

ANXIETY-PERCEIVED CONTROL - PERCEIVED DANGER  
IN  
INDUSTRIAL WORKERS  
A STUDY ON COAL MINERS

by  
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## A B S T R A C T

This study was carried out in the Kozlu area of Zonguldak Coal Mine Industry in order to compare the level of anxiety between underground and surface mine workers. The effects of a personality variable and a cognitive factor on anxiety were searched. Some social and demographic characteristics of these coal miners were also investigated.

Four different measurement instruments were used; the State-Trait Anxiety Inventory, the Internal-External Locus of Control Scale, Perceived Danger Scale and a Questionnaire.

The results showed that the anxiety level of the subjects could be discriminated significantly by the three independent variables of location (surface versus underground), perceived danger, and internal-external control, in that order. Underground miners were found to have higher anxiety, to perceive higher danger and to be more external than surface miners. That is, the physical conditions of the workplace and the degree of danger perceived by miners were the best predictors of anxiety states, whereas the personality factor (internal-external locus of control) was not such an important predictor of anxiety states.

These results were discussed in the light of our theoretical expectations and in view of stress theories. The results of the study supported Lazarus's stress model in general. They also showed that underground mine work was a highly stressful occupational field and should be given serious attention.

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## I. INTRODUCTION

Studies that are relevant to the problem of stress in industry have generally attempted to determine different aspects of workers' environments and to estimate the effect of these factors on the health of individuals. In these studies, the emphasis has long been on the physical and biological aspects of an individual's environment as possible sources of well-being and health problems (Kalimo, 1980). The change in the conceptualization of illness and the realization that the physical, biological aspects of an individual's environment could explain only a part of their health problems have resulted in a widened, new perspective on the range of environmental health hazards. New trends of thinking have stressed the importance of psycho-social factors in people's environment and their effects on the psychological health of individuals. New research has also led to an emphasis on symbolic stimuli, subjective experiences of the environment and resulting psycho-physiological states (Kalimo, 1980). Stress and Anxiety theories have increasingly been applied in view of this new, widened perspective on occupational health. Our concern in this study is with the environment of the individual worker from this new perspective.

Work is one of the most important fields in an individual's life. People spend most of their time at work. It involves a network of roles, social contacts, obligations,

challenges. There are many sources of stress at work. Although work stress seems to be an important problem, the amount of material relating specifically to the effect of stress on individuals in industry is small. Also, most of the research is related to white-collar workers; whether these results will be equally applicable to blue-collar workers has not been proven.

The definition of the concept of work stress has occupied some researchers. In Caplan et.al.'s definition stress refers to "any characteristic of the job environment which pose a threat to the individual. Two types of job stress may threaten the person; either demands which he may not be able to meet or insufficient supplies to meet his needs" (1975, p.3). Caplan et.al. (1975) have used the term "strain" to define the reaction of the individual and distinguished between psychological strains such as job dissatisfaction, anxiety, low self-esteem, physiological strains such as blood pressure etc. and behavioral symptoms of strain such as smoking (cited in Kalimo, 1980). Researchers like Margolis and Kroes (1974), have also defined job stress. According to Margolis and Kroes there were five dimensions of job-related strain; short-term subjective states (anxiety, tension, anger), long-term and more chronic psychological responses (depression, alienation), transient physiological changes (blood pressure), lowered physical health (gastro-intestinal disorders, coronary hearth disease, asthmatic attacks), and work performance decrement (cited in Kalimo, 1980).

The forces that are "sources of stress" at work are very complex. A wide variety of stresses are described ranging from conflict with one's boss to the effect of pacing and monotony. French and Caplan (1972) have produced a list of "occupational stresses", these were, "role ambiguity, role conflict, role overload (quantitative and qualitative), res-

ponsibility for people, relations with others, participation, occupation differences". With personality as an intervening variable, they have listed stress reactions as "job dissatisfaction, heavy smoking, high blood pressure, cholesterol, job tensions, job-related threat, low self-actualization, low self-esteem" (cited in Murrell, 1978, p.17). Any of these singly or in combination could lead to psychosomatic diseases. The different working environments, the quality of work, different ties work has with other phases of life and the big individual differences between people who are working, are all different but interrelated factors as possible sources of stress and health problems.

