiatric Association (APA) Diagnostic and statistical manual of mental disorders. Fourth Edition, DSM-IV. Washington, DC: APA, 1994.
- Antonovsky, A. (1984). A call for a new question - salutogenesis and a proposed answer - the sense of coherence. Journal of Preventive psychiatry, (2), 1-13.
- Appley, M.H. & Tumbull, R. (Eds) (1967). Psychological stress. New York: Meredith.
- Bech, P. (1993). Rating scales for psychopathology, health status and quality of life. Berlin: Springer-Verlag.
- Blaun, R. (1996). How to eat smart. Psychology Today, 29(3) 35-47.
- Bradfield, R.H. & Fones, D.M. (1984). Recipe for burnout: The special education teachers' diet. Academic Therapy, 19 (4) 499-504.
- Brookes, M.J. & Kaplan, J. (1972). The office environment: space planning and affective behaviour. Human Factors, 14 373-391
- Byrne, D.G. & White, H.M. (1986). Life events and myocardial infarction revisited: the role of individual impact. Psychosomatic Medicine, 42 1-10.
- Carver, C.S., Sheier, M.F. & Weintraub, J.K. (1989). Assessing coping strategies: a theoretically based approach. Journal of Personality and Social Psychology, 56, 267-283.
- Cobb, S. (1976). Social support as a moderator of life stress. Psychosomatic medicine, 38, 300-314.
- Cohen, S., Kamarck, T. & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24, 385-396.
- Coleman, J.C., Butcher, J.N. & Carson, R.C. (1984). Abnormal psychology and modern life. (7th ed.) Illinois: Scott Foresman.
- Constanza, R.S., Derlega, V.J. & Winstead, B.A. (1988). Positive and negative forms of social support: Effects of conversational topics on coping with stress among same-sex friends. Journal of Experimental Social Psychology, 24, 182-193.
- Cronkite, R.C. & Moos, R.H. (1984). The role of predisposing and moderating factors in the stress-illness relationship. Journal of Health and Social Behaviour, 25, 372-393.

- Davidson, L.M. & Baum, A. (1986). Chronic stress and post-traumatic stress disorder. Journal of Consulting and Clinical Psychology, 54, 303-308.
- Dries, Hugo. (1984) De psychologie van de moderne afrikaan; Een psycho-antropologische benadering van het modernisatie proces in Zaire. Lisse: Swets & Zeitlinger.
- Epstein, S. & Katz, L. (1992). Coping ability, productive load and symptoms. Journal of Personality and Social Psychology, 62, 813-825.
- Folkman, S., Lazarus, R.S. Dunkel-Shetter, C., DeLongis, A. & Rand, J.G. (1986). Dynamics of a stressful encounter: Cognitive appraisal, coping and encounter outcomes. Journal of Personality and Social Psychology, 50, 992-1003.
- Folkman, S. & Lazarus, R.S. (1988). Coping as a mediator of emotion. Journal of Personality and Social Psychology, 54, 466-475.
- Freudenberger, H.J. (1974). Staff burn-out. Journal of Social Issues, 30, 159-165.
- Gannon, K. (1994). Food plan. Drug Topics, 138, 60-61.
- Glaser, R. & Kiecolt G.J.K. (eds) (1994) Handbook of human stress and immunity. San Diego: Academic Press.
- Goodhart, D.E. (1985). Some psychological effects associated with positive and negative thinking about stressful event outcomes: Was Pollyanna right? Journal of Personality and Social Psychology, 48, 216-232.
- Griffin, K.W.. Friend, R., Eitel, R. & Lobel, M. (1993). Effects of environmental demands, stress and mood on health practices. Journal of Behavioural Medicine, 16, (6). 643-661.
- Hanson, P.G. (1989). Stress for success. Toronto: Collins.
- Heppner, P.P., Baumgardener, A., & Jackson, J. (1985). Problem solving, self appraisal, depression and attributional styles: Are they related? Cognitive Therapy and Research, 9, 105-113
- Hermelin, F. (1993). The food-stress link. Working Women, 18, (5) 92.
- Holohan, C.J. & Moos, R.H. (1985). Life stress and health: Personality, coping and family support in stress resistance. Journal of Personality and Social Psychology, 49, 739-747.
- Huysamen, G.K. (1985). Introductory statistics and research design for the behavioural sciences. Volume 1. Cape Town: H & R Academica.
- Institute of Directors. (1958). Health problems of directors. London: Institute of Directors.

