

The Stress, Power, Environment, Arousal Checklist (SPEAC):

A Three Model Measurement of Stress

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Greg Purvis**

Saint Mary's University



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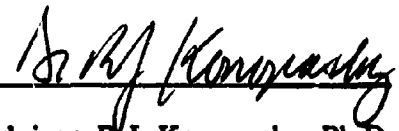
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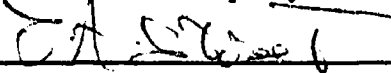
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Abstract

The Stress, Power, Environment, Arousal Checklist (SPEAC):

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The literature on stress can be organized according to three models : stress as a stimulus, stress as a response, and stress as an interaction between stimuli and responses (Cox, 1978; McGrath, 1970). Each model of stress employs different measures of stress, for example, the Schedule of Recent Life Events (Holmes & Rahe, 1967), consistent with the stimulus model, records the number and kind of life events, whereas a different measure, the amount of catecholamine found in a subject's urine, is appropriate to the response model (Frankenhaeuser, 1975).

This study offers a major revision of the Checklist of Arousal, Stress, and Power - Revised (CLASP-R) (Wheeler, unpublished masters thesis, 1988), a measure which was developed to represent all three models. While the Checklist of Arousal, Stress, and Power (CLASP) (Konopasky & McGovern, 1989) and the CLASP-R offered scales measuring arousal, stress, and power, several items comprising these tests showed small loadings on the appropriate factors.

This study introduces a test which offers measures of stress as a stimulus, that is, the environment, stress as a response, that is, arousal, and stress as an interaction between stimulus and response, that is, power. It also offers a "summary scale", of stress which allows the subjects to report their judgement of their stress. First and second drafts of the

SPEAC were administered to 100 and 95 students, respectively, at Saint Mary's University. Their responses to these tests were factor analyzed and items showing

insignificant loadings on the appropriate factors were replaced by new items.

The revised SPEAC was then administered to 491 students at Saint Mary's University. Their responses were factor analyzed and six monopolar factors were identified: (a) high arousal, (b) low arousal, (c) high stress, (d) low stress, (e) high power, and (f) low power. Responses to the environmental scale were factor analyzed separately; the results demonstrated that the "environment" consists of a multitude of independent factors which may contribute to stress.

Finally, in a separate study, the SPEAC and the SACL (Mackay, Cox, Burrows & Lazzerini, 1978) were administered to 48 Saint Mary's University students. Scores of the stress and arousal scales of the SPEAC were compared to those of the SACL, and the significant correlations ($p \leq 0.001$) suggest that these scales measure the same factors.

Stress is pervasive, being associated with many life events (Tausig, 1982; Zimmerman, 1983), and it is a serious threat to health (Hawkins, Davies & Holmes, 1957; Stein & Charles, 1971). While there has been long-term interest in stress, the lack of a universal definition and a universal measure of stress have impeded research on its identification and treatment. This study reviews definitions, models and measures of stress. A global and inclusive definition is offered along with a broad, three-factor measure.

History

The word "stress" has a long history and is believed to have been derived from the Latin root "stringere" meaning to draw tight. As early as 1303 A.D. the poet Robert Mannyng used the word stress in his work entitled "Handlyng Synne", when he wrote, "yn hard stres" to describe the hardships incurred during winter survival in the wilderness.

The Oxford English Dictionary of the 15th century defined stress as "physical strain or pressure", and related this term to the fields of architecture and engineering. Over the next few centuries, the definition of stress was broadened. In 1704 the concept of stress was applied to people and not just used to describe a force on inanimate objects. By the mid 19th century, the concept of stress included "a strain upon a bodily organ or mental power". Even here, it should be noted that while the usage of the word was broadened, the emphasis was still on external events or forces having impact "on" or "against" an individual.

Selye (1950), an endocrinologist, changed this focus through a series of experiments, papers, and books. He defined stress as an organism's response to an external force and not the external force itself. Shaffer (1982) refers to this "reversal" of the traditional definition of stress as Selye's most significant accomplishment. The contribution made by Selye (1950, 1956, 1970) in the understanding of stress is impressive, however, this concept is opposed by those who still view stress as a force or

agent acting upon something (Welford, 1973). Further "opposition" comes from a new definition of stress by several researchers (Cox, 1978; Lazarus, 1966; McGrath, 1976) who proposed that stress is neither the stimulus of an external force, nor the organism's response to an external force; it is, rather, the interaction between the stimulus and the response. This new definition defines stress as a maladaptive cognitive and dynamic interaction between stimulus and response.

A review of the scientific literature on stress indicates that three valid models of stress are apparent (Cox, 1978; McGrath, 1970): The first model suggests that stress is a stimulus and that it varies according to noxious or disturbing characteristics of the environment; in this model, stress is an independent variable. The second model of stress suggests that stress is a response to the environment, rather than a stimulus from the environment. In this model, stress is a dependent variable and varies according to the adaptive or the nonadaptive characteristics of the response. The third model suggests that stress is an interaction between stimuli and responses. Cox (1978) describes stress "as a lack of fit between a person and his environment" (p. 3).

Models of Stress

Stress as a Stimulus

Supporters of the stimulus-based models of stress describe stress in terms of stimulus characteristics which are noxious or disturbing. This early model, derived from an engineering model, in which external stressors act upon an individual producing a strain or a stress reaction, is the one usually referred to in everyday conversation. Symonds (1947), describing this view of stress, stated that, "It should be understood once and for all that (flying) stress is that which happens to the man, not that which happens in him; it is a set of causes, not a set of symptoms".

This "engineering" model of stress is consistent with Hooke's Law of Elasticity (Cox, 1978), which describes how a demand, that is, "stressors" placed on a metal produces a deformation or "a strain". This law states that if the strain placed on a metal by a stressor is within the elastic limit of that metal, the metal will simply return to normal when the stressor is removed. However, if the stressor exceeds the elastic limit of the metal, permanent damage will result. The parallel human example of this law states that just as physical systems have their elastic limits to stress, so do people. People can tolerate stress to a certain limit but, when this limit is exceeded, permanent psychological and/or physiological damage may result. Individuals do seem to vary greatly in their ability to cope with stress and what one person may find tolerable may be completely intolerable to another.

The foundation for research on the effects of stress as a stimulus was laid by Cannon (1929) in his observations of bodily changes of an individual experiencing pain, hunger, and major emotions. Cannon (1929) stated that, "derangement of bodily functions in strong emotional reactions can be interpreted as due to persistence of the stimuli which evoke the reactions". Cannon's most important contribution to this field of study was finding that stimuli associated with emotional arousal causes physiological change in individuals. However, it was not until Meyer (1951) developed a "life chart", that life events were considered important with respect to the etiology of a disorder. Meyer suggested that life events need not be catastrophic to be a contributor to pathology, and that even normal life events are potential contributors.

Popkin, Stillner, Pierce, Williams and Gregory (1976) investigated the effects life events had on the performance of 25 subjects participating in a dog-sled race. The researchers found that there was an inverse relationship between the order of finish and the number of life stressors experienced by the subjects in the year prior to the race. Similarly, Levenson, Hirschfield, Hirschfield, and Dzubay (1983) found that industrial accidents

were usually experienced by employees who had had an increase in life changes prior to the accident.

Other, more current, studies indicate a relationship between life events and physiological pathology (Byrne & Whyte, 1980; Hawkins, Davies & Holmes, 1957; Stein & Charles, 1971; Stevenson, Nabseth, Masuda & Holmes 1979). According to these studies, life change was related to tuberculosis, diabetes, chronic yeast infections, stomach ulcers, and myocardial infarctions. Zimmerman (1983) and Tausig (1982) have also demonstrated that life stress contributes to psychological pathology, dysphoria and depression.

Stress is not restricted to "damaging" life events; it can also refer to conditions which are discomforting. Commonly mentioned stressful situations involve extremes of sensory stimulation and work load, the extremes often characterized as: too noisy, too hot, too cold, too humid, or too dry. Weitz (1970) identified eight types of stress: (a) speeded information processing; (b) noxious environmental stimuli; (c) perceived threat; (d) disrupted physiological function; (e) isolation and confinement; (f) blocking; (g) group pressure; and (h) frustration. Lazarus (1966, 1976) saw perceived threat and, in particular, threat to a person's most important values and goals, as the central characteristic in stressful situations. Frankenhaeuser (1975) added lack of control to Weitz's list. These researchers use stress as a stimulus model and view stress as demands made upon the person by the environment.

A variant of the stimulus based model of stress shifts the focus from the "absolute " characteristics of the stimulus to "departure" from some ideal level. Welford (1973) proposed that humans, like most organisms, function best under moderate stress. Sub-optimal performance in an individual may be due to either too high, or too low a level of demand. Both positive and negative departures from the optimum produce stress when

they are not quickly or easily corrected. Stress can occur, for example, when an individual is consistently busy or consistently inactive in the workplace.

Similarly, Margetts (1975) defined stress in terms of stimulus input which allows an individual to function normally. To achieve this, input must be "within the limits" of the individual. However, if the stimulus input should fall outside of these limits, the excess or insufficiency of the stimulation can be described as stress. If the organism cannot manage the excessive or insufficient stimulus input, it will go into a state of disequilibrium. This state of disequilibrium may be temporary, or, if experienced over an extended period of time, may lead to functional or physiological pathology.

Although the engineering analogy to stress is appealing, Cox (1978) pointed out two important limitations of this analogy: Stressful situations do not seem to have any one variable in common, undemanding or boring situations are as stressful to many individuals as situations involving excessive demand; secondly, the character of the people involved seemed to moderate the impact of the stressor. Some researchers have found character "strengths" to be an important factor in stress tolerance. Korchin and Ruff (1964) concluded that the backgrounds and personality characteristics of the Mercury Astronauts contributed significantly to their extraordinary stress tolerance. They were characterized as: ambitious, able, intelligent, successful, free from self-doubts, persevering, highly controlled and accurate in their testing of reality. Little or no impairment of the astronauts' performance was observed, nor was there any change in their characteristic positive moods when these astronauts were placed in stressful situations. The astronauts observed in this study reacted to stressful events by: (a) discontinuing the event; (b) appraising the event; (c) deciding on the appropriate action to take; and (d) following the event through. The researchers concluded the demanding and stimulating backgrounds of these astronauts contributed to their high tolerance of stress (Korchin & Ruff, 1964). Finally, Cox (1978) suggested that unless people experience the stress-strain relationship as both unconscious

and automatic, there must be a psychological process which mediates the outcome of that relationship.

In reviewing this literature, it appears obvious that life events can be related to physiological pathology, psychological pathology, and individual performance. Several studies have determined the relationship between life stress and pathology, thus adding credibility to these measures of stress. Edwards (1971) found life stress to be related to seriousness of pregnancy and birth complications and Vinokur and Selzer (1975) found it correlated with measures of anxiety and depression. However, this model of stress is not without obvious problems, for example, the identification of everyday situations which are stressful, identification of the common character of these situations, and determination of the amount of stress caused by each. Another problem is that some stimuli evoke the appropriate response in most, but not in all individuals. Highlighting this point, Cox (1978) stated, "If stress resides in the stimulus, why do not all people show the same effects if subjected to it?" (p. 17).

Stress as a Response

Stimulus based definitions of stress view it as environmental stimuli which act on the individual in a noxious or disruptive manner. Opposed to this position is the model which suggests that stress is a response to non-specific stimuli. The response based model of stress equates it with the body's response to any given demand (Selye, 1950).

The concepts developed by Cannon (1929) and reported by Appley and Trumbell (1967), which demonstrated the association of arousal and changes in physiology, have often been credited with laying the groundwork for response based stress research. Kagan and Levi (1971), at The International Symposium on Society, Stress and Disease, described stress as "the physiological state that prepares the organism for action" (p. 9). However, it was not until the early writings of Selye (1956), that this model of stress

gained popularity. Selye (1956) perceived stress as the non-specific physiological response of the body to the non-specific demands of the environment. The physiological stress response does not depend upon the nature of the stressor, nor does it depend upon the species in which it was evoked. Selye noted a "general malaise" associated with being ill, regardless of the specific nature of the illness. This general syndrome of illness was characterized by the following: (a) loss of appetite; (b) associated weight loss and weakness; (c) loss of ambition; and (d) a recognizable facial expression associated with illness. Further research led to the discovery of these additional characteristics: (a) enlargement and discoloration of the adrenals; (b) intense shrinkage of the thymus, spleen and lymph nodes; and (c) bleeding ulcers.

Selye's (1983) concept of stress consists of three distinct phases collectively known as the General Adaptation Syndrome (GAS). The GAS consists of three phases: the alarm reaction, resistance and exhaustion (Selye, 1956). The alarm reaction is the first phase and is indicated by bodily changes characteristic of initial exposure to the stressor. The alarm reaction phase is divided into a shock phase and a counter shock phase. During immediate reaction to the stressor, the shock stage, the following symptoms are usually present: (a) tachycardia; (b) loss of muscle tone; (c) decreased temperature; and (d) decreased blood pressure. The countershock phase mobilizes the organism's defenses for a rebound reaction. This rebound reaction is marked by an enlargement of the adrenal cortex and an increase in the secretion of corticoid hormones. If the stressor is too severe, resistance may collapse and death results. If, however, the organism survives this initial stage of stress, the phase of resistance will ensue.

The second stage of the GAS, resistance, is characterized by the improvement or disappearance of the symptoms of shock. The manifestations of the alarm phase, for example, the discharge of secretory granules from the adrenal cortex into the bloodstream,

disappear and are replaced by the quite different bodily changes of the resistance phase such as the cortex becoming rich in secretory granules.

The final aspect of the Selye (1956) theory states that if defense responses are prolonged and severe, they will result in a disease state called "the diseases of adaptation". Illness occurs when the maintenance of defense responses extends beyond the organism's physiological limits. Continued exposure to the stressor however, may result in the loss of this acquired adaptation and the organism will progress to the final stage of the GAS, exhaustion. If the same stressor is severe and prolonged, the signs of the alarm reaction will reappear. In the event that the stressor continues to exceed the limits of adaptability, death will result.

Similar to the response based model proposed by Selye (1956), Kagan and Levi (1971) identified the physical stress responses as the causes of functional and structural damages, and even death. They constructed a complex response model of stress describing psychological factors involved in the etiology of physical disease, while maintaining Selye's (1956) construct of non-specific responses to environmental stressors. A "psychobiological program" is produced when external influences interact with genetic factors and early life experiences. The combination of psychosocial stimuli and the "psychobiological program" determines the occurrence of the stress response, which then may produce the symptomology of disease and then disease itself (Kagan & Levi, 1971).