All of the factors outlined briefly above assume special characteristics in relation to work done in coal-mines. Researchers have been interested on the problem of the structure and function of coalmines. Unfortunately minor attention has been paid to the health problems and well-being of the workers in there. Coal-miners are generally open to physical, chemical, biological hazards. They are under pressures of hard work, threats to security, monotony which may lead to such serious stress reactions as anxiety, alienation, job dissatisfaction, accident, psychosomatic diseases. The psychological health of coal-miners plays an important role in affecting many people's lives. Regardless of however important this subject is seen, as being studies on the psycho social well-being of coal-miners are scarce.

The only available study in this specific field in Turkey was a survey which explained coal-miner's working conditions (Oskay, 1983). This study showed how various socio-cultural, economical factors affect coal-miners' thought and behavior patterns. The results indicated that a considerable number of problems exist in the work conditions. The social and economical conditions in which miners live, were



not found adequate considering the great risk of working underground. Psychological and physiological health problems were common and the health services were not sufficient.

In the present study, the aim is to investigate the differences in the state-trait anxiety levels between two groups of coal-miners who work under different stress conditions in coal-mines. Variables such as perceived danger and internal-external locus of control are seen as intervening factors. In this study demographic variables (age, education etc..) are also investigated.

Thus, the study offers an adequate target for the application of the stress and anxiety theories in examining the relationships between work and health. In the light of the previously described aims, the study will discuss first, a conceptual analysis of stress and general stress, anxiety theories. This part also includes the main objectives of occupational mental health and an overview of the sources of stress at work with consequences of work stress. Then, sections on the measurement of anxiety, the concepts of perceived danger and internal-external locus of control will be presented.

## II. REVIEW OF THE LITERATURE

### CONCEPTUALIZATION OF STRESS

The term "stress" has been interpreted in different ways by different researchers. The expression seems to be used in a number of different ways, usually without a specific explanation of the user's intent. This usage has resulted in a fair amount of confusion. Today, there is a lack of agreement on what is meant by stress. It is even suggested that the term be abandoned completely or be applied as a paradigm "stress research", rather than "stress" as a separate concept.

The two extremes in the definition of this term can be seen in Selye's and Caplan's definitions of stress. Caplan et.al. defined stress as an environmental characteristic which poses a threat to the individual (1975). Whereas Selye considered stress as a response of the organism to any environmental demand (1956).

Lazarus (1966) has suggested that any environmental imbalance can produce stress, which may be psychological or perceived. He used the term "psychological stress" and distinguished psychological stress from physiological stress. In psychological stress the reaction depends on how the person interprets or appraises (consciously or unconsciously) the

significance of a harmful, threatening or challenging event. This process is determined by the cognitive processes of the individual (Lazarus, 1966).

Spielberger (1972) has defined stress as the external forces that act on an individual, that is, the objective danger or the objective properties of the environment. Miller (1965) has used the concept "threat" when referring to the environmental conditions that disturb individual. In McGrath's (1974) view, stress referred to an imbalance between the expectation of the individual and the actual environment (all cited in Kalimo, 1980).

The environmental conditions with which the individual is in discordance are called stressors or stress factors. However, it should not be forgotten that environmental factors are stressful only with reference to an interaction with the individual. An individual's behavior in a stressful situation is called a response, adjustment reaction or a coping process (Lazarus, 1966). Caplan et.al. have used the term "strain" to define the reaction of the individual. This term refers to "any deviation from normal responses of the person" (1975, p.3). These definitions are generally accepted by both behavioral and medical scientists.