Kanner, A.D., Coyne, J.C., Schaefer, C. & Lazarus, R. (1981). Comparison of two modes of stress measurement: Daily hassles and uplifts versus major life events. Journal of Behavioral Medicine, 4, 1-39.

Kaplan, H.I. & Sadock, B.J. (Eds.) (1995). Comprehensive textbook of psychiatry/VI. Sixth Edition. Vols 1 & 2. Blatimore: Williams & Wilkins.

Karasek, R. & Theorell, T. (1990). Healthy work - stress, productivity and the reconstruction of working life. New York: Basic Books.

Kathi, G. (1994). Food Plan. Drug Topics, 1328.

Kearns, J.L. (1973). Stress in industry. London: Priory Press.

Kobasa, S.C. (1979). Stressful life events, personality and health: An enquiry into hardiness. Journal of Personality and Social Psychology, 37, 1-11

Kreuse, M.J., Dale, J. & Straw, S.E. (1989). Psychiatric diagnosis in patients who have chronic fatigue syndrome. Journal of Clinical Psychiatry, 50, 53-56.

Kugelmann, R. (1992). Stress: The nature and history of engineered grief. Westport: Praeger Publishers.

Lazarus, R.S. (1966). Psychological stress and the coping process. New York: McGraw Hill.

Lazarus, R.S. (1981). Little hassles can be hazardous to your health. Psychology Today, (July) 58-62.

Leatz, C.A. & Stolar, M.W. (1993). Career Success/personal stress - How to stay healthy in a high stress environment. New York: McGraw Hill.

Lettko, M. & Mever, S. (1990). Vitamin B induced prevention of stress-related immunosuppression: Results of a double blind clinical study. Annals of the New York Academy of Sciences, 58, 513-515.

Levine, S. & Scotch, N.A. (1970). Social stress. Chicago: Aldine Publishing.

Levinson, H. (1964). Executive stress. New York: Harper & Row.

Locke, S.E., Krause, L., Leserman, J., Hurst, M.W., Heisel, S. & Williams, M. (1984). Life change stress, psychiatric symptoms and natural killer cell activity. Psychosomatic Medicine, 46, 441-453.

Marshall, J. & Cooper, C.L. (1979). Executives under pressure. London: Macmillan Press.

Maslach, C. & Jackson, S.E. (1981). The measurement of experienced burnout. Journal of Occupational Behavior 2, 99-113.

- Mathews, K.A. (1988). Coronary heart disease and Type A behaviors: Update on and alternative to the Booth-Kewley and Friedman (1987) Quantitative Review. Psychological Bulletin, 104, 373-380.
- McCrae, R.R. (1984). Situational determinants of coping responses: Loss, threat and challenge. Journal of Personality and Social Psychology, 46, 919-928.
- McCrae, R.R. & Costa, P.T. (1986). Personality, coping and coping effectiveness in an adult sample. Journal of Personality, 54, 385-405.
- McDonald, N. & Doyle. (1981). The stresses of work. Surrey: Nelson.
- McDougall, J.M., Dembroski, T.M., Dimsdale, J.E. & Hackett, T.P. (1985). Components of Type A, hostility, and anger: Further relationships to angiographic findings. Health Psychology, 4, 137-152.
- McDowell, I. & Newell, C. (1996) Measuring health: A guide to rating scales and questionnaires. New York: Oxford University Press.
- Miller, S.M. (1987). Monitoring and blunting: Validation of a questionnaire to assess styles of information seeking under threat. Journal of Personality and Social Psychology, 52, 345-352.
- Miller, S.M., Brody, D.S. & Summerton, J. (1988). Styles of coping with threat: Implications for health. Journal of Personality and Social Psychology, 54, 142-148.
- Mothersbaugh, D.L., Hermann, R.O. & Warland, R.H. (1993). Perceived time pressure and recommended dietary practices: The moderating effect of knowledge of nutrition. Journal of Consumer Affairs, 27, (1) 106-126.
- Nezu, A.M. & Ronan, G. F. (1985). Life stress, current problems, problem solving, and depressive symptoms: An integrative model. Journal of Consulting and Clinical Psychology, 53, 693-697.
- Nezu, A.M. (1986). Negative life stress and anxiety: Problem solving as a moderator variable. Psychological Reports, 58, 279-283.
- Nowack, K.M. & Pentkowski, A.M. (1994). Lifestyle habits, substance use and predictors of job burnout in professional working women. Work and Stress, 8, (1). 19-35.
- Parkes, K.R. (1986). Coping in stressful episodes: The role of individual differences, environmental factors, and situational characteristics. Journal of Personality and Social Psychology, 51, 1277-1292.
- Pervin, L.A. & Lewis, M. (Eds.) (1978). Perspectives in interactional psychology. New York: Plenum Press.
- Popovic, I.C. (1993). Neurotrope Vitamin-Mineralstoff-Kombination in der Stress-Therapie. Schweiz Zeitschr Ganzh Med, 3.