The enthusiasm for the response based theories of stress began to subside in the late 1970's. This wane in interest was due to a number of weaknesses of the response based theories of stress, including the interindividual and intraindividual differences in responses to identical stressors. Cox (1978) reiterated these concerns when he stated that this lack of consistency among the components of the stress response across individuals, or within individuals across situations, was distressingly poor. Mason (1971) found evidence that some noxious physical conditions, for example, exercise, fasting and heat, do not produce

the general adaptation syndrome. Research conducted by Lacey (1967) demonstrated that not all of the symptoms of the general adaptation syndrome necessarily appear together.

In summation, stress, defined as a response, is concerned with the specification of a response or pattern of responses, which may be taken as evidence that a person is under pressure from his/her environment. The two most popular theories on this model of stress are Selye's (1956) nonspecific stress response, and Kagan and Levi's, (1971) extension of Selye's model to include a psychobiological program.

Stress as An Interaction Between Stimuli and Responses.

The stimulus and response based theories of stress share the common weakness of a narrow field of focus: the stimulus theories focus solely on the environment, and the response based theories focus solely on the organisms response to the environment. These simplistic models overlook the fact that humans perceive the "stressors" and react, in part, to their perception of the stimulus. In addition, one reacts to the "stressor", in part, based on the an assessment of the resources or power available to oneself.

The interactional model of stress proposes that the dynamic interaction between stimulus and response, and an individual's perception of the interaction, determines stress (Cox, 1978). Although this eclectic model draws from response and stimulus based models, it is more than a simple combination of the two. The emphasis in the interactional model is on the transactional nature of stress. Cox (1978) described stress as an individual perceptual phenomenon based in psychological processes. This model differs from the two previous models because the feedback components of this model make it dynamic rather than linear. Stress occurs when an imbalance exists between a perceived stressor and the individual's perception of his/her ability to successfully deal with that stressor.

Other proponents of this approach such as McGrath (1976) and Lazarus (1976), emphasize that stress does not occur until an individual perceives the discrepancy between the demand and their ability to deal with the demand. The critical feature of this model is not the absolute "demand" of the stimulus, nor the actual capability of the individual to respond productively, but the individual's perception of the demand and their own capability. In other words, if a demand is placed on an individual that exceeds his/her capabilities to respond effectively, but the individual does not appreciate this problem, no stress is experienced. Stress will not be experienced by the individual until he/she realizes the demand is beyond their capabilities.

McGrath (1976) suggested a similar interactional model of stress to the one developed by Cox and Mackay (1981). McGrath (1976) theorized that there is a potential to experience stress when a demand is perceived as exceeding the person's capabilities, and when it is important that the person meet the demand. It was initially thought that a minor discrepancy between perceived demand and perceived capability would not be experienced as stressful. But, research by Lowe and McGrath (1971) led McGrath (1976) to conclude that the closer the perceived demand is to one's perceived capabilities, the greater the stress experienced; larger "gaps" between demand and capability were less stressful. This theory has become known as the theory of minimum discrepancy, maximum stress.

A model showing a similar emphasis on the interactional view of stress has been proposed by Lazarus (1976). He suggested that stress occurs when there are demands on a person which tax or exceed the capacity to cope. Stress, in this case, not only depends on the demands of the external environment, but on the individual's ability to cope. In the development of this theory, Lazarus emphasized the individual's appraisal of the situation. In appraising a situation, an individual is influenced by the following: (a) frustration (danger or harm which has already occurred); (b) conflict (simultaneous presence of two or more inconsistent goals); and (c) threat (the anticipation of harm occurring).

Cox and Mackay (1981) describe five recognizable stages in their interactional model of stress. The first stage is characterized by the demand made on the person by the environment. Demand is divided into two components: the external demands of a person's environment; and the internal demand produced by psychological and physiological needs of the individual.

The second stage is comprised of the individual's perception of the demand and coping ability. Stress arises when an imbalance exists between perceived demand and perceived ability. This perceptual factor allows for a wide variety of organism variability. One's personality can contribute to the existence of interindividual differences. For example, a person who is very money-conscious may become quite stressed over small financial "discrepancies"; conversely, a person who is less concerned with financial matters may experience no stress.

The third stage occurs when the subjective experience of stress is accompanied by changes in physiology plus cognitive and behavioral attempts to alleviate the experience of stress. These psychophysiological changes represent the response to stress and should be regarded as the methods of coping available to an individual.

The fourth stage, the consequences of coping, was described by Sells (1970) as the anticipation of adverse consequences, pending the failure to meet the demand.

The fifth and final stage, is feedback. Feedback occurs during all of the above stages and is one of the factors which determines the appropriate coping response. If the organism has the capacity to show the appropriate coping response, such feedback will shorten the stress response and may even lessen its severity.

A similar transactional model of stress has been proposed by Howarth (1978). He suggests the existence of four sources of stress: (a) the biological; (b) the developmental; (c) the social; and (d) the phenomenological. Imbalance between perceived demands and perceived capabilities can occur for a number of reasons: (a) biologically, stress may occur

if one's lifestyle differs significantly from those to which one's primitive ancestors were adapted; (b) developmental stress may arise if individuals are not adequately prepared by their early learning experiences for their lifestyle demands; (c) social stress may occur if individuals are forced into inconsistent social roles, or because of conflicting social pressures; and, (d) phenomenological stress may occur when individuals fail to meet their aspirations or live up to their individual ideologies.

In summation, the interactional model of stress views perception and appraisal as intervening variables between an individual's response and the stimulus to which he or she is responding. Depending on the intervening variables, an individual will or will not experience stress.

Measures of Stress

Not only have various definitions of stress been extensively investigated, much attention has also been directed to the measurement of stress. The types of measurement used by researchers is clearly contingent upon the definition of stress advocated. Measures of stress are discussed below in terms of the same three broad models: stress as a stimulus, stress as a response and stress as an interaction between stimuli and responses.

Measures of Stress as a Stimulus

Measures of stress consistent with a stimulus based model include measures of events or conditions to which people are subjected, for example, temperature, noise, work, isolation, and life events, such as the death of a loved one. The life chart developed by Meyer (1951) appears to be the first attempt to measure stress as a stimulus. Meyer postulated that a life event does not have to be catastrophic, as even normal, necessary life events can be potential contributors to pathology.

Probably the most utilized life events assessment instruments are the Schedule of Recent Life Experiences (SRE) (Holmes & Rahe, 1967) and the Social Readjustment Rating Scale (SRRS), (Holmes & Rahe, 1967). These assessment instruments were developed empirically from the analysis of clinical studies involving data collected on more than 5000 patients. Subjects respond by indicating whether they have experienced each particular life event. The SRRS requires subjects to indicate all events they have experienced prior to the date of the administration of the assessment instrument, whereas the SRE requires subjects to report only events experienced during the past year. The scoring weights for the items were determined by having the subjects rate each item according to the amount of social readjustment required in order to live through each event. The item "marriage" was used as a standard point of reference and was given the arbitrary value of 500. Subjects were then asked to rate the remaining items based on whether they required more or less readjustment than the "marriage" item. The items were assigned values by dividing the scores obtained by ten and then rank ordering them. A total life stress score for the SRE is obtained by counting the life events experienced by the respondent and summing the associated life change unit (LCU) values. Based on previous studies, Rahe (1968) established a particular score, 150 LCU, as indicative of risk. The SRE originally included events experienced over the two year period prior to the test taking, whereas the SRRS counts only those events occurring in the previous year (Holmes, 1974).

A further improvement to life event scales, the Life Experiences Survey (LES) was developed by Sarason, Johnson and Siegel (1978). LES uses items chosen from existing life stress measures, including the SRE, as well as including more male and female specific items. This 57 item self-report measure was developed to improve the SRE by allowing respondents to rate the impact of events individually, and allowing the individual to indicate the desirability (either positive or negative), of each event. Sarason, Johnson and Siegel,

(1978) when describing the LES wrote, "one's perception of control over environmental events, sensation seeking status, and degree of psychological assets may all mediate the effects of life stress" (p.942). Although the LES was developed as an improvement on a stimulus measure of stress, having subjects rate impact of the events individually makes the LES an interactional measure of stress.

Measures of Stress as a Response

Proponents of the response based model of stress utilize physiological indices, for example, the catecholamine found in an individual's urine; Frankenhaeuser (1975) demonstrated an increase in the level of catecholamine found in a subject's urine in response to the stress of race-car driving. Selye (1983) suggested a variety of physiological indices as measures of stress: (a) enlargement of the adrenal cortex; (b) increase in the secretion of corticoid hormones; (c) enlargement and discoloration of the adrenals; (d) intense shrinkage of the thymus, spleen and lymph nodes; and (e) deep bleeding ulcers.

Additional support for evaluating stress by tracking responses comes from the field of neurophysiology; here stress and relaxation are coincident with the activity of the reticular arousal system (RAS). Activity in the RAS indicates changes in an individual's level of alertness and high arousal is taken as an indication of stress. Functionally, relationships have been found among electroencephalogram (EEG) autonomic response patterns and mental states. Berger (1930) discovered that beta wave EEG activity increases when an individual is aroused, however, alpha waves predominate when the individual is relaxed. Lindsley (1951), suggested that the neural excitation of the reticular formation accounted for humoral, autonomic, cortical activities, and EEG changes.

Arnold (1960) has made two criticisms of arousal as a model of psychological stress. First, placing all emotions on a single continuum of arousal does not allow for

qualitative differentiation among these emotions. Second, an excited, or aroused individual is not necessarily a threatened one. For example, a joyful celebration may cause the same level of arousal as a threatening stressful situation. It is suggested that while arousal may be a component of stress, stress cannot be reduced to arousal.

Measures of Stress as an Interaction Between Stimulus and Response

Supporters of the interactional model advocate the measurement of stress by self-report ,adjective checklists. Various forms of these mood adjective checklists have proliferated since Nowlis and Nowlis (1956) used Cattell's (1950) list of adjectives as a reference to develop what is probably the most utilized scale for measuring transient mood states, the Mood Adjective Checklist (MACL). The MACL is offered in varied forms, with the number of items ranging from 40 to 140. The MACL provides scores for the following 12 moods: aggression, anxiety, surgency, elation, fatigue, social affection, sadness, skepticism, egotism, vigor, concentration, and nonchalance. The monopolar factors yielded by the factor analysis of the responses to these adjectives suggested that moods, originally thought to be co-dependent, can vary independently and can occur simultaneously in the same individual (Nowlis & Nowlis, 1956).

The work of Nowlis and Nowlis (1956) provided the foundation for Thayer's (1967) development of the Activation-Deactivation Checklist (AD-ACL). The AD-ACL provides scores for four basic factors of mood, which Thayer named: (a) general activation; (b) general deactivation; (c) high activation; and (d) deactivation-sleep. Thayer proposed that these four factors approximate four points on a hypothetical arousal continuum. The AD-ACL was later expanded by Thayer to include two additional high activation adjectives and 26 other mood adjectives added, to disguise the purpose of the test, to provide information on a number of mood dimensions. These revisions and additions resulted in a 50 item checklist. A short form was also devised consisting of the 20 items which showed

the largest factor loadings. Subsequent research employing the shortened 20 item AD-ACL yielded two bipolar factors (mood and activation), which conflicted with his earlier findings (Thayer, 1967) of four monopolar factors. The first factor includes the "positive" feeling of energy as one pole, and the "negative" feeling of sleepiness as the other. The second factor includes the "positive" feeling of subjective tension, and the "negative" feeling of placidity.

As a result of the difficulties experienced when trying to interpret the factor analysis of Thayer's (1967) study on the AD-ACL, Mackay et al. (1978) developed an alternate checklist, the Stress Arousal Checklist (SACL). The original AD-ACL was used as the core of the SACL, however, items viewed as being too "American" were dropped from the AD-ACL and replaced with adjectives more appropriate for a British population. The SACL, a 45-adjective checklist, was administered to 145 students. Analysis of the responses yielded two bipolar factors identified as "arousal" and "stress". Thayer's factors of high activation and general deactivation corresponded to the stress factor on the SACL. Similarly, Thayer's factors of general activation and deactivation-sleep corresponded to the SACL's arousal factor. Mackay et al. reduced the SACL to 34 items by eliminating 11 items which failed to show a factor loading of 0.40 or greater on either factor. Four additional items were dropped from the checklist because of small loadings and because the researchers believed them to be too difficult for the average subject to understand. These changes resulted in a 30 item checklist reflecting two basic aspects of mood: a) arousal, defined as being alert, awake, attentive, and lively; and b) stress defined as feeling tense, uncomfortable, unpleasant, and bothered. Four "alternate" forms of the SACL were developed by the authors, but these differed from each other only in respect of the order in which the items are presented.

Konopasky and McGovern (1989), attempting to make the items of the SACL easier to understand, constructed an alternate form of the SACL, the Checklist of Arousal

and Stress (CLAS). They replaced the single word adjectives of the SACL with short, simple phrases. Consistent with others (Cox, 1978; Lazarus, 1976; McGrath, 1970; Russell & Mehrabian, 1977), Konopasky and McGovern suggested that a third stress variable, power, should be measured. A 15-item power scale was developed and added to the CLAS, the synthesis of which was named the Checklist of Arousal, Stress, and Power (CLASP). The power items were written to reflect an individual's perception of his/her ability to cope with stressful situations. The factor analysis yielded six monopolar factors: (a) high stress; (b) low stress; (c) high arousal; (d) low arousal; (e) high power; and (f) low power.

In order to expand the number of items in each scale of the CLASP, and to have equal numbers of positively and negatively keyed items, Wheeler (unpublished master's thesis, 1988) developed the Checklist of Arousal, Stress, and Power, Revised (CLASP-R). Wheeler also developed an alternate form of the CLASP-R by adding a power scale to the SACL. In addition, Wheeler investigated the effect of offering subjects a symmetrical response format, suggested by Meddis (1972) as critical to the investigation of polarity of mood factors, with both versions of the CLASP-R, rather than the usual asymmetrical response format used with the SACL. The factor analysis yielded the same six monopolar factors found by Konopasky and McGovern (1989). Unfortunately, the number of high-loading items in the power scale remained small and some items showed high loadings on other factors.

In summary, more comprehensive than the measures of various stimuli alone or the measure of responses alone, the interactional measures resolve most of the difficulties encountered by these single-dimension measures. For example, unlike the response based measures, the interactional measures do not confuse arousal with stress; sexual activities may cause heightened arousal without elevating stress. Likewise, interactional measures avoid the criticisms of the stimulus based measures by allowing for the inclusion of the

individual's perception of stressful situations. Notwithstanding the gains made by developing the interactional model, something is lost when the single-dimension models and measures are discarded. There are occasions and situations in which a single-dimension model provides a parsimonious and complete explanation of stress. For this reason, it is suggested that a complete model of stress include all three models; (a) stress as a stimulus; (b) stress as a response; and (c) stress as an interaction between stimuli and responses.