## THEORIES OF STRESS

The first theories of stress are based on Cannon's (1935) and Selye's (1936) views. In these first views the emphasis was on physiological and organismic levels of stress.

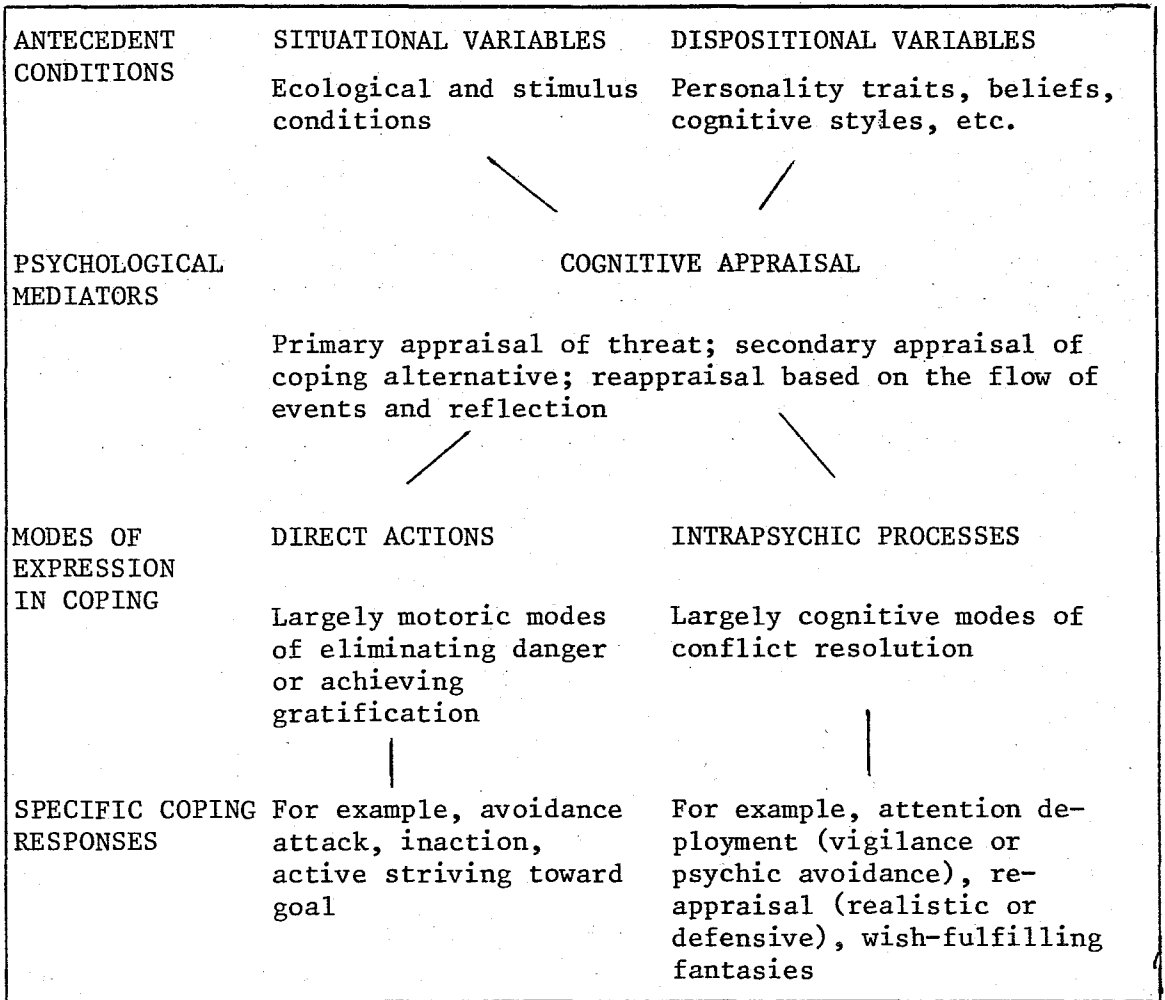
Selye's concept of stress so called, "general adaptation syndrome" is environmentally generated in a nonspecific,

stereotyped form. This syndrome was explained as the beginning of man's old "flight or fight" response in situations including danger (Lippincott, 1968). The process includes stages of alarm, resistance and exhaustion. With the recognition of a demand on adaptation, bodily functions aim towards the maintenance of organismic homeostatis.