- Prokop, C.K., Bradley, L.A. Burish, T.G. Anderson, K.O. & Fox, J.E. (1991). Health psychology: clinical methods and research. New York: McMillan.
- Reber, A.S. (1985). Dictionary of psychology. Middlesex: Penguin Books.
- Rhodewalt, F. & Zone, J.B. (1989). Appraisal of life change: depression and illness in hardy and non-hardy women. Journal of Personality and Social Psychology, 56, 81-88.
- Rice, P.L. (1992). Stress and health. (2nd ed.). California: Brooks/Cole Publishing.
- Rippetoe, P.A. & Rogers, R.W. (1987). Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. Journal of Personality and Social Psychology, 52, 596-604.
- Roberts, G.A. (1986). Burnout: Psychobabble or valuable concept. British Journal of Hospital Medicine, 36, 194-197.
- Roche. Berocca Stress Index Survey. Roche Products (Pty) Ltd., Isando, Johannesburg.
- Rosenbluh, E.S. (1984). Intervener Survival: Depression, anxiety and sleep problems: A relationship to the post-traumatic stress syndrome. Emotional First Aid - A Journal of Crisis Intervention, 1, (3) 60-65.
- Roth, S. & Cohen, L.J. (1986). Approach, avoidance and coping with stress. American Psychologist, 41, 813-819.
- Rotter, J.B. (1966). Generalised expectancies for internal versus external control of reinforcement. Psychological Monographs: General and Applied, 80, 1.
- Scheier, M.F. & Carver, C.S. (1985). Optimism, coping and health: Assessment and implications of generalized outcome expectancies. Health Psychology, 3, 219-247.
- Scheier, M.F., Weintraub, J.K. & Carver, C.S. (1986). Coping with stress: Divergent strategies of optimists and pessimists. Journal of Personality and Social Psychology, 51, (6) 1257-1264.
- Schlebusch, L. (Ed.) (1990). Clinical health psychology - A behavioural medicine perspective. Halfway House: Southern Book Publishers.
- Schlebusch, L. (1997) Stress, Change and Nutrition. Earthyear. The essential environmental guide, Edition 15: 54-59
- Schlebusch, L. (Ed.) (1998) South Africa Beyond Transition. Psychological Well-being. Psychological Society of South Africa. Pretoria.
- Schlebusch, L. (1998). Proverbial stress busters. Capetown: Human and Rousseau.