Combining The Three Models of Stress

Cox (1978), stated that there is a logical overlap between the stimulus and the response based models of stress. Stimulus based models are dependent on the existence of "stress" responses in order to determine which stimuli are stressful; there are no properties of stimuli as stressors which are dissociated from our responses to them. Similarly, response-based models of stress are dependent on the existence of "stressful" stimuli; without a stressful stimulus there cannot be a stressful response. The interactional models emphasize the perception of the stimulus by the stressed individual and the individual's appraisal of his/her capability to respond. Monat & Lazarus (1970) stressed the need for an interactional model of stress when they proposed that, "stress is not any one of these things; nor is it stimulus, response, or intervening variable, but rather a collective term..." (p. 3). Wheeler (unpublished master's thesis, 1988) concluded her research by indicating a complete measure of stress should include three scales to reflect these three models: (a) a scale which measures stressful stimuli; (b) a scale which measures stressful responses; and (c) a scale which measures the individual's perception of the stimulus and ability to respond to it. Konopasky and McGovern (1989) developed such a test of stress; two scales corresponded to the SACL's stress and arousal and the third reflected the subject's perception of "stressful" stimuli and his or her ability to respond to them. This scale was

named "power". Power was defined as one's sense of control, or ability to cope, or the mediating cognitive process which interacts between stimuli and responses. Power was concluded by Wheeler (unpublished master's thesis, 1988) to be a pervasive element in the measurement of stress and the most important single stress component. Wheeler stated, "Not only does power play a significant role in the experience of stress but results of the present study suggest that it may be the predominant and determining factor in the occurrence of stress." (p. 90) Monat and Lazarus (1970) confirmed this evaluation of power, claiming that power does not always follow emotion/stress, but can also precede and influence it. Two qualities of this test require clarification. First, the stress scale of the SACL, which is preserved in the CLASP and the CLASP-R, offers the subject an opportunity to provide his or her own summation of stress by responding to items like "tense" and "aggitated". Second, this scale does not clearly refer to stimuli which indicate stress, but rather, the items seem to represent the alternate of stress. In an afterthought to improve the CLASP-R, the stress scale was preserved and a new scale was developed which more clearly represented stress as a stimulus.

Objectives

There were three objectives of this study. The first was to develop a checklist, the scales of which reflected three models of stress: (a) stress as a stimulus (environment); (b) stress as a response (arousal); and (c) stress as an interaction between stimuli and responses (power). A major part of this objective was to differentiate the components of stress, as components, from the global concept or the "summary" concept of stress. Cox and Mackay (1981) failed to make this differentiation between the components of stress and a global concept of stress when developing the SACL. They included a global measure of stress asking subjects to indicate their stress level by responding to such items as

"distressed", along with a scale measuring one component of stress, namely, arousal. This undifferentiated combination of more abstract and less abstract scales, or components of stress and a global measure of stress, makes their test confusing. In this study, three scales, each of which is considered a component of stress are offered. In addition, a "summary" scale of stress is offered which allows subjects to rate their own stress level.

The third objective of this study was the addition of an environmental scale. The new scale was comprised of items which referred to environmental situations in one of seven categories: (a) work/school; (b) family; (c) finance; (d) partner; (e) living conditions; (f) social; and (g) legal.

METHOD

Overview

A checklist was developed which included four scales: stress, power, environment, and arousal (SPEAC). The SPEAC was administered to subjects who were asked to use a symmetrical response format, (one offering an equal number of positive and negative response options) and the responses were factor analyzed. Finally, subject scores on the SPEAC and the SACL were compared.

Pilot Study One

Subjects

One hundred and ten Saint Mary's University students, enrolled in summer semester courses, were asked to participate in the first pilot study. Ten did not complete the questionnaire. Forty two of the volunteers, who completed the checklist, were male, 35 were female, and 23 did not indicate their gender. The ages of the subjects ranged from

18 to 44 with the average being 25.1. The subjects received no compensation for their participation in this study.

Materials

This study utilized one, 112 item checklist, the SPEAC (see Appendix A). The SPEAC checklist was comprised of single words and short phrases which are consistent with four scales: (a) The stress scale. The "summary" scale, is comprised of a collection of words synonymous with the dictionary definition of stress, for example, "edgy"; (b) The environmental scale. Items in the environmental scale were written to reflect the stimulus model of stress, for example, "friend is ill"; and (c) The arousal scale. The items were written to reflect the response based models of stress, for example, "full of pep"; and (d) The power scale. Items were written to reflect the subject's appraisal of his or her ability to cope, for example, "difficulty coping".

Consistent with the suggestions of Meddis (1972), the SPEAC employed a symmetrical response format, consisting of an equal number of positive and negative response choices: there were two positive responses and two negative responses. A fifth response option, "? , not clear" was to be used when a subject did not understand the meaning of a word. Instructions were provided on the front page of the SPEAC (see Appendix H) which advised respondents to choose one of five responses: (a) if the item definitely described the subject's feelings or mood at that moment, the subject was to circle the double plus, indicated as, "++"; located to the right of the response; (b) if the item only likely applied to the subject's feelings or moods at that moment, then she or he was to circle the single plus, indicated by, "+"; (c) if the item did not particularly apply to the subjects feelings or mood at that moment, then the subject was to circle the single minus sign, indicated as, "-"; (d) if the subject clearly decided that an item did not apply to his or her feelings or moods at this particular moment, then the double minus sign was to be circled,

--"; and (e) if the item was unclear or did not apply, then the subject was to circle the question mark, "?".

Verbal instructions were also given to the subjects before they received the checklists. Subjects were told to read the appropriate attached instructions for each checklist and to respond according to the directions given. Subjects were then asked to indicate their gender and age at the top of the instruction sheet. They were also asked to answer every item without omissions, and were told that any omission would result in their questionnaire being set aside.

Procedure

The time required for the administration of the first SPEAC pilot, including instructions (verbal and written), completion, and handling of checklists, was approximately 15 minutes. The responses obtained from this pilot study were factor analyzed to determine the number of factors necessary to account for the majority of the variance; a varimax rotation of the principle components analysis was used to rotate the factor loadings and achieve a simple factor structure (Norusis, 1985). The factors so identified were named according to the item content of the majority of the items which showed high loadings on these factors. Items showing small loadings on the significant factors were eliminated, and new items were written to replace them.

Pilot Study Two

Subjects

One hundred and ten Saint Mary's University undergraduate students enrolled in an introductory psychology course participated in the second pilot study. Of those who participated, 40 were male, 64 were female and 6 did not indicate their gender. Fifteen of

the subjects failed to complete the Questionnaire leaving a sample size of 95 subjects. Since the study was conducted during regularly scheduled class time, whether or not the subjects received course credit for their participation was left to the discretion of the professor who was instructing the class.

Materials

This study utilized one, 163 item checklist, the SPEAC (see Appendix B, and C). This SPEAC reflected the same three models of stress, was comprised of single words and phrases, and offered the same symmetrical scoring format. Unlike the original, this SPEAC was divided into two parts: Part A consisted of 93 items comprising the stress, arousal, and power scales; Part B consisted of 70 items and comprised the environment scale.

Separate instructions were attached to Part A and Part B (see Appendices H and I). Brief verbal instructions were also given to the subjects, before they received the SPEAC: Subjects were told to read the appropriate attached instructions for each checklist and to respond according to the directions given. Subjects were also instructed to leave their names and student numbers on a list at the front of the classroom. Finally, the respondents were also asked to answer every item without omission, and were told that omissions would result in their checklists being set aside.

Procedure

The time required for the administration of the second pilot of the SPEAC was approximately 15 minutes including completion and handling of checklists. Consistent with the statistical analysis in pilot study one, the responses were factor analyzed to determine the factors necessary to account for the majority of the variance; a varimax rotation of the principle components analysis was used to achieve a simple factor structure

(Norusis, 1985). The factors so identified were named according to the item content of the majority of the items showing high loading on these factors. Items showing small loadings on these factors were eliminated and new items were written to replace them.

Main Study

Subjects

Five hundred and fifty Saint Mary's University undergraduates who were enrolled in an introductory psychology course participated in this study. Of those who participated, 59 were male, 72 were female, and 360 did not indicate their gender. Fifty nine of the subjects did not complete the questionnaire. Since the study was conducted during regularly scheduled class time, whether or not the subjects received a bonus point towards their final grade for their participation was left to the discretion of the professor who was instructing the class.

Materials

This study utilized one 130 item checklist, the SPEAC (see Appendix C). This SPEAC was divided into two parts: Part A consisted of 60 items and comprised the stress, arousal, and power scales; Part B consisted of a 70-item environment scale. The SPEAC main study offered the same symmetrical response format as the SPEAC scales used in the pilot studies, and the same instructions (see appendices H and I).

The same brief verbal instructions were given to the subjects before they received the checklists. Subjects were told to read the appropriate attached instructions for each checklist and to respond according to the directions given. Participants were also asked to write their names and student numbers on a list at the front of the classroom. Finally, the respondents were asked to answer every item without omissions, and were told that omissions would result in their questionnaires being set aside.

Procedure

The time required for the administration of the SPEAC, including instructions (verbal and written), completion, and handling of checklists, was approximately 15 minutes. The data consisted of the subjects' responses to the 130 items on the SPEAC. The responses were factor analyzed to determine the number of factors necessary to account for the majority of the variance. A varimax rotation was used to rotate the factor loadings and achieve a simple factor structure (Norusis, 1985). These factors were named according to the item content of the majority of the items showing high loadings on these factors. Items showing small loadings on these factors were eliminated with the remaining items becoming the final, 115 item, SPEAC (see appendix C and E).

Study to Compare SPEAC, SACL, and Marlowe-Crowne Scores

Subjects

Forty nine Saint Mary's University undergraduates enrolled in an introductory psychology course participated in this study. Two subjects did not complete one or more of the questionnaires. The study was conducted during regularly scheduled class time and whether or not the subjects received course credit, that is a bonus point towards their final grade, for their participation was left to the discretion of the instructor of the class.

Materials

This study utilized three checklists: (a) the (final) SPEAC; (b) the SACL; and (c) the Marlowe-Crowne Social Desirability Scale (see appendices: E G, and F respectively). The SACL, a stress measure, is divided into two parts: a stress scale consisting of 18 adjectives, ten "high stress" adjectives and eight "low stress" adjectives; and an arousal scale comprised of 12 adjectives, seven "high arousal" adjectives and five "low arousal" adjectives. The Marlowe-Crowne Social Desirability Scale is a measure of social

desirability. This test consists of a brief, three-sentence, set of instructions which requires the subjects to read each of the 33 statements, for example "I like to gossip", and "decide whether it is true or false as it relates to you personally". The Marlowe-Crowne Social Desirability Scale is scored by an answer key which assigns a single point for each "socially desirable" response, the sum total indicating the subject's tendency to present themselves as socially desirable.

The present study used the original instructions for the SACL as developed by Mackay et al, (1978), with one change: consistent with the suggestion of Meddis (1972), five response choices were offered instead of the (original) four. Specifically the SPEAC offered two positive responses, "definitely how you feel ++", and "likely how you feel +", and two negative responses, "not likely how you feel -," and "definitely not how you feel --". A fifth response option "?" indicated that a subject did not understand the meaning of a word or the situation did not apply. The Marlowe-Crowne Social Desirability Scale asked subjects to indicate whether they thought the item was a true or false description of themselves.

Brief verbal instructions were also given to the subjects, before they received the checklists. Subjects were told to read the attached instructions for each checklist and to respond accordingly. The respondents were also asked to answer every item without omission, and were told that checklists with omissions would be set aside.

Procedure

The time required for the administration of the SPEAC, SACL and the Marlowe-Crowne Social Desirability Scale was approximately 35 minutes. Administration time included: instructions, (both verbal and written), completion, and handling of checklists. The scores of the stress, power, arousal, and environment scales of the SPEAC were

compared to the scores of the stress and arousal scales of the SACL, and all four SPEAC scale scores were compared with the Marlowe-Crowne Social Desirability Scale scores.

RESULTS

Overview

The responses to the various SPEAC questionnaires comprise the data for both pilot studies and the main study. Additional data, the responses to the (final) SPEAC, the SACL, and the Marlowe-Crowne Social Desirability Scale questionnaires, were collected in an additional study.

There were ten Pilot Study One incomplete SPEAC checklists yielding a sample of one hundred. In Pilot Study Two, there were fifteen incomplete SPEAC checklists resulting in a sample of ninety five. In the Main Study, there were fifty nine incomplete SPEAC checklists yielding a sample of four hundred and ninety one subjects; there were two incomplete SPEAC checklists in the study, which compared the SPEAC, SACL, and the Marlowe-Crowne Social Desirability Scale, yielding a sample of forty seven subjects.

The data collected from the two pilot studies and the main study were factor analyzed. In accordance with the Kaiser criterion (Kim & Mueller, 1978), the factors extracted by the principal components method were only those whose eigen values were greater than one. The extracted factors were subjected to a varimax rotation (Kim & Mueller, 1978), and items showing less than a 0.30 factors loading on a significant factor were deleted (Gorsuch, 1983) from the pilot SPEACs and the final SPEAC. This criterion is extremely conservative, being appropriate for a sample size of one hundred and seventy five subjects.

The stress and arousal scores of the SPEAC, and the SACL, were correlated and all SPEAC scores were correlated with the Marlowe-Crowne Social Desirability Scale scores.

Factor Analysis of the SPEAC. Pilot Study One

The results of the factor analysis of the responses of 100 subjects to the SPEAC are presented in Table 1. The following six factors were extracted and labelled according to the content of the items: (1) low arousal; (2) high stress; (3) high power; (4) high arousal; (8) low stress; and (11) low power. Gorsuch (1983) states that "if a new factor does not add very much to the information already extracted, it would not be worth extracting and interpreting." (p. 165) Accordingly factors 5, 6, 7, 9, and 10 were set aside as statistically trivial.