These views were gradually replaced by psychological views on the development of stress, Lazarus (1966) one of the foremost researchers on psychological stress, has emphasized the cognitive and affective functions of the individual in both the perception and interpretation of the situation. For Lazarus, environmental factors are stressful only when the individual appraises an event as threatening, harmful or challenging (Phares, 1984). The appraisal of a situation is determined by the cognitive processes of the individual. A particular situation may be stressful for one individual but not for everyone. For example, a demanding job may produce stress if an individual sees it as something he/she may not be able to handle (Phares, 1984). Here it can easily be seen that the event in itself may not be stressful for everyone but the cognitions about the event are important. Past experiences also determine individual differences in response to environmental events (Phares, 1984). Even in situations such as war and natural calamities that would frighten everyone regardless of their predispositions, the degree of stress would change from person to person.

The conditions that induce stress responses, psychological mediators, modes of expression in coping and some specific coping responses as schematized by Phares (1984, p.474) are shown in Table 1. The table shows how the role of cognitive appraisal is important whether the precursor conditions are dispositional or situational events. The cognitive appraisal of an event occurs in three phases;

TABLE 1- Lazarus's Stress Model



primary appraisal of threat, secondary appraisal of coping alternative, reappraisal based on the flow of events and reflection. Then, different modes of expression in coping are seen; those are direct actions and intrapsychic processes. Direct actions are largely motoric modes of eliminating danger or achieving gratification such as, avoidance, attack... Intrapsychic processes are largely cognitive modes of conflict resolution such as, attention, deployment, reappraisal, wish-fulfilling fantasies.

In view of the different sources in the literature, it can be said that "stress is not merely something exogenous, but is a product of a dynamic mismatch between the individual and his/her physical or social environment. This view of stress emphasized that "situations are not inherently stressful, rather it is the combination of a particular situation and individual with his specific personality, behavior pattern and life circumstances that result in a stress producing imbalance" (McMichael, 1979, p.128; cited in Kalimo, 1980).

On the basis of the above definitions and theories of stress, three basic type of responses in reaction to stressful situations are seperated. These response patterns are psychological, physiological and behavioral ones (Kalimo, 1980). Feelings of irritation, anger, anxiety, depression are all psychological stress reactions to long term or intense stress. The differentiation of behavioral stress reactions from psychological stress reactions is made on the basis of the observable nature of behavioral stress reactions. Dependence on alcohol, nicotine and drugs are ways of escaping from situations provoking stress reactions. The phase of escape efforts is often preceded by active efforts to change the

situation with complaints or with aggressive, impulsive behavior in the social settings (Gardell, 1971; cited in Kalimo 1980). Murrell (1978), has made a list of behavioral stress reactions at work such as; overload shedding, accident, absence from work, separating from firm, refusal to take orders, sabotage and alienation. The leader of stress research, Selye has explained the concept of stress primarily with physiological criteria (1956). Psychological stress is accompanied by various physiological alterations of which the most prominent are the disturbance of autonomic and hormonal states. This disturbance upsets tissue regulatory functions and in turn reduces their resistances to other influences. Stress could be indicated by a series of physiological effects. If a dysfunction in the physiological systems lasts very long or is repeated very often, it may be pathogenic. Mental and psychosomatic illnesses may develop due to prolonged malfunctioning of mental and physiological systems without definite disability or structural damage (Murrell, 1978).

## STRESS AND OCCUPATIONAL MENTAL HEALTH

The objectives of the field of "occupational health" have been defined as "the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the workers in an occupational environment adapted to his physiological and psychological condition" (WHO, 1972, p.2).