APPENDIX A

THE STRESS SYMPTOM CHECKLIST

Make a **✓** if you experience the symptoms *often* (at least once a week or more), and an **X** if you experience it *sometimes* (less than weekly, but at least monthly). Do you experience:

PHYSICAL REACTIONS			
- UNUSUAL TIREDNESS	- HIGH BLOOD PRESSURE	- UNEXPLAINED NAUSEA	
- APATHY/LACK OF ENTHUSIASM	- SEXUAL PROBLEMS	- FREQUENT INDIGESTION	
- BREATHLESSNESS FOR NO REASON	- UNEXPLAINED HEADACHES/PAIN	- ERRATIC BOWEL FUNCTION	
- FEELINGS THAT YOUR APPEARANCE HAS ALTERED FOR THE WORSE	- FEELING FAINT OR UNUSUALLY WEAK FOR NO REASON	- EXCESSIVE PERSPIRATION FOR NO REASON	
- DIFFICULTY IN RELAXING	- MUSCLE TENSION	- DIZZY SPELLS FOR NO REASON	
- DISTURBING DREAMS/NIGHTMARES	- FEELING PHYSICALLY UNWELL	- FEELING TIGHT-CHESTED FOR NO REASON	
PSYCHOLOGICAL REACTIONS			
- FEELINGS OF HELPLESSNESS	- FEELINGS OF DISLIKING YOURSELF	- FEELINGS THAT YOU ARE A FAILURE	
- FEELINGS OF DEPRESSION	- BEING AFRAID OF DISEASE	- FEELING YOU CAN'T COPE	
- FEELINGS THAT NO ONE UNDERSTANDS YOU	- AN INCREASE IN COMPLAINTS ABOUT WHAT HAPPENS TO YOU	- FEELINGS THAT OTHER PEOPLE DISLIKE YOU	
- FEELINGS OF GENERAL ANXIOUSNESS	- LOW SELF-ESTEEM/LOW OPINION OF YOURSELF	- FEELINGS OF CONFUSION	
- PHOBIAS (IRRATIONAL FEARS)	- FEELINGS OF BEING GOSSIPED ABOUT	- FEELINGS OF CONCERN MAINLY FOR YOURSELF	
- AWKWARD FEELINGS WHEN CLOSE TO OTHERS	- BEING OVER SELF-CRITICAL	- FEELINGS OF FREQUENT CRITICISM	
- FEELINGS THAT YOU HAVE FAILED IN YOUR ROLE AS A PARENT, SPOUSE, CHILD EMPLOYEE, EMPLOYER	- FEELINGS THAT NO ONE WANTS TO WORK WITH YOU	- FEELINGS THAT YOU HAVE BEEN NEGLECTED OR LET DOWN	
- PANICKY FEELINGS	- FEELING TENSE AND KEYED-UP	- FEELINGS OF LONELINESS AND NO ONE TO TALK TO	
- BEING UPSET BY DISEASE IN OTHERS	- PERSISTENT GUILT	- A LACK OF SELF-CONFIDENCE	

BEHAVIOURAL REACTIONS

BEHAVIOURAL REACTIONS			
- MEMORY LOSS/ FORGETFULNESS	- DIFFICULTY IN MAKING UP YOUR MIND	- DISINTEREST IN OTHER PEOPLE	
- POOR LONG TERM PLANNING	- DIFFICULTY IN SHOWING/EXPRESSING YOUR TRUE FEELINGS	- SUPPRESSED OR UNEXPRESSED ANGER	
- POOR CONCENTRATION	- WORRYING	- FEARFULNESS	
- INCONSISTENCY	- SOCIAL WITHDRAWAL	- POOR DECISION MAKING	
- INABILITY TO MEET DEADLINES	- MAKING UNNECESSARY MISTAKES	- UNCO-OPERATIVE RELATIONSHIPS	
- POOR TIME MANAGEMENT	- THE NEED TO REGULARLY WORK LATE	- FEELING DISGRUNTLED/ MOODY/IRRITABLE	
- PROCRASTINATION	- POOR WORK QUALITY	- EMOTIONAL OUTBURSTS	
- THE NEED TO CONSTANTLY TAKE WORK HOME	- DIFFICULTY IN COMPLETING ONE TASK BEFORE RUSHING ON TO THE NEXT	- GREATER USE OF ALCOHOL, CAFFEINE, NICOTINE, MEDICINES TO COPE	
- POOR PROBLEM SOLVING SKILLS	- THE NEED TO CANCEL LEAVE	- FIDGETING/ RESTLESSNESS	
- ACCIDENT-PRONENESS	- NAILBITING	- UNPREDICTABILITY	
- LOW INTEREST IN WORK	- AN EXCESSIVE APPETITE	- A LOSS OF APPETITE	
- A DROP IN PERSONAL STANDARDS	- ENGAGING IN FREQUENT CRITICISM OF OTHERS	- THE NEED TO CRY FOR NO REASON	
- INCREASED AGGRESSIONESS	- FRANTIC BURSTS OF ENERGY	- TICS/NERVOUS HABITS	
- LACK OF INTEREST IN LIFE	- LITTLE SENSE OF HUMOUR	- SLEEP DISTURBANCES	