TABLE 1

Factor Loadings of the SPEAC Items, Pilot Study One

Item	Factor Loadings					
	F1/LA	F2/HS	F3/HP	F4/HA	F8/LS	F11/LP
57. on the verge of exhaustion	.786	*				
111. fatigued	.735					
90. burned out	.718					
104. feeling weary	.708					
33. really tired	.672					
56. hard to keep awake	.658					
82. stressed	.650					
31. under too much pressure	.616					
83. tensed up	.599					
88. ready to drop	.574		-.342			
15. worn out	.532					
48. drained and listless	.531					
30. half asleep	.509					
107. irregular breathing	.414					
92. things are beyond my reach	.388					
47. frustrated	.377					
80. bored and uninterested	.317					
105. relaxed muscles	-.377					
21. better than average at handling	-.330					
51. experiencing sexual difficulties		.794				
29. bundle of nerves	.333	.642				
54. down in the dumps		.608				
102. have a racing pulse		.533				
35. feeling uptight all of the time	.364	.510				
58. at the end of my rope	.334	.483				
2. difficulty coping	.376	.416	-.351			

Item	Factor Loadings					
	F1/LA	F2/HS	F3/HP	F4/HA	F8/LS	F11/LP
53. in over my head	.442	.410				
42. having difficulty managing	.328	.409	-.450		.319	
26. no get up and go		.399				
79. at my wits end	.373	.390				
40. agitated	.509	.326				
59. uneasy most of the time	.447	.326				
16. edgy	.426	.312				
100. full of enthusiasm		-.435				
43. my life is going smoothly		-.422			.319	
38. happy with the way things are		-.384				
77. enjoying myself		-.312				
28. ready for anything			.722			
27. in control of my life		-.319	.652			
46. still have energy left over			.609			
10. can take whatever comes my way			.554	.390		
34. usually know what to do next			.531			
39. capable			.490			
11. like to be challenged			.428			
66. can make things happen			.308			
24. full of pep				.816		
37. full of vim and vigor				.741		
44. raring to go				.679		
22. full of life				.629		
4. full of energy			.361	.625		
71. lots of spirit				.519		
36. enjoying myself			.323	.504		
23. up to handling most situations				.337		
62. wide awake	-.436			.305		
25. secure and at ease					.589	

Item	Factor Loadings					
	F1/LA	F2/HS	F3/HP	F4/HA	F8/LS	F11/LP
18. at peace			.396		.428	
8. on top of things			.314		.337	
70. there isn't enough time in the day	.418				-.405	
73. wish that I had more talent						.845
52. wish I were more skilled in dealing with people						.726
84. don't have enough background education						.382
67. too many responsibilities	.721					
93. not worried about money					.746	
98. friend is ill	.470					
60. things happen too quickly	.399	.383				
7. recent change in work load	.379					
65. my spouse/partner has been unfaithful	.378					
78. I have many family responsibilities	.343					
89. arguments occur often with the family	.318					
101. friends want more time than I can give	.316					
95. neither bored nor overworked	-.374					
45. change in relationship with boss		.671				
32. recently quit/fired from a job		.584				
81. I have been rejected		.406				
91. I have people I can lean on		-.346				

Item	Factor Loadings					
	F1/LA	F2/HS	F3/HP	F4/HA	F8/LS	F11/LP
85. I am happy with my family life				.370		
49. have enough money to make ends meet					.367	

* Blank spaces indicate a loading less than 0.30

Factor one, labeled low arousal, accounted for 21.8 percent of the variance; 39 items showed significant loadings (above 0.03), four of which were negative. Eleven of these items, written for the low arousal scale, were retained for the SPEAC and added to four new items, "hard to get going in the morning", "don't feel like doing anything", "not active physically", and "not excited easily" for a total of fifteen low arousal scale items.

The second factor, high stress, accounted for 7.4 percent of the variance; seventeen items showed significant and positive loadings. These items were used to represent the high stress scale.

Factor three, high power, accounted for 4.6 percent of the variance; fifteen items showed significant loadings. Ten items from factor three were added to three new items, "feel competent", "feel like nothing can stop me", and "a real go getter", for a total of thirteen items on the stress scale.

Factor four, high arousal, accounted for 3.2 percent of the variance; ten items showed significant loadings. Seven items from factor four were added to three items from factor five, specifically, "lots of spirit", "ready to get involved", and "full of enthusiasm". In addition, five new items; "fully alert", "energetic", "full of ambition", "physically active", and "stimulated by life", were also added to the scale for a total of fifteen, high arousal items.

Seven items showed significant loadings on factor eight, low stress; this factor accounted for 2.5 percent of the variance. Five of these items were added to four CLASP items (McGovern, 1987), "easy going", "light hearted", "happy go lucky", and "taking it easy"; and seven new items, "pleased with the way things have turned out", "happy with the way things are", "satisfied", "content with myself", "can't complain", "tranquil", and "comfortable", to form the low stress scale.

Three items showed significant loadings on factor eleven, low power, which accounted for 2.2 percent of the variance. To these three items, seven CLASP-R items

(Wheeler, unpublished master's thesis, 1988), "unsure of myself", "not making any progress", "going nowhere fast", "lacking in resources", "unable to assert myself", "feel like a failure", and "can't make up my mind", which seemed to measure low power, were added. Seven new items, "feel insecure", "have doubts about myself", "not good enough", "not always prepared", "wish I had more experience", "not strong", and "don't know whether I can handle things", were written, and added to the ten described above, to form the low power scale.

Environmental items loaded significantly on the remaining factors. None of these factors was significant on its own suggesting that one should not conceptualize the environment as a single or simple factor or component of stress. It was decided that stress as a stimulus, or the "environment", is comprised of many independent factors; for example, stress in one's personal life and stress in one's work life. For this reason a new environmental scale (divided into seven themes, each containing ten items) was written for the SPEAC.

Factor Analysis of the SPEAC Pilot Study. Two. Part A

The factor analysis of responses from 95 subjects to the SPEAC (second pilot study), yielded 4 factors from part A (stress, arousal, and power) and 13 factors from part B (environment). The results of part A of this factor analysis are presented in Table 2. The following four factors were extracted and labelled according to the content of the high-loading items: (1) arousal, (2) stress, (3) low power, and (8) high power. Factors 4, 5, 6, and 7 were excluded because they were statistically trivial.

TABLE 2

Factor Loadings of the SPEAC Items, Pilot Study Two, Part A

Item	Factor Loadings			
	F1/A	F2/S	F3/LP	F8/HP
6. full of energy	.838	*		
41. wide awake	.806			
17. full of life	.774			
23. full of pep	.761			
71. fully alert	.752			
77. energetic	.740			
29. full of vim and vigor	.727			
35. raring to go	.692			
65. full of enthusiasm	.638			
53. lots of spirit	.438			
32. still have energy left over after a busy task	.408			
68. a real go getter	.364			
19. my life is going smoothly	.357	-.352		
31. on top of things	.342	-.508	-.334	
58. fatigued	-.737			
5. worn out	-.729			
16. really tired	-.703			
64. burned out	-.672			
22. drained and listless	-.617			
46. ready to drop	-.594			
52. feeling weary	-.564			
11. half asleep	-.504			
34. on the verge of exhaustion	-.495	.322		
76. don't feel like doing anything	-.387			

Item	Factor Loadings			
	F1/A	F2/S	F3/LP	F8/HP
7. bundle of nerves		.751		
12. feeling uptight all of the time		.730		
48. uneasy most of the time		.723		
30. down in the dumps		.676		
1. edgy		.673		
18. agitated		.652		
66. unhappy with the way things are		.587		
72. my life is not going smoothly		.583		
51. feel like a failure		.485		
88. having difficulty managing		.453	.356	
83. difficulty coping		.444		
21. unsure of myself		.407	.337	
63. feel insecure		.398	.415	
78. not enjoying myself		.366		
57. can't make up my mind		.339	.384	
49. easy going		-.732		
2. at peace		-.716		
92. comfortable		-.685		
79. content with myself		-.628		
8. secure and at ease		-.611		
73. satisfied		-.505		
43. happy with the way things are		-.465		
47. enjoying myself		-.456		
37. pleased with the way things have turned out		-.449		
3. can take whatever comes my way		-.445		
13. my life is going smoothly		-.404		
56. ready for anything		-.344		
61. happy go lucky		-.320		
50. not having difficulty managing		-.309		
84. can't complain		-.309		

Item	Factor Loadings			
	F1/A	F2/S	F3/LP	F8/HP
93. don't know whether I can handle things			.791	
75. not good enough			.718	
69. have doubts about myself			.378	
20. usually know what to do next			-.438	.461
9. like to be challenged				.785
68. a real go getter				.461
56. ready for anything				.392
74. feel like nothing can stop me				.321

*Blank spaces indicate a loading of less than 0.30 level

Factor one, arousal, was bipolar: fourteen items showed positive and significant loadings on arousal, and eleven significant and negative loadings on the same factor. This first factor accounted for 23.8 percent of the variance. Ten items with the highest positive factor loadings on factor one and ten items, with the highest negative factor loadings on factor one, were used to form the arousal scale. The second factor, stress, in part A was also bipolar: thirty five items showed significant loadings on factor two; sixteen showed positive loadings and 19, showed negative loadings). This factor accounted for 7.9 percent of the variance. The ten items showing the largest positive loadings items were added to the ten which showed the largest negative loadings to form the stress scale.

Factor three, low power, was primarily monopolar: 13 items, showed significant loadings. This factor accounted for 4.9 percent of the variance. The seven items showing the highest loadings were added to three new items, "wish I were more organized", "feel rushed on important tasks", and "confused a lot of the time", and used to form the low power scale. Five items loaded significantly and positively on factor eight, high power, a monopolar factor, which accounted for 2.6 percent of the variance. These five items were added to six new items, "generally capable", "able to figure things out", "good at handling things", "up for anything", "can handle whatever comes my way", and "enjoy competition", to form the high power scale.

Factor Analysis of the SPEAC. Pilot Study Two. Part B

The responses by 95 subjects to part B, the environment items, of the SPEAC were factor analyzed. The analysis yielded 13 factors, which are presented in Table 3. The first seven factors were statistically significant (Gorsuch, 1983), the remaining six were trivial. The factors were named according to the content of the high-loading items: (1) major life occurrences; (2) legal issues; (3) job; (4) living conditions; (5) finance; (6) family; and (7) life partners. The first seven factors accounted for 46.6 percent of the total variance.

Table 3

Factor Loadings of the SPEAC Items, Pilot Study Two, Part B

Item	Factor Loadings						
	F1/MLO	F2/L	F3/J	F4/LC	F5/F	F6/Fa	F7/P
66. recently married	.849	*					
48. recently been in jail	.750	.308					
34. have been in court recently	.675						
60. recently separated/divorced	.668						
6. have been arrested	.557						
63. live in unsanitary conditions	.555			.333			
3. in debt over 10,000	.524						
43. recently quit/fired from job	.520			-.304			
67. have been recent victim of crime	.475	.415					
28. live in good neighborhood	.440						
14. live in run down area	.433						
12. friend is ill	.365						
56. family member in trouble with law	.315						
58. have poor relationships with my siblings	.313						-.312
27. recently have had a serious legal problem		.780					
20. recently have had a minor legal problem		.763					
41. recent contact with police		.680					
13. have been in prison	.385	.625					
56. family member in trouble with the law		.456					
50. change in relationship with boss		.385	.369				
26. friends help me when I need it	-.363						
2. family member is ill			.899				
8. my job is fulfilling			.858				
52. feel secure in job			.841				
15. like my co-workers			.714				
49. recent change in my living conditions			.340				

Item	Factor Loadings						
	F1/MLO	F2/L	F3/J	F4/LC	F5/F	F6/Fa	F7/P
7. my living conditions are crowded				.752			
69. have no privacy				.714			
42. dislike the people I live with	.308			.659			
57. my living conditions are spacious				-.825			
31. having financial problems					.714		
53. running out of money					.688		
17. living beyond my means					.324		
38. have plenty of money in the bank					-.849		
59. not worried about money					-.602		
24. have enough money to make ends meet					-.589		
37. arguments occur often with family						.781	
25. I have been rejected						.350	
51. have a good relationship with my parents						-.771	
30. I am happy with family life						-.741	
44. come from a close family						-.511	
21. like where I live						-.312	
18. have close relationship							.780
68. am deeply in love with partner/spouse							.772
39. problems communicating with partner							.329
54. have no partner/spouse							-.859

*Blank spaces indicate a loading of less than 0.30 level

Table 4 shows the number of items with significant loadings on each of the environment factors of the SPEAC. This table provides an indication of the degree of polarity of each factor.

Table 4

Polarity of the SPEAC Items, Pilot Study Two, Part B

Factor	% of variance	# significant variables	# significant positive variables	# significant negative variables
1. major life occurrences	15.3	14	14	0
2. legal	6.7	6	6	0
3. Job	5.9	5	5	0
4. living condition	5.5	4	3	1
5. finance	4.9	6	3	3
6. family	4.4	6	2	4
7. partner	3.8	4	3	1

One sub-scale, social, originally intended for the environment scale, did not constitute a statistically significant factor. This may have been due to the fact that only 95 subjects participated in this pilot study; no changes were made to the environment scale and these same items were used for the main study SPEAC.

Factor Analysis of the SPEAC. Main Study. Part A

The factor analysis of the SPEAC data from 491 subjects, yielded eleven factors. The results of this factor analysis are presented in Table 5; the factors were labelled according to the content of high loading items: (1) high arousal; (2), low arousal; (3) low stress; (4) low power; (5) high stress; and (6) high power. The first six factors accounted for 47.3 percent of the total variance.

TABLE 5

Factor Loadings of the SPEAC Items, Main Study, Part A

Item	Factor Loadings					
	F1/HA	F2/LA	F3/LS	F4/LP	F5/HS	F6/HP
18. full of pep	.766					
24. raring to go	.708					
44. full of enthusiasm	.668					
5. full of energy	.663					
54. energetic	.648					
19. full of vim and vigor	.645					
12. full of life	.579					
35. lots of spirit	.570					
27. wide awake	.550	-.522				
48. fully alert	.537	-.341				
21. on top of things	.438			-.330		.346
38. ready for anything	.423					
36. up for anything	.412					
46. a real go getter	.386					
23. on the verge of exhaustion		.737				
29. ready to drop		.712				
10. really tired		.699				
43. burned out		.637				
8. half asleep		.611				
40. fatigued	-.378	.584				
34. feeling weary	-.336	.580				
3. worn out		.568				
17. drained and listless		.498				
37. no get up and go	-.311	.364				

Item	Factor Loadings					
	F1/HA	F2/LA	F3/LS	F4/LP	F5/HS	F6/HP
50. satisfied			.748			
28. happy with the way things are			.728			
25. pleased with the way things have turned out			.697			
55. content with myself			.536	-.359		
60. don't know whether I can handle things			.530			
59. comfortable			.525			
31. enjoying myself	.392		.447			
45. unhappy with the way things are			-.613			
49. my life is not going smoothly			-.556			
15. unsure of myself				.703		
42. feel insecure				.680		
47. have doubts about myself			-.302	.638		
53. not good enough				.520		
51. confused a lot of the time			-.345	.490		
39. can't make up my mind				.418		-.357
57. difficulty coping			-.325	.400		
32. uneasy most of the time				.372	.338	
58. having difficulty managing				.318		
1. edgy					.674	
13. agitated					.540	
9. feeling uptight all of the time		.457			.502	
26. bundle of nerves		.416			.478	
20. down in the dumps		.369			.400	
2. at peace					-.618	
6. secure and at ease	.322		.318		-.503	
16. able to figure things out						.695
14. usually know what to do next						.632
22. good at handling things						.517

Item	Factor Loadings					
	F1/HA	F2/LA	F3/LS	F4/LP	F5/HS	F6/HP
11. generally capable						.411
41. can handle whatever comes my way						.396

* Blank spaces indicate a loading of less than 0.30 level

Nineteen items loaded significantly and positively on factor one, high arousal: eight items with the highest factor loadings were retained for the high arousal scale and the remaining items were deleted.