This study is concerned only with the mental health aspects of occupational health.

Most of the reports on the effect of industrial work on mental health (in a non medical sense) refer back to Kornhauser (1965). As he defined it, mental health comprises those behaviors, attitudes, perceptions and feelings that determine a worker's overall level of personal effectiveness, success, happiness and excellence of functioning as a person. Therefore people with good mental health have a high probability of feeling well satisfied with their lives, are positive and favourable in their self feelings, are relatively free of nervousness or anxiety. When the concept is extended to the job level, characteristics which can make for good mental health will include; job security, physical conditions of work, relationships with co-workers or the company, job status and opportunities for advancement, the importance of the work being done and the level of income (Murrell, 1978).

Starting during world war I and continuing until the present time, a series of research studies into the health of industrial workers have been carried out. These studies are directly or indirectly relevant to the general problem of mental health in industry. The following topics may be listed as examples of such studies; studies of accidents, monotony and boredom, labour turnover and absence from work, studies of attitudes to work, satisfaction in work, studies that are directly associated with personality, neurosis, social status, social support and stress and their relation to mental health (WHO, 1972). However these studies vary too much in theory construction (independent, dependent and intervening variables, concept definitions), it is impossible to compare the results of different studies. This situation makes an analysis of the literature in a theoretical frame of reference difficult.

#### DETERMINANTS OF STRESS IN WORK

Determinants and consequences of role stress have received great attention in work life research especially



because of the work of Kahn et.al., (1964). Role stress may be the result of role ambiguity when the individual has inadequate information about what he is expected to do, about what his work objectives are, what his colleagues' expectations are of his job and about the scope of the responsibilities he is expected to meet. Tension, anxiety, dissatisfaction, lowered level of performance, increased turnover have been proposed as consequences of role conflict and ambiguity (Kahn et.al., 1964; Miles, 1976).

The relations between individuals are a source of job satisfaction. Correlations between perceived interpersonal problems and stress reactions have been studied. For example, problems in relations among staff have been found to be related to a large number of psychological stress reactions among nurses (Jokinen, 1980; cited in Kalimo, 1980).

Other findings have indicated that good relations at work act as a buffer against the stressful effects of the workload. The effects of quantitative workload on physiological functions have been found to be dependent on the quality of the relationships between superiors and subordinates and among co-workers (French, 1972). For instance, blood pressure could be related to workload, but only among those employees who had poor relations with their superiors. Relations with immediate subordinates had an even stronger effect on blood pressure than relations with superiors.

Organizational structure or climate is an important stress factor at work and a popular object of research. In a study by French and Caplan (1972), those persons who reported greater opportunity for participation in the decision making of the company have reported significantly higher job satisfaction and a higher feeling of self-esteem. Autonomy, self determination and decision making have been demonstrated

to be important determinants of the level of job stress in some other studies (House, 1972; cited in Murrell, 1978).

The size effect is another stress factor at work. Revans (1958), Hewitt and Parfitt (1953) have suggested that there can be an improvement in morale in areas which are small enough for individuals to be familiar with each other and which are not so large that rival and conflicting groups can form. In another study, it has been found that there was a clear relationship between the size of the pit of a coal mine and the accident rate (Murrell, 1978).

Not only "mental overload but also physical work overload and inconvenient work hours" have been proposed as mental health risks (Kornhauser, 1965, p.3). According to the results of the work of Caplan and Jones, the strongest relationship was between anxiety and physical, mental overload (1975).

Simple, repetitive work has been found to be related to low self-esteem, low job satisfaction and low general satisfaction with life. Various studies have shown that simple, repetitive work has an adverse effect on the health of assembly-line workers. They are apt to show serious stress reactions (Manderscheid et.al., 1975).

So far as we have seen, work has many sources of stress in itself, but, work has been historically the way individuals organized themselves and their environment. The problem is whether it is possible to have both an authentic existence and a membership in a norm-demanding occupational organization (WHO, 1972).