Rate the PRESENT INTENSITY of your stress somewhere along the scale below. Choose any number between lowest intensity (1) to highest intensity (10). Circle only one number along the scale below:



Patient No:

Date:

APPENDIX B
INFORMED CONSENT FORM

I (Name) hereby consent to the following Procedure and/or Treatment being conducted on myself.

I acknowledge that I have been informed by:

concerning the possible advantages and possible adverse effects which may result from the abovementioned procedure and/or treatment and of the ways in which it is different from the conventional procedure and/or treatment.

I hereby acknowledge that I understand and accept the "Information to Patients" leaflet handed to me in connection with this trial.

I agree that the above procedure and/or treatment will be carried out and/or supervised by

I acknowledge that I understand the contents of this form, including the information provided in the "Information to Patients" leaflet and as the *PATIENT PARENT
GUARDIAN OTHER (Specify) _____ freely consent to the
above procedure and/or treatment being conducted on:

(Name)

I am aware that I may withdraw my consent at any time without prejudice to further care.

Signed: _____
Patient/Parent/Guardian

Date: _____

Signed: _____
Witness

Date: _____

Signed: _____
Informant

Date: _____

Signed: _____
Researcher

Date: _____

APPENDIX C

BIOGRAPHIC/DEMOGRAPHIC QUESTIONNAIRE

CASE REPORT FORM

Trial started on (date): _____
Trial ended on (date): _____

This profile contains questions that will help us to better understand your unique situation. Please read and answer each and every question carefully, and print your answers clearly. If you feel that something needs to be clarified or added, please feel free to provide additional information. Please be complete and detailed.

DEMOGRAPHIC INFORMATION

- (1) Name: _____ (2) Age: _____
- (3) Address: _____
- (4) Home phone: _____ (5) Work phone: _____
- (6) Birth date: _____ (7) Sex: Male Female
- (8) Marital Status: Married Remarried
 Separated Widowed
 Single Divorced
- (9) Ethnic group: White Black Coloured Asian
 Other _____
- (10) With whom do you live? _____
- (11) How many children do you have? _____
- (12) Present or most recent occupation: _____
- (13) Spouse's occupation: _____
- (14) Present religious affiliation: _____
- (15) Religious background: _____
- (16) What is your current employment status?
 1. Employed full time
 2. Employed part time
 3. Retired
 4. Homemaker
 5. Unemployed due to stress
 6. Unemployed for other reasons (describe): _____
- (17) Has your stress forced you to give up or change your type of work? Yes No
- (18) If unemployed, how long have you been out of work? Months (No. ____) Years (No. ____)
- (19) Are there any immediate reportable adverse events?
If yes, specify: _____
- Reported to: _____ Date: _____
- (20) Are there any protocol violations?
If yes, specify: _____
- Reported to: _____ Date: _____

APPENDIX D
OPEN LETTER TO PARTICIPANTS

Dear Participant,

We are conducting a study of stress among South Africans to ascertain the factors that contribute to their stress, the effects of stress on coping, as well as the role of essential micronutrients on the ability to cope.

Often when people are under stress, certain essential nutrients are depleted. This study is designed to help you cope psychologically with stress in this regard. We would like to measure your stress levels with certain psychological questionnaires. Thereafter you would be required to supplement your diet with a daily tablet of Berocca Calmag (which consists of vitamins and minerals) for thirty days. At the end of this period we will measure your stress levels again with the same psychological questionnaires to see if you are able to cope better with your stress. You are free to decline to participate or to withdraw at any time without suffering any disadvantage or prejudice to treatment. All information obtained will be treated with the utmost confidentiality.