Fifteen items showed significant and positive loadings on factor two, low arousal: eight items with the largest factor loadings were retained for the low arousal scale.

Of the ten original items on the low stress scale, seven loaded on factor three. Three items, "at peace", "on top of things", and "easy going", failed to load significantly. Of the 12 items which loaded on factor three, the eight items with the highest factor loadings were selected as the low stress scale. Two of these eight items loaded significantly and negatively: "unhappy with the way things are", and "my life is not going smoothly".

Nine items loaded positively and significantly on factor four, low power: the eight items with the highest factor loadings were chosen to comprise the low power scale.

Nine items loaded significantly on factor five, high stress: six loaded positively and three loaded negatively. Two of these items, "on top of things", and "uneasy most of the time", showed larger loadings on other factors and were set aside for this reason. The remaining seven items were used to construct the high stress scale. Two of these seven items, "at peace", and "secure and at ease", showed negative loadings.

Seven items loaded significantly on factor six, high power. One item, "can't make up my mind", showed a larger loading on factor four; the remaining six items were used to comprise the high power scale.

Factor Analysis of the SPEAC. Main Study. Part B

The responses by 491 subjects to Part B, the environmental items, of the SPEAC were factor analyzed. The analysis yielded the following 19 factors, which are presented in Table 6. Factors were named according to the content of the majority of items which showed high loadings on the factors: (1) legal issues; (2) social; (3) finance; (4) job; (5) family; (6) living conditions; and (7) partner. The first seven factors accounted for 37.1 percent of the total variance.

TABLE 6

Factor Loadings of the SPEAC Items, Main Study, Part B

Item	Factor Loadings						
	F1/L	F2/S	F3/Fin	F4/W	F5/Fam	F6/LC	F7/P
34. have been in court recently	.760	*					
27. recently have had a serious legal problem	.735						
48. recently been in local jail	.731						
13. have been in prison	.722						
41. recent contact with police	.708						
20. recently have had a minor legal problem	.689						
6. have been arrested recently	.581						
56. family member in trouble with law	.481						
67. have been a recent victim of crime	.420						
43. recently quit/fired from a job	.381						
66. recently married	.341						
26. friends help me when I need it		.736					
40. I am comfortable with my friends		.720					
32. have people I can lean on		.648					
55. happy with my social life		.672					
47. people are considerate of my feelings		.625					
33. don't socialize often		-.583					
38. have plenty of money in the bank			.795				
59. not worried about money			.720				
24. have enough money to make ends meet			.698				
45. earn more money than my peers			.362				
70. have good credit			.309				
31. having financial problems			-.706				
53. running out of money			-.702				

Factor Loadings

Item	F1/L	F2/S	F3/Fin	F4/W	F5/Fam	F6/LC	F7/P
8. my job is fulfilling				.851			
1. satisfied with my job				.826			
15. like my co-workers				.771			
52. feel secure in my job				.729			
50. change my relationship with my boss				.423			
51. have a good relationship with my parents					.828		
44. come from a close family					.760		
30. I am happy with family life					.743		
37. arguments occur often with family					-.630		
7. my living conditions are crowded						.740	
69. have no privacy						.645	
42. dislike the people I live with						.463	
21. like where I live						-.622	
57. my living conditions are spacious						-.621	
68. am deeply in love with partner/spouse							.720
18. have close relationship							.661
19. friends want more time than I can give							.315
54. have no partner/spouse							-.759
25. I have been rejected							-.452
4. experiencing sexual difficulties							-.328

* Blank spaces indicate a loading of less than 0.30 level

Table 7 indicates the polarity of the environmental factors by indicating the number of items of the SPEAC, part B, which show significant and positive loadings, and the number of items which show significant and negative loadings.

Table 7

Polarity of the SPEAC Environment Factors Part B

Factor	% of variance	# significant variables	# significant positive variables	# significant negative variables
1. legal	10.9	11	11	0
2. social	8.3	6	5	1
3. finances	4.3	7	5	2
4. work	4.1	5	5	0
5. family	3.7	4	3	1
6. living conditions	3.1	5	3	2
7. partner	2.7	6	3	3

Relations Among the SACL, SPEAC and the Marlowe-Crowne Social Desirability Scale

Pearson product-moment correlation coefficients between the stress and arousal scale scores of the SPEAC (the high and low stress scale scores were combined to yield a stress score and the high and low arousal scale scores were combined to yield an arousal score), and the stress and arousal scores of the SACL were calculated. The correlation coefficients calculated by comparing all possible pairs of these scales, presented in Table 8, were large and significant.

Pearson product-moment correlation coefficients between the stress, arousal, and power scale scores of the SPEAC (the high power and the low power scale scores were, similarly, combined to form a power scale score) and the scores on the Marlowe-Crowne Social Desirability Scale were calculated. The results of these comparisons are also presented in Table 8. These analyses yielded two significant negative correlation coefficients between the Marlowe-Crowne Social Desirability Scale and the SPEAC arousal and power scales. There was also one positive correlation coefficient between the Marlowe-Crowne Social Desirability Scale and the SPEAC stress scale. Similarly, a significant positive correlation was found between the SACL stress scale and Marlowe-Crowne Social Desirability Scale, while a significant negative correlation was noted between the SACL arousal scale and the Marlowe-Crowne Social Desirability Scale.

Pearson product-moment correlation coefficients between the SPEAC stress scale and the remaining SPEAC scales, that is, arousal, power, and environment (the high environment and the low environment item scores of the seven environment sub-scales were similarly combined to form a single environment scale score). These results are also presented in Table 8. Large significant correlations were found between the SPEAC stress scale and the SPEAC arousal and power scales. A significant correlation was also found between the SPEAC stress scale and the SPEAC environment scale.

TABLE 8

Pearson Product-Moment Correlation Coefficients Calculated Among Responses to: the Items Comprising the Stress and Arousal Scales of the SACL, the Items Comprising the Stress, Arousal, Power, and Environment Scales of the SPEAC, and the Items Comprising the Marlowe-Crowne Social Desirability Scale.

	SPEAC arousal	SPEAC stress	SPEAC power	Marlowe- Crowne	SPEAC environment	SACL arousal
SPEAC stress	-.575*					
SPEAC power	.521*	-.751*				
Marlowe- Crown	-.289**	.360**	-.293***			
SPEAC environment	.155	-.337***	.316***	-.313***		
SACL arousal	.773*	-.359**	.351**	-.268***	.083	
SACL stress	-.520*	.801*	-.644*	.344**	-.439**	-.264***

*** denotes significance at the 0.05 level
 ** denotes significance at the 0.01 level
 * denotes significance at the 0.001 level

Summary of Results

The final version of the SPEAC consists of two parts: part A offers three scales: the first provides a global measure of stress which is the subject's own appraisal of stress; the second measures one component of stress, arousal, and the third measures a second component of stress, power, or the subject's appraisal of his/her capacity to meet demands. Part A of the SPEAC offers 45 items on six different scales, the scales consisting of items

which, according to factor analysis, measure the same abstract construct: (a) High Arousal, eight items; (b) Low Arousal, eight items; (c) Low Stress, eight items; (d) Low power, eight items; (e) High Stress, seven items; and f) High Power, six items.

Part B of the SPEAC offers 44 items on seven environment different scales, the scales consisting of terms which, according to factor analysis, measure the same abstract construct: (a) Legal, eleven items; (b) Social, six items; (c) Financial, seven items; (d) Work, five items; (e) Family, four items; (f) Living conditions, five items ; and (g) Partner, six items,

Evidence of construct validity of the SPEAC was indicated by the significant Pearson product-moment correlations between subject scores on the stress and arousal scales of the SPEAC and the SACL. The validity of the SACL has been tested in several studies. Burrows, Cox and Simpson (1977) demonstrated the relationship between the SACL and a measure of the subjects blood glucose level to measure stress in a sales training situation. The authors concluded that the SACL was "useful in describing the nature of stress in the observed situation" (p. 90). In a similar study Cox, Mackay, and Page (1982) indicate the usefulness of measuring the effects of mood on work. Ray and Fitzgibbon (1981) reported appropriate differences in SACL scores between pre-operative and post-operative subjects.

Consistency was found between subjects' own assessment of stress, that is, their scores on the "summary" stress scale, and their scores on the power, arousal, and environment scales, which are considered "component" scales. High scores on the SPEAC and the SACL stress scales indicates a high level of "stress" or "anxiety". (A high score on the SPEAC and the SACL arousal scales indicate a high level of "arousal" or a high level of "positive energy". A high score on the SPEAC power scale indicates a high level of "power" or "coping". Finally, a high score on the SPEAC environment scale indicates a "positive" or "non-stressful" environment).

Significant negative correlations were found between the SPEAC summary stress scale and the SPEAC arousal, power, and environment scales. All correlation coefficients between the stress scale and the component scales were significant at or beyond the 0.05 level.

Significant Pearson product-moment correlation coefficients were found between the Marlowe-Crowne Social Desirability Scale scores and the stress, power, and arousal scores of the SPEAC. High scores on the Marlowe-Crowne Social Desirability Scale indicate a tendency to respond in a socially desirable manner.

DISCUSSION

The goal of this study was to develop a three model measure of stress, stress being defined as a stimulus, as a response, and as an interaction between stimuli and responses. First, the factor analytic results of the SPEAC are examined in terms of the polarity of factors, the number of factors extracted, and the order of extraction. Second, the validity of the SPEAC is considered: Construct validity of the SPEAC will be discussed with respect to the Pearson product-moment correlation coefficients between the SPEAC and the SACL. The implications for the use of a three model measure of stress for assessment and treatment will be examined. Finally, ideas for future research are explored, and a brief conclusion is offered.

Factor Analytic Results of the SPEAC

Method of factor extraction and rotation

The present study employed a principal components analysis which, according to Norusis (1985), is an effective procedure for transforming correlated variables to a set of

uncorrelated variables. Because of the high level of communality between the items in this study's data base, a principal components analysis was chosen as the method of factor extraction. To further deal with the problem of communality, an orthogonal (varimax) rotation was used to produce uncorrelated factors, Nouris (1985). Although the procedures utilized in extracting and rotating the factors in this study are not appropriate if one wants to generalize to other populations, they are an appropriate means of exploratory factor analysis, Gorsuch (1983).

Polarity of the SPEAC

The factor analysis of responses to the SPEAC, the main study, yielded primarily monopolar factors, or factors with only positively loading items. Factor three did show five items with negative loadings; however, two of these loaded higher on another factor, factor four. Factor five showed three items with negative loadings, but one of these showed higher on another factor. The finding of primarily monopolar factors in the SPEAC is consistent with the findings of Konopasky and McGovern (1989) and Wheeler (unpublished master's thesis, 1988). However, this does differ from the findings of Mackay et al. (1978) who, analyzing a factor analysis of the SACL, found only two bipolar mood factors.

Three major differences between the Mackay et al. (1978) study and the studies of Konopasky and McGovern (1989), and Wheeler (unpublished master's thesis, 1988), and this present study should be noted. First Mackay et al. administered the SACL to a British population, where the other studies used a Canadian population. Secondly, Mackay et al. used an "uneven" response format consisting of two positive choices, that is, "agreement", and "strongly agree" but only one negative choice, that is, "disagree". The others used only symmetrical scoring formats, which offered the same number of positive and negative response choices.

Finally, there was a substantial difference in the size of the sample in the Mackay et al. (1978) study and the other three studies. Mackay et al. employed a small sample of 145 subjects in their initial study, and 72 subjects in a subsequent study. Konopasky and McGovern (1989) worked with a much larger sample of 394 subjects, Wheeler reported results on 301 subjects, and this study tested 491 subjects. Gorsuch (1983) suggests that the absolute minimum ratio of subjects to variables is five individuals to every one variable and not less than 100 subjects for any one analysis.

Consistent with the findings of Mackay et al. (1978), bipolar factors were found, specifically, stress and arousal, in the second pilot study in which the sample size was only 95. Perhaps if Mackay et al. employed a larger sample size their factors would have also been monopolar.

The finding of monopolar mood factors in this study suggest that mood states may vary independently of each other, or that moods once thought to be mutually exclusive can co-exist within the same individual at the same time. While this position seems improbable at first, one can appreciate that life experiences often elicit conflicting feelings; for example, public speaking often offers the speaker the mixed feelings of fear and exhilaration.

Number of factors

Six factors, collectively accounting for 47.3 percent of the variance, were extracted from the SPEAC data. Five other factors, with eigen values greater than one, were also examined to determine whether or not they should be interpreted. Factors seven, eight, nine, ten, and eleven were statistically trivial and account for only a small percentage of the variance, 2.4, 2.1, 2.0, 1.9, and 1.8 respectively. According to Gorsuch, (1983), "trivial factors might better be defined as those factors without a unique set of defining variables" (p. 165).

Order of extraction of factors of the SPEAC. Main Study

Factors are extracted in principle components analysis according to the amount of variance for which each accounts. The first principle component accounts for the largest amount of variance in the sample, while each successive factor accounts for less and less of the variance (Norusis 1985). The order in which the SPEAC (main study) factors were extracted was: (1) high arousal on; (2) low arousal; (3) low arousal; (4) low power; (5) high stress; and (6) high power. High arousal accounts for the largest amount of the variance, 28.1 percent.

High power was most likely extracted first in Konopasky and McGovern (1989), because the largest number of items were "power" items (Gorsuch, 1983). This finding, while most probably determined by the number of power items in the questionnaires compared to non-power items, is consistent with the emphasis of Cox (1978) who stated that stress arises when an imbalance exists between perceived demand and the individual's ability to meet those demands, except in extreme cases. In this scale, where the number of items per factor are approximately the same, the order of the factors is not predictable. It may be, however, that arousal, defined as the body's response to stress, is the most clearly identified for item-writer and respondent alike.

Factor Structure of The Environmental Scale

Items written for the environmental scale of the SPEAC reflect a wide variety of environmental situations: (a) Work, (b) Family, (c) Finance, (d) Partner, (e) Social, (f) Legal, and (g) Living Conditions. All seven categories are represented by seven statistically significant factors yielded in the analysis of the environmental items. Due to the diverse nature of environmental situations, it is naive to expect items which have one dimension in common, but which refer to quite different situations, to "cluster". For example, two family category items, "arguments occur often with family" and "family

member has died recently", both deal with what appears to be (environmentally) stressful situations within the family, but clearly, they refer to very different difficulties within a family. The factor analysis of the SPEAC environment data indicates a broad base of environment features. Nonetheless, Pearson's correlation coefficients between a "summary" of the SPEAC environment scale scores which combined scores from all seven environmental categories and the scores on the stress scales of the SPEAC and the SACL were significant.

Validity of the SPEAC

Face validity of the SPEAC

Face validity was defined by Anastasi (1988) as, "whether the test looks valid" (p. 144). The face validity of the SPEAC is illustrated by examining the items of the different SPEAC scales. For example; the item "full of energy" found on the high arousal scale certainly appears to indicate a high level of arousal. Conversely, the item "worn out" from the low arousal scale seems to indicate a much lower level of arousal. The item "edgy" on the high stress scale appears to indicate a high level of stress. In contrast, the item "satisfied", taken from the low stress scale, seems to indicate a much lower level of stress. The item "don't know whether I can handle things", taken from the low power scale seems to indicate a low level of coping and contrasts significantly to the item "can handle whatever comes my way", taken from the high power scale. The environmental item "my living conditions are crowded" clearly indicates a subject's environmental situation. Based on the above examples, the face validity of the SPEAC seem to be self-evident.

Construct validity of the SPEAC

Anastasi (1988) defined construct validity as, "the extent to which a test may be said to measure a theoretical construct or trait" (p. 153). The construct validity of the SPEAC was assessed by calculating the Pearson product-moment correlation coefficients between the stress scale of the SPEAC with the stress scale of the SACL, and the arousal scale of the SPEAC with the arousal scale of the SACL. Predictive validity of the SACL has been reported by various researchers: Burrows, Cox and Simpson (1977); Cox, Thirlaway and Cox (1982); and Ray and Fitzgibbon (1981). The correlation between the stress scales was highly significant, at the .001 level. This suggests that the SPEAC's stress scale and the SACL's stress scale measure similar constructs.

The stress scale of the SPEAC is comprised of synonyms of stress. It represents the subject's direct appraisal of his or her own stress. In contrast, the other scales measure components or factors of stress. Scores on one of these scales alone would not indicate stress, rather a score on one scale, in combination with scores on other stress scales, define stress. For example, a low score on "environment" would be interpreted differently if the individual had a high or low score on power.

As stated above, an extremely high level of significance was found between the SPEAC arousal scale and the SACL arousal scale ($p = .001$) indicating that the scales measure the same construct. This correlation is not surprising considering the SPEAC's arousal scale was designed similarly to the SACL's. The SPEAC and the SACL both define arousal as a subject's mental energy level or amount of wakefulness. The SPEAC measures arousal with items like "wide awake", and the SACL uses items like "alert".

The negative correlations between the SPEAC stress scale and the arousal and power scales of the SPEAC are highly significant ($p = .001$), and the percentage of common variance accounted for are, 33 percent and 56.4 percent, respectively. The SPEAC stress scale also correlated significantly ($p \leq 0.05$) with the SPEAC environment scale, common

variance being 11 percent. These correlations are expected and appropriate. After all, there should be consistency between the component scores of stress and the "summary" scale of self-reported stress. The relatively small common variances indicate, however, that there is psychometric gain if the scales are kept separate, and if separate scores are reported for them.

Unfortunately, the SPEAC power and arousal scales correlated significantly with each other. While less overlap would be preferred, as the common variance is only 27 percent, there is psychometric gain in using the two scales to measure stress.

Relationship between Stress and Arousal

It is commonly believed that high arousal is related to high stress. The correlation between the high stress and high arousal scales of the SPEAC was highly significant ($p \leq 0.001$) and negative. Similarly, a negative correlation was found between the scores of the SACL's stress and arousal scales. In the case of the SPEAC and the SACL, high arousal is reflected in items like "full of pep" and "energetic". These items indicate positive high arousal. Low arousal is reflected in items like "worn out" and "really tired", or negative, low arousal. Therefore, high arousal does not necessarily mean high stress. For example, a runner during a morning run will feel highly aroused, i.e., rapid pulse, elevated respirations, and flushed skin, but, may report relatively low feelings of stress, and may have an elevated sense of well being. Although this correlation may not be commonly known, it is not without substantiation.

Selye (1956), in describing stress in the final stage of his general adaptation syndrome as that of exhaustion, may have actually been describing low arousal. The low arousal scale of the SPEAC uses adjectives similar to Selye's final stage, i.e., "on the verge of exhaustion".

Developing the activation-deactivation checklist (AD-ACL), Thayer (1967) found four factors, all of which describe arousal: general activation, general deactivation, high activation, and deactivation-sleep. Thayer's general activation factor was represented by, adjectives similar to the SPEAC's high arousal scale, for example, "full of pep" and "energetic". Thayer's deactivation-sleep factor was represented by adjectives similar to the SPEAC's Low Arousal scale, for example, "worn out". It may be that arousal is made up of four factors: positive high and low arousal; and, negative high and low arousal. While Thayer included all four, Cox (1978) included only two; negative high arousal and positive low arousal.

Implications for Assessment and Treatment

The SPEAC differs from other measures of stress, in that it measures all three major components of stress, that is arousal, power and environment and reflects three models of stress. Not only will the SPEAC render global information on subject stress, but it will also indicate the area or areas from which the stress is originating.

If the subject scores high on the arousal scale it would indicate the subject may have an overly reactive physiology which may be contributing to an elevated stress level. The appropriate treatment may include physiological training such as progressive relaxation training. If the subject scores high on the environmental scale, it would indicate that the subject may be exposed to too many environmental stressors. Appropriate treatment may be relocation to a less stressful environment or modification of the environment. If the subject scores high on the power scale it would indicate that the subject's stress may be a consequence of an inability to cope. Treatment may involve learning new life skills, making appropriate self-statements, etc., in dealing with stress.

Directions for Further Research

Factor analyses were extremely helpful in demonstrating the integrity of the SPEAC and in providing evidence of the construct validity of the SPEAC as a three-model test. The research which should follow the present study is the assessment of reliability of the SPEAC, and the assessment of the criterion validity of the SPEAC.

There are various stress tests such as: the SRRS (Holmes & Rahe, 1967); the SRE (Holmes, 1974); the LES (Sarason, et al 1978); and AD-ACL (Thayer, 1978), the scores of which could be compared with the appropriate SPEAC scales. Groups identified a priori as high and low stress groups, could be tested with the SPEAC to determine whether the scores discriminate appropriately.

The SPEAC's identification of three components of stress, that is, environment, arousal, and power may not prove exhaustive. Transcendence or the capacity to "rise above" stress may be a fourth factor Wheeler (unpublished master's thesis, 1988). However, whether transcendence is a new and separate factor of stress or whether it is just a subcategory of the power factor remains to be proven. Future research should develop an appropriate operational definition of transcendence and establish appropriate items for a transcendence scale. These items could then be added to the SPEAC and administered to various groups; the resulting data could then be factor analyzed to determine if the new items load on a separate factor rather than one of the existing SPEAC factors.

Future research should offer normative data for the SPEAC. SPEAC scores collected from differing populations, such as, university students, the incarcerated, and hospitalized groups should be contrasted to develop guidelines to determine what constitutes an average versus a high SPEAC score for each scale.

CONCLUSION

The SPEAC, a new three model measure of stress, was developed and administered to a Canadian sample of 491 Saint Mary's University students. Evidence for the construct validity of the SPEAC was found by factor analyzing the responses of this large sample.

Additional evidence of the construct validity of the SPEAC was found in significant Pearson product-moment correlations between the stress and arousal scales of the SPEAC and the stress and arousal scales of the SACL.

REFERENCES

- Anastasi, A. (1988). Psychological testing. New York: MacMillan Publishing Co., Inc.
- Appley, M. H. , and Trumbull, R. 1967. On the concept of physical stress. In Appley, M. H. , and Trumbull, R. (Eds.), Psychological stress: Issues in research, New York: Appleton-Century Crofts.
- Arnold, M. A. (1960). Emotion and personality. In R. Lazarus, Psychological stress and the coping process. New York.: McGraw Hill Inc.
- Berger, H. (1930). Uber das electrenkephalogramm des menchen. In R. Lazarus (Ed.), Psychological stress and the coping processes. New York: McGraw Hill Inc.
- Burrows, G. Cox, T., & Simpson, G. (1977). The measurement of stress in a sales training situation. Journal of Occupational Psychology, 50, 45-51.
- Byrne, D. G.& Whyte, H. M. (1980). Life events and myocardial infarction revisited. Psychosomatic Medicine, 42,1-10.
- Cannon, W. B. (1929). Bodily changes in pain, hunger, fear and rage. New York: D. Appleton and Co.
- Cattell, R. B. (1950). Personality: A systematic theoretical and factual study. New York: McGraw-Hill.
- Cox, T. (1978). Stress. Baltimore: University Press.
- Cox, T. & Mackay, C. (1981). A transactional approach to occupational stress. In E.N. Corlett and J. Richardson (Eds.), Stress, work design and productivity. Chichester: John Wiley and Sons.
- Cox, T., Mackay, C.& Page, H. (1982). Research notes simulated repetitive work and self-reported mood. Journal of Occupational Behaviour, 3, 247-252.
- Cox, T., Thirlaway, M., & Cox, S. (1982). Repetitive work, well-being, and arousal. In H. Ursin and K. Murison (Eds.), Biological as Psychological bases of psychosomatic disease. Oxford, England: Pergamon.

- Crowne, D. P. & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. Journal of Consulting Psychology, 24, 349-354.
- Edwards, M. K. (1971). Life crisis and myocardial infarction. In B. Snell Dohrenwend and B. Dohrenwend (Eds.), Stressful life events: Their nature and effects, New York: John Wiley and Sons Inc.
- Frankenhaeuser, M. (1975). Experimental approaches to the study of catecholamines and emotion. In L. Levi (Ed.), Emotions: Their parameters and measurement. New York: Raven Press.
- Gorsuch, R. (1983). Factor analysis. New Jersey: Lawrence Erlbaum Associates, Publishers.
- Graveling, R. A., Simpson, G. C., Maybe, M. H., Flax, R. B., Hodge, C. J. & Leamon, T. B. (1980). An investigation of stress on coal face workers and the temporal variation of such stress. Final Report on EEC Contract 6254-11/8/50, October, Institute of Occupational Medicine, Burton, England.
- Hawkins, N. G., Davies, R. & Holmes, T. H. (1957). Psychosocial factors in the development of pulmonary tuberculosis. In B. Snell Dohrenwend and B. Dohrenwend (Eds.), Stressful life events: Their nature and effects, New York: John Wiley and Sons Inc.
- Holmes, T. H. (1974). Life change and illness susceptibility. In B. Snell Dohrenwend and B. Dohrenwend (Eds.), Stressful life events: Their nature and effects, New York: John Wiley and Sons Inc.
- Holmes, T. H. & Rahe, R. H. (1967). The social readjustment rating scale. Journal of Psychosomatic Research, 11, 213-218.
- Howarth, C. I. (1978). Environmental stress. In C. I. Howarth and W. C. Gillham (Eds.), The uses of psychology. London, Unwin.
- Kagan, A. & Levi, L. (1971). Adaptations of the psychosocial environment to man's abilities and needs. In L. Levi (Ed.), Society, stress and disease. London: Oxford University Press.
- Kim, J. & Mueller, C. W. (1978). Factor analysis statistical methods and practical issues. London: Sage Publications.

- Konopasky, R. J. & McGovern, J. (1989). The measurement of stress, arousal and power: alternate and expanded versions of the stress arousal checklist. Paper presented at the Canadian Psychological Association, June, Halifax, Nova Scotia, Canada.
- Korchin, S. J., & Ruff, G. E. (1964). Psychological responses on the Mercury astronauts. In G. H. Grosser, H. Wechsler and M. Greenblatt(Eds.), The threat of impending disaster. Cambridge, Mass.: M.I.T. Press.
- Lacey, J. I. (1967). Somatic response patterning and stress: Some revisions of activation theory. In M. H. Appley & M. Trumbull (Eds.), Psychological stress. New York: Appleton-Century-Croft.
- Lazarus, R. (1966). Psychological stress and the coping process. U.S.A: McGraw Hill Inc.
- Lazarus, R. (1976). Patterns of adjustment. New York: McGraw Hill Inc.
- Levenson, H., Hirschfield, M. L., Hirschfield, A. & Dzubay, B. (1983).Recent life events and accidents. Journal of Human Stress, 1, 11-4.
- Lindsley, D. B. (1951). Emotion. In R Lazarus (Ed), Psychological stress the coping process. U.S.A: McGraw Hill Inc.
- Lowe, M. & McGrath, J. E. (1971). Stress, arousal, and performance:Some findings calling for a new theory. Project Report, AF 1161-67, AFOSR.
- Mackay, C. J., Cox, T., Burrows, G., & Lazzerini, T. (1978). Inventory for the measurement of self-reported stress and arousal. Journal of Social and Clinical Psychology, 17, 283-284.
- Margetts, E. L. (1975). Stress, homeostasis and the human ecological continuum in time - some implications for psychiatry. In L. Levi (Ed), Society stress and disease, Vol. 2, New York: Oxford Press.
- Mason, J. W. (1971). A re-evaluation for the concept of "non-specificity" in stress theory. Journal of Psychiatric Research, 8, 323-333.
- McGovern, J. (1987). The measurement of stress, arousal and power:Alternate and expanded versions of the stress arousal checklist. Unpublished Masters Thesis. Saint Mary's University, Halifax, Nova Scotia.

- McGrath, J. (1970). Social psychological factors in stress. New York: Holt, Rinehart and Winston Inc.
- McGrath, J. (1976). Stress and behaviour in organizations. In M. Dunnett (Ed.), Handbook of industrial and organizational psychology. Chicago: Rand-McNally College Publishing Company.
- Meddis, R. (1972). Bipolar factors in mood adjective checklists. British Journal of Clinical Psychology, 11, 178-184.
- Meyer, A. (1951). The life chart and the obligation in specifying positive data in psychopathologic diagnosis. In B. Snell Dohrenwend and B. Dohrenwend (Eds.), Stressful life events: Their nature and effects. New York: John Wiley and Sons.
- Monat, A. & Lazarus, R. (1970). Stress and coping: an anthology. New York : Columbia University Press.
- Norusis, M. (1985). Advanced statistics guide to SPSSX. Chicago: SPSS Inc.
- Nowlis, V. & Nowlis, G. (1956). The description and analysis of mood. Annals: New York Academy of Science, 5, 345-355.
- Popkin, M., Stillner, V., Pierce, C., Williams, M. & Gregory, P. (1976). Recent life changes of prolonged competitive stress. Journal of Nervous Mental Disorders, 163, 302-306.
- Rahe, R. H. (1968). Life change measurement as a predictor of illness. Proceedings of The Royal Society of Medicine, 61, 1124-1126.
- Ray, C. & Fitzgibbon, G. (1981). Stress, arousal and coping with surgery. Psychological Medicine, 11, 741-746.
- Roget's II: The new edition (1984). New York: Berkeley Books.
- Russell, J.A., & Mehrabian, A. (1977). Evidence for a three-factor theory of emotions. Journal of Research in Personality, 11, 273-294.
- Sarason, I. G. (1978). Recent developments in research on life stress. In V. Hamilton and D. Warburton (Eds.), Human stress and cognition. Chinchester: John Wiley and Sons.

- Sarason, I. G., Johnson, J. H. & Siegel, J. M. (1978). Assessing the impact of life changes: Development of the life experiences survey. Journal of Consulting and Clinical Psychology, 46, 932-946.
- Sells, S. B. (1970). On the nature of stress. In J. E. McGrath (Ed.), Social and psychological factors in stress. New York: Holt, Rinehart and Winston.
- Selye, H. (1950). Stress. Acta, Montreal.
- Selye, H. (1956). The stress of life. New York: McGraw Hill Inc.
- Selye, H. (1983). The stress concept: past, present and future. In C. Cooper (Ed.), Stress research: Issues for the eighties. New York: John Wiley and Sons.
- Shaffer, M. S. (1982). Life after stress. New York: Plenum Press.
- Stein, S. P. & Charles, E. (1971). A study of early life experiences of adolescent diabetics. American Journal of Psychiatry, 128, 56-60.
- Stevenson, D. K., Nabseth, D., Masuda, M. & Holmes, T. H. (1979). Life events and the postoperative course of ulcer patients. Journal of Human Stress, 5, 19-28.
- Symonds, C. (1947). Use and abuse of the term flying stress. In Air ministry. psychological disorders in flying personal of the Royal Air Force, 1939-1945. H.M.S.O., London.
- Tausig, M. (1982). Measuring life events. Journal of Health and Social Behavior, 23, 52-64.
- Thayer, R. (1967). Measurement of activation through self-reports. Psychological Reports, 20, 663-678.
- Thayer, R. (1978). Factor analytic and reliability studies on the activation-deactivation adjective checklist. Psychological Reports, 42, 747-756.
- Vinokur, A. & Selzer, M. L. (1975). Desirable versus undesirable life events. Journal of Personality and Social Psychology, 32, 329-337.

- Weitz, J. (1970). Psychological research on the problems of human stress. In J. E. McGrath (Ed), Social and psychological factors in stress. New York: Holt, Rinehart and Winston.
- Welford, A. T. (1973). Stress and performance. Ergonomics, 16, 567.
- Wheeler, P. J. (1988). Reliability and factor structure of the SACL checklist of arousal, stress and power revised, and the expansion of the SACL to measure power, a third factor. Unpublished masters thesis, Saint Mary's University, Halifax, Nova Scotia.
- Zimmerman, M. (1983). Using personal scalings of life event inventories to depict dysphoria. Journal of Human Stress, 9, 32-38.

Appendix A

SPEAC: Pilot Study One

1. under a great strain	++	+	-	--	?
2. difficulty coping	++	+	-	--	?
3. in a panic	++	+	-	--	?
4. full of energy	++	+	-	--	?
5. calm	++	+	-	--	?
6. in debt over \$10 000	++	+	-	--	?
7. recent change in work load	++	+	-	--	?
8. on top of things	++	+	-	--	?
9. in debt under \$10 000	++	+	-	--	?
10. can take whatever comes my way	++	+	-	--	?
11. like to be challenged	++	+	-	--	?
12. not jumpy	++	+	-	--	?
13. living beyond my means	++	+	-	--	?
14. good jobs are scarce	++	+	-	--	?
15. worn out	++	+	-	--	?
16. edgy	++	+	-	--	?
17. lack of control over things	++	+	-	--	?
18. at peace	++	+	-	--	?
19. work/school is boring	++	+	-	--	?
20. rested	++	+	-	--	?
21. better than average at handling things	++	+	-	--	?
22. full of life	++	+	-	--	?
23. up to handling most situations	++	+	-	--	?
24. full of pep	++	+	-	--	?
25. secure and at ease	++	+	-	--	?
26. no get up and go	++	+	-	--	?
27. in control of my life	++	+	-	--	?
28. ready for anything	++	+	-	--	?
29. bundle of nerves	++	+	-	--	?
30. half asleep	++	+	-	--	?
31. under too much pressure	++	+	-	--	?
32. recently quit/fired from a job	++	+	-	--	?

33. really tired	++	+	-	--	?
34. usually know what to do next	++	+	-	--	?
35. feeling uptight all of the time	++	+	-	--	?
36. enjoying myself	++	+	-	--	?
37. full of vim and vigor	++	+	-	--	?
38. happy with the way things are	++	+	-	--	?
39. capable	++	+	-	--	?
40. agitated	++	+	-	--	?
41. healthy	++	+	-	--	?
42. having difficulty managing	++	+	-	--	?
43. my life is going smoothly	++	+	-	--	?
44. raring to go	++	+	-	--	?
45. change in relationship with boss	++	+	-	--	?
46. still have energy left over even after a difficult task	++	+	-	--	?
47. frustrated	++	+	-	--	?
48. drained and listless	++	+	-	--	?
49. have enough money to make ends meet	++	+	-	--	?
50. look forward to things	++	+	-	--	?
51. experiencing sexual difficulties	++	+	-	--	?
52. wish I were more skilled in dealing with people	++	+	-	--	?
53. in over my head	++	+	-	--	?
54. down in the dumps	++	+	-	--	?
55. have the patience to persevere	++	+	-	--	?
56. hard to keep awake	++	+	-	--	?
57. on the verge of exhaustion	++	+	-	--	?
58. at the end of my rope	++	+	-	--	?
59. uneasy most of the time	++	+	-	--	?
60. things happen too quickly	++	+	-	--	?
61. have peace of mind	++	+	-	--	?
62. wide awake	++	+	-	--	?
63. secure in my job	++	+	-	--	?
64. I am happy with work/school	++	+	-	--	?
65. my spouse/partner has been unfaithful	++	+	-	--	?

66. can make things happen	++	+	-	--	?
67. too many responsibilities	++	+	-	--	?
68. light hearted	++	+	-	--	?
69. family member is ill	++	+	-	--	?
70. there isn't enough time in the day	++	+	-	--	?
71. lots of spirit	++	+	-	--	?
72. see family regularly but not too often	++	+	-	--	?
73. wish that I had more talent	++	+	-	--	?
74. family members are in good health	++	+	-	--	?
75. have a variety of natural talents	++	+	-	--	?
76. have close relationship	++	+	-	--	?
77. enjoying myself	++	+	-	--	?
78. I have many family responsibilities	++	+	-	--	?
79. at my wits end	++	+	-	--	?
80. bored and uninterested	++	+	-	--	?
81. I have been rejected	++	+	-	--	?
82. stressed	++	+	-	--	?
83. tensed up	++	+	-	--	?
84. don't have enough background education	++	+	-	--	?
85. I am happy with my family life	++	+	-	--	?
86. lack power to change things	++	+	-	--	?
87. keen to get involved	++	+	-	--	?
88. ready to drop	++	+	-	--	?
89. arguments occur often with the family	++	+	-	--	?
90. burned out	++	+	-	--	?
91. I have people I can lean on	++	+	-	--	?
92. things are beyond my reach	++	+	-	--	?
93. not worried about money	++	+	-	--	?
94. relaxed jaw and neck muscles	++	+	-	--	?
95. neither bored nor overworked	++	+	-	--	?
96. no change in social activity	++	+	-	--	?
97. my heart pounds sometimes	++	+	-	--	?
98. friend is ill	++	+	-	--	?
99. not jumpy	++	+	-	--	?
100. full of enthusiasm	++	+	-	--	?

101. friends want more time than I can give	++	+	-	--	?
102. have a racing pulse	++	+	-	--	?
103. friends help me when I need it	++	+	-	--	?
104. feeling weary	++	+	-	--	?
105. relaxed muscles	++	+	-	--	?
106. I am comfortable with my friends	++	+	-	--	?
107. irregular breathing	++	+	-	--	?
108. people are considerate of my feelings	++	+	-	--	?
109. happy go lucky	++	+	-	--	?
110. happy with my social life	++	+	-	--	?
111. fatigued	++	+	-	--	?
112. my friends can be mean	++	+	-	--	?

Appendix B

SPEAC: Pilot Study Two, Part "A"

strongly agree	agree	disagree	strongly disagree	unclear
++	+	-	--	?

Form A

No.

1. edgy	++	+	-	--	?
2. at peace	++	+	-	--	?
3. can take whatever comes my way	++	+	-	--	?
4. wish I were more skilled	++	+	-	--	?
5. worn out	++	+	-	--	?
6. full of energy	++	+	-	--	?
7. bundle of nerves	++	+	-	--	?
8. secure and at ease	++	+	-	--	?
9. like to be challenged	++	+	-	--	?
10. wish I had more talent	++	+	-	--	?
11. half asleep	++	+	-	--	?
12. feeling uptight all of the time	++	+	-	--	?
13. my life is going smoothly	++	+	-	--	?
14. in control of my life	++	+	-	--	?
15. don't have enough background education	++	+	-	--	?
16. really tired	++	+	-	--	?
17. full of life	++	+	-	--	?
18. agitated	++	+	-	--	?
19. my life is going smoothly	++	+	-	--	?
20. usually know what to do next	++	+	-	--	?
21. unsure of myself	++	+	-	--	?
22. drained and listless	++	+	-	--	?
23. full of pep	++	+	-	--	?
24. in over my head	++	+	-	--	?
25. there is enough time in the day	++	+	-	--	?
26. capable	++	+	-	--	?

27. not making any progress	++	+	-	--	?
28. hard to keep awake	++	+	-	--	?
29. full of vim and vigor	++	+	-	--	?
30. down in the dumps	++	+	-	--	?
31. on top of things	++	+	-	--	?
32. still have energy left over after a busy task	++	+	-	--	?
33. going nowhere fast	++	+	-	--	?
34. on the verge of exhaustion	++	+	-	--	?
35. raring to go	++	+	-	--	?
36. experiencing sexual difficulties	++	+	-	--	?
37. pleased with the way things have turned out	++	+	-	--	?
38. can make things happen	++	+	-	--	?
39. lacking in resources	++	+	-	--	?
40. bored and uninterested	++	+	-	--	?
41. wide awake	++	+	-	--	?
42. at the end of my rope	++	+	-	--	?
43. happy with the way things are	++	+	-	--	?
44. coping	++	+	-	--	?
45. unable to assert myself	++	+	-	--	?
46. ready to drop	++	+	-	--	?
47. enjoying myself	++	+	-	--	?
48. uneasy most of the time	++	+	-	--	?
49. easy going	++	+	-	--	?
50. not having difficulty managing	++	+	-	--	?
51. feel like a failure	++	+	-	--	?
52. feeling weary	++	+	-	--	?
53. lots of spirit	++	+	-	--	?
54. no get up and go	++	+	-	--	?
55. light hearted	++	+	-	--	?
56. ready for anything	++	+	-	--	?
57. can't make up my mind	++	+	-	--	?
58. fatigued	++	+	-	--	?
59. ready to get involved	++	+	-	--	?
60. not in control of my life	++	+	-	--	?
61. happy go lucky	++	+	-	--	?

62. feel competent	++	+	-	--	?
63. feel insecure	++	+	-	--	?
64. burned out	++	+	-	--	?
65. full of enthusiasm	++	+	-	--	?
66. unhappy with the way things are	++	+	-	--	?
67. taking it easy	++	+	-	--	?
68. a real go getter	++	+	-	--	?
69. have doubts about myself	++	+	-	--	?
70. hard to get going in the morning	++	+	-	--	?
71. fully alert	++	+	-	--	?
72. my life is not going smoothly	++	+	-	--	?
73. satisfied	++	+	-	--	?
74. feel like nothing can stop me	++	+	-	--	?
75. not good enough	++	+	-	--	?
76. don't feel like doing anything	++	+	-	--	?
77. energetic	++	+	-	--	?
78. not enjoying myself	++	+	-	--	?
79. content with myself	++	+	-	--	?
80. not always prepared	++	+	-	--	?
81. not active physically	++	+	-	--	?
82. full of ambition	++	+	-	--	?
83. difficulty coping	++	+	-	--	?
84. can't complain	++	+	-	--	?
85. wish I had more experience	++	+	-	--	?
86. not excited easily	++	+	-	--	?
87. physically active	++	+	-	--	?
88. having difficulty managing	++	+	-	--	?
89. tranquil	++	+	-	--	?
90. not strong	++	+	-	--	?
91. stimulated by life	++	+	-	--	?
92. comfortable	++	+	-	--	?
93. don't know whether I can handle things	++	+	-	--	?

Appendix C

SPEAC, Part "B"

strongly agree	agree	disagree	strongly disagree	unclear
++	+	-	--	?

Form A

No.

1. satisfied with my job	++	+	-	--	?
2. family member is ill	++	+	-	--	?
3. in debt over \$10,000	++	+	-	--	?
4. experiencing sexual difficulties	++	+	-	--	?
5. no change in social activity	++	+	-	--	?
6. have been arrested recently	++	+	-	--	?
7. my living conditions are crowded	++	+	-	--	?
8. my job is fulfilling	++	+	-	--	?
9. see family regularly but not too often	++	+	-	--	?
10. in debt under \$10,000	++	+	-	--	?
11. my spouse/partner has been unfaithful	++	+	-	--	?
12. friend is ill	++	+	-	--	?
13. have been in prison	++	+	-	--	?
14. live in a run down area	++	+	-	--	?
15. like my co-workers	++	+	-	--	?
16. family members are in good health	++	+	-	--	?
17. living beyond my means	++	+	-	--	?
18. have close relationship	++	+	-	--	?
19. friends want more time than I can give	++	+	-	--	?
20. recently have had a minor legal problem	++	+	-	--	?
21. like where I live	++	+	-	--	?
22. change in work load	++	+	-	--	?
23. I have many family responsibilities	++	+	-	--	?
24. have enough money to make ends meet	++	+	-	--	?

25. I have been rejected	++	+	-	--	?
26. friends help me when I need it	++	+	-	--	?
27. recently have had a serious legal problem	++	+	-	--	?
28. live in a good neighborhood	++	+	-	--	?
29. good jobs are scarce	++	+	-	--	?
30. I am happy with my family life	++	+	-	--	?
31. having financial problems	++	+	-	--	?
32. have people I can lean on	++	+	-	--	?
33. don't socialize often	++	+	-	--	?
34. have been in court recently	++	+	-	--	?
35. like my neighbors	++	+	-	--	?
36. work /school is boring	++	+	-	--	?
37. arguments occur often with family	++	+	-	--	?
38. have plenty of money in the bank	++	+	-	--	?
39. problems communicating with my partner	++	+	-	--	?
40. I am comfortable with my friends	++	+	-	--	?
41. recent contact with police	++	+	-	--	?
42. dislike the people I live with	++	+	-	--	?
43. recently quit/fired from job	++	+	-	--	?
44. come from a close family	++	+	-	--	?
45. earn more money than my peers	++	+	-	--	?
46. fight often with partner	++	+	-	--	?
47. people are considerate of my feelings	++	+	-	--	?
48. recently been in local jail	++	+	-	--	?
49. recent change in living conditions	++	+	-	--	?
50. change in relationship with boss	++	+	-	--	?
51. have a good relationship with my parents	++	+	-	--	?
52. feel secure in my job	++	+	-	--	?
53. running out of money	++	+	-	--	?
54. have no partner/spouse	++	+	-	--	?
55. happy with my social life	++	+	-	--	?
56. family member in trouble with law	++	+	-	--	?
57. my living conditions are spacious	++	+	-	--	?
58. have a poor relationship with my siblings	++	+	-	--	?
59. not worried about money	++	+	-	--	?

60. recently separated/divorced	++	+	-	--	?
61. my friends can be mean	++	+	-	--	?
62. have been a witness to a crime	++	+	-	--	?
63. live in unsanitary conditions	++	+	-	--	?
64. I am happy with work/school	++	+	-	--	?
65. family member has died recently	++	+	-	--	?
66. recently married	++	+	-	--	?
67. have been a recent victim of a crime	++	+	-	--	?
68. am deeply in love with partner/spouse	++	+	-	--	?
69. have no privacy	++	+	-	--	?
70. have good credit	++	+	-	--	?

Appendix D

SPEAC: Main Study, Part "A"

strongly agree	agree	disagree	strongly disagree	unclear
++	+	-	--	?

Form A

No.

1. edgy	++	+	-	--	?
2. at peace	++	+	-	--	?
3. worn out	++	+	-	--	?
4. wish I were more organized	++	+	-	--	?
5. full of energy	++	+	-	--	?
6. secure and at ease	++	+	-	--	?
7. like to be challenged	++	+	-	--	?
8. half asleep	++	+	-	--	?
9. feeling uptight all of the time	++	+	-	--	?
10. really tired	++	+	-	--	?
11. generally capable	++	+	-	--	?
12. full of life	++	+	-	--	?
13. agitated	++	+	-	--	?
14. usually know what to do next	++	+	-	--	?
15. unsure of myself	++	+	-	--	?
16. able to figure things out	++	+	-	--	?
17. drained and listless	++	+	-	--	?
18. full of pep	++	+	-	--	?
19. full of vim and vigor	++	+	-	--	?
20. down in the dumps	++	+	-	--	?
21. on top of things	++	+	-	--	?
22. good at handling things	++	+	-	--	?
23. on the verge of exhaustion	++	+	-	--	?
24. raring to go	++	+	-	--	?
25. pleased with the way things have turned out	++	+	-	--	?

26. bundle of nerves	++	+	-	--	?
27. wide awake	++	+	-	--	?
28. happy with the way things are	++	+	-	--	?
29. ready to drop	++	+	-	--	?
30. feel rushed on important tasks	++	+	-	--	?
31. enjoying myself	++	+	-	--	?
32. uneasy most of the time	++	+	-	--	?
33. easy going	++	+	-	--	?
34. feeling weary	++	+	-	--	?
35. lots of spirit	++	+	-	--	?
36. up for anything	++	+	-	--	?
37. no get up and go	++	+	-	--	?
38. ready for anything	++	+	-	--	?
39. can't make up my mind	++	+	-	--	?
40. fatigued	++	+	-	--	?
41. can handle whatever comes my way	++	+	-	--	?
42. feel insecure	++	+	-	--	?
43. burned out	++	+	-	--	?
44. full of enthusiasm	++	+	-	--	?
45. unhappy with the way things are	++	+	-	--	?
46. a real go getter	++	+	-	--	?
47. have doubts about myself	++	+	-	--	?
48. fully alert	++	+	-	--	?
49. my life is not going smoothly	++	+	-	--	?
50. satisfied	++	+	-	--	?
51. confused a lot of the time	++	+	-	--	?
52. feel like nothing can stop me	++	+	-	--	?
53. not good enough	++	+	-	--	?
54. energetic	++	+	-	--	?
55. content with myself	++	+	-	--	?
56. enjoy competition	++	+	-	--	?
57. difficulty coping	++	+	-	--	?
58. having difficulty managing	++	+	-	--	?
59. comfortable	++	+	-	--	?
60. don't know whether I can handle things	++	+	-	--	?

Appendix E

Final SPEAC, Part "A"

strongly agree	agree	disagree	strongly disagree	unclear
++	+	-	--	?

Form A

No.

1. edgy	++	+	-	--	?
2. at peace	++	+	-	--	?
3. worn out	++	+	-	--	?
4. full of energy	++	+	-	--	?
5. secure and at ease	++	+	-	--	?
6. half asleep	++	+	-	--	?
7. feeling uptight all of the time	++	+	-	--	?
8. really tired	++	+	-	--	?
9. generally capable	++	+	-	--	?
10. full of life	++	+	-	--	?
11. agitated	++	+	-	--	?
12. usually know what to do next	++	+	-	--	?
13. unsure of myself	++	+	-	--	?
14. able to figure things out	++	+	-	--	?
15. full of pep	++	+	-	--	?
16. full of vim and vigor	++	+	-	--	?
17. down in the dumps	++	+	-	--	?
18. on top of things	++	+	-	--	?
19. good at handling things	++	+	-	--	?
20. on the verge of exhaustion	++	+	-	--	?
21. raring to go	++	+	-	--	?
22. pleased with the way things have turned out	++	+	-	--	?
23. bundle of nerves	++	+	-	--	?
24. wide awake	++	+	-	--	?
25. happy with the way things are	++	+	-	--	?

26. ready to drop	++	+	-	--	?
27. enjoying myself	++	+	-	--	?
28. feeling weary	++	+	-	--	?
29. lots of spirit	++	+	-	--	?
30. can't make up my mind	++	+	-	--	?
31. fatigued	++	+	-	--	?
32. can handle whatever comes my way	++	+	-	--	?
33. feel insecure	++	+	-	--	?
34. burned out	++	+	-	--	?
35. unhappy with the way things are	++	+	-	--	?
36. have doubts about myself	++	+	-	--	?
37. my life is not going smoothly	++	+	-	--	?
38. satisfied	++	+	-	--	?
39. confused a lot of the time	++	+	-	--	?
40. not good enough	++	+	-	--	?
41. energetic	++	+	-	--	?
42. content with myself	++	+	-	--	?
43. difficulty coping	++	+	-	--	?
44. comfortable	++	+	-	--	?
45. don't know whether I can handle things	++	+	-	--	?

Appendix F

The Marlowe-Crowne Social Desirability Scale

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it relates to you personally. Then circle either T (for true) or F (for false) as they appear at the end of each item.

- | | |
|---|-----|
| 1. Before voting I thoroughly investigate the qualifications of all the candidates. | T F |
| 2. I never hesitate to go out of my way to help someone in trouble. | T F |
| 3. It is sometimes hard for me to go on with my work if I am not encouraged. | T F |
| 4. I have never intensely disliked anyone. | T F |
| 5. On occasion I have had doubts about my ability to succeed in life. | T F |
| 6. I sometimes feel resentful when I don't get my way. | T F |
| 7. I am always careful about my manner of dress. | T F |
| 8. My table manners at home are not as good as when I eat out in a restaurant. | T F |
| 9. If I could get into a movie without paying and be sure I was not seen, I would probably do it. | T F |
| 10. On a few occasions, I have given up doing something because I thought too little of my ability. | T F |
| 11. I like to gossip. | T F |

12. There have been times when I felt like rebelling against people in authority even though I knew they were right. T F
13. No matter who I'm talking to, I'm always a good listener. T F
14. I can remember "playing sick" to get out of something. T F
15. There have been occasions when I took advantage of someone. T F
16. I'm always willing to admit it when I make a mistake. T F
17. I always try to practice what I preach. T F
18. I don't find it particularly difficult to get along with loud mouthed, obnoxious people. T F
19. I sometimes try to get even, rather than forgive and forget. T F
20. When I don't know something I don't at all mind admitting it. T F
21. I am always courteous, even to people who are disagreeable. T F
22. At times I have really insisted on having things my own way. T F
23. There have been occasions when I felt like smashing things. T F
24. I would never think of letting someone else be punished for my wrongdoings. T F
25. I never resent being asked to return a favor. T F
26. I have never been irked when people expressed ideas very different from my own. T F
27. I never make a long trip without checking the safety of my car. T F
28. There have been times when I was quite jealous of the good fortunes of others. T F
29. I have almost never felt the urge to tell someone off. T F
30. I am sometimes irritated by people who ask favors of me. T F
31. I have never felt that I was punished without cause. T F

Appendix G

The SACL (form A)

1. sleepy	++ + - -- ?	16. uptight	++ + - -- ?
2. jittery	++ + - -- ?	17. restless	++ + - -- ?
3. energetic	++ + - -- ?	18. alert	++ + - -- ?
4. calm	++ + - -- ?	19. cheerful	++ + - -- ?
5. tired	++ + - -- ?	20. active	++ + - -- ?
6. drowsy	++ + - -- ?	21. apprehensive	++ + - -- ?
7. lively	++ + - -- ?	22. sluggish	++ + - -- ?
8. idle	++ + - -- ?	23. peaceful	++ + - -- ?
9. distressed	++ + - -- ?	24. dejected	++ + - -- ?
10. relaxed	++ + - -- ?	25. nervous	++ + - -- ?
11. contented	++ + - -- ?	26. bothered	++ + - -- ?
12. tense	++ + - -- ?	27. pleasant	++ + - -- ?
13. uneasy	++ + - -- ?	28. worried	++ + - -- ?
14. vigorous	++ + - -- ?	29. comfortable	++ + - -- ?
15. activated	++ + - -- ?	30. stimulated	++ + - -- ?

Appendix H

Instructions for the SPEAC "Part A"

INSTRUCTIONS

Each of the following single word items or phrases describe feelings, moods, or situations. Please use the list to describe your feelings or your situation at this moment.

If the phrase definitely describes how you feel or your situation at the moment you read it, circle the double plus as is indicated by a ++ mark to the right of the phrase. For example, if the phrase is "wide awake" and you are feeling wide awake at the moment, circle the ++ as follows:

(wide awake ++ + - -- ?)

If the phrase only likely applies to your feelings or situation at the moment, circle the single plus indicated as a + mark as follows:

(wide awake ++ + - -- ?)

If the phrase does not particularly apply to your feelings or situation at this moment, circle the single minus sign - as follows:

(wide awake ++ + - -- ?)

If you clearly decide that the phrase does not apply to your feelings or situation at this moment, circle the double minus sign -- as follows:

(wide awake ++ + - -- ?)

If the phrase is not clear to you, circle the question mark ? as follows:

(wide awake ++ + - -- ?)

First reactions are usually the most reliable. Therefore, do not spend much time considering each phrase. However, try to be as accurate as possible.

Appendix I

Instructions for the SPEAC "Part B"

INSTRUCTIONS

Each of the following single word items or phrases describe feelings, moods, or situations. Please use the list to describe your feelings or your situation at this moment.

If the short sentence definitely describes how you feel or your situation at the moment you read it, circle the double plus as is indicated by a ++ mark to the right of the phrase. For example, if the short sentence is "I have no privacy" and you are feeling in a panic at the moment, circle the ++ as follows:

(I have no privacy. ++ + - -- ?)

If the short sentence only likely applies to your feelings or situation at the moment, circle the single plus indicated as a + mark as follows:

(I have no privacy. ++ + - -- ?)

If the short sentence does not particularly apply to your feelings or situation at this moment, circle the single minus sign - as follows:

(I have no privacy. ++ + - -- ?)

If you clearly decide that the short sentence does not apply to your feelings or situation at this moment, circle the double minus sign -- as follows:

(I have no privacy. ++ + - -- ?)

If the short sentence is not clear, or does not apply, to you circle the question mark ? as follows:

(I have no privacy. ++ + - -- ?)

First reactions are usually the most reliable. Therefore, do not spend much time considering each phrase. However, try to be as accurate as possible.

Appendix J

Instructions for the SACL

INSTRUCTIONS

Each of the following words describe feelings or moods. Please use the list to describe your feelings at this moment.

If the word definitely describes how you feel at the moment you read it, circle the double plus as is indicated by a ++ mark to the right of the word. For example, if the phrase is "relaxed" and you are feeling relaxed at the moment, circle the ++ as follows:

(relaxed ++ + - -- ?)

If the word only likely applies to your feelings at the moment, circle the single plus indicated as a + mark as follows:

(relaxed ++ + - -- ?)

If the word does not particularly apply to your feelings at this moment, circle the single minus sign - as follows:

(relaxed ++ + - -- ?)

If you clearly decide that the word does not apply to your feelings at this moment circle the double minus sign -- as follows:

(relaxed ++ + - -- ?)

If the word is not clear to you circle the question mark ? as follows:

(relaxed ++ + - -- ?)

First reactions are usually the most reliable. Therefore, do not spend much time considering each phrase. However, try to be as accurate as possible.