## DETERMINANTS OF STRESS OUTSIDE WORK

### Life Events as Stressors

Any change in a person's environment such as divorce, death of a loved one, job changes which creates new challenges and requires adaptation on the part of the individual, is stressful (Sarason, et.al., 1978).

On a larger social scale, technological changes, characterized by the "industrial revolution" have required changes in central aspects of life. Technological changes have directly or indirectly increased the stress in life, in many countries. These countries often seek to retain material benefits while hoping to keep their traditional cultures. However, the changes in technology have been enabled industrial urban organizations to replace rural domestic ones (WHO, 1978; 1979). As a result of urbanization changes in family structure have occurred (WHO, 1972). The industrial workers were leaving home to join in a large and unfamiliar urban community, were leaving the land which they previously had an active interest in. Thus, industrial workers became isolated from their land and families.

As mechanization developed, work itself changed from being a creative well defined activity into meaningless, repetitive, simple jobs. As automation and mechanization developed worker's social relationships changed, they became isolated from one another.

Social changes in family structure, especially because of urbanization, changes in social relationships, isolation, alienation, changes in the type of work because of mechanization and automation have faced individuals with requirements for constant adaptability (Selye, 1974). All these factors have increased stresses experienced in life.

There is considerable evidence that health disorders have developed as a result of changes in central aspects of life (Dohrenwend and Dohrenwend, 1974, Rahe and Lind, 1971, Holmes, 1970; all cited in Sarason et.al., 1978).

Social class, education and income are also correlates of mental health. Studies in different cultures have shown that a low position on the social hierarchy is related to mental disturbances more than higher statuses (Purola et.al., 1970). In this study, it has been found that blue-collar workers suffer from much greater stress than white-collar workers. The mental health of a white-collar worker (executives, managers, middle level employees) is important not only in itself but for its effects on other workers, but, blue-collar workers may suffer greater stress than white-collar workers with less financial backing and more worry about job security. However, the differences in mental health among different occupations can not only be explained by social status and income. Differences between occupations on about the same level on the social scale are also common (Murrell, 1978).

Physical factors like lighting, noise and chemical hazards are also determinants of stress and mental health in the working environment, but this review will not cover physical factors in work as determinants of stress.

#### THE INDIVIDUAL

Another important element in considering occupational mental health is the individual and his/her unique personality. Perceived stress and different health problems have been found to vary according to some personality characteristics (Kalimo, 1980).

Those who were free from trait anxiety were found to have fewer signs of cardiovascular disorders (Mallinger, et.

al., 1978). People who were generally anxiety-prone have experienced the role conflicts more intensily. Introverts also have reacted with a more intense unpleasant response to role conflict than extroverts. Flexibility, rigidity has also influenced the relationship between role conflict and problems in interpersonal relations strongly (Kahn et.al., 1964). Self-esteem has been found to correlate positively with frustration tolerance and the lack of anxiety (Rosenberg, 1965; cited in Kalimo, 1980).

A variety of pressures and stresses have been described so far. Finally when the stress gets too much or lasts too long, the consequences range from job dissatisfaction to psychosomatic breakdown to absenteeism and accidents.

## CONSEQUENCES OF STRESS AT WORK

### Job Dissatisfaction

Job dissatisfaction appears to be directly related to lack of autonomy and control over the work place and to jobs which require attention but do not provide a challenge. These factors also seem to be related to absenteeism, accidents, turnover and apathy (Murrell, 1978).

### Apathy

Strauss (1974) has suggested that a variable which has received little attention is "apathy". It can be defined as a situation in which, the worker's expectations are low but where he accepts the situation in which he finds himself. In a sense he has bargained with his employer and does not feel badly cheated, that is he is resigned to his lot (Murrell, 1978). These people look upon the job merely as a means to a financial end. They work to earn a living but not for the

challenge of