Thank you for your co-operation.

Sincerely

L Schlebusch
PROFESSOR AND HEAD
DEPARTMENT OF MEDICALLY APPLIED PSYCHOLOGY
FACULTY OF MEDICINE
UNIVERSITY OF NATAL
DURBAN
SOUTH AFRICA

APPENDIX E
BEROCCA STRESS INDEX SURVEY

AGE: 16-20 35-39
 21-24 40-44
 25-29 45-49
 30-34 50+

SEX: Male Female

HOW DO YOUR STRESS LEVELS COMPARE WITH THOSE OF THE POPULATION IN GENERAL? FILL IN THIS QUESTIONNAIRE AND WE'LL GIVE YOU YOUR PERSONAL STRESS INDEX FREE OF CHARGE!

PEOPLE USE DIFFERENT WORDS TO DESCRIBE HOW THEY FEEL BOTH EMOTIONALLY AND PHYSICALLY. PLEASE GO THROUGH THIS LIST, AS QUICKLY AS POSSIBLE, AND ✓ IN COLUMN 1 ALL THOSE WORDS OR PHRASES WHICH DESCRIBE HOW YOU HAVE BEEN FEELING OVER THE PAST 3 TO 4 DAYS.

BEROCCA STRESS INDEX SURVEY: I

	1	2
Able to relax		
Alive		
Calm		
Cheerful		
Concerned		
Daring		
Decisive		
Depressed		
Difficulty in falling asleep		
Difficulty in staying asleep		
Drinking more tea and coffee		
Easily startled		
Easy going		
Eating and drinking habits much as always		
Energetic		
Fall asleep easily		
Feeling keyed-up and on edge		
Feeling shaky or trembly		
Feeling tired when you wake up		
Feelings of being unworthy		
Feelings of emotional emptiness		
Fine		
Frightened		
Frustrated		
Generally healthy		
Get tired easily		
Good appetite		

	1	2
Guilty		
Happy		
Headaches		
Heartburn/Indigestion		
Hopeless		
Hostile		
Irritable		
Joyful		
Lonely		
Loss of appetite		
Mind goes blank or memory problems		
Neck and backache		
Nervous		
Nightmares		
No real stomach problems		
Optimistic		
Panicky		
Poor concentration or easily distracted		
Rebellious		
Restless or fidgety		
Sad		
Sleep well		
Stomach upsets/diarrhoea		
Troubled		
Using more alcohol or tobacco or tranquillizers or drugs		

NOW GO THROUGH THE LIST AGAIN, AND IN COLUMN 2, ✓ THOSE WORDS WHICH BEST DESCRIBE HOW YOU HAVE GENERALLY FELT OVER THE LAST 1 TO 2 MONTHS. JUST ✓ THE ONES THAT HAVE BEEN THE *MAIN* THINGS YOU HAVE FELT.

APPENDIX F

SOURCES OF STRESS

DEFINITION OF STRESS / STRESSOR

Stress is your physiological, psychological, and behavioural reactions when you attempt to adapt and adjust to internal and/or external demands or pressures that you cannot cope with. A stressor can be any event, situation, person etc. that you perceive as stressful and induces your stress reaction.

DETERMINING YOUR STRESSORS

1. List your FIVE most common STRESSORS and their REASONS.

	STRESSORS	REASONS
a)		
b)		
c)		
d)		
e)		

2. Rate how much your stressor(s) interfere(s) with your activities: the one which best fits each column.

WORK	FAMILY CHORES	RELAXATION	
			Continuously
			Several times a day
			Once a day
			Several times a week
			Several times a month
			Once monthly
			Less than once monthly
			Never

3. In general, how likely do you feel that your stress will be decreased or better managed during the next month? Circle one of the following:

Unlikely Impossible Certain Uncertain Likely

4. If it is not possible to completely alleviate your stress (that is to a rating of 0%), what percentage of stress is an acceptable stress level for you to live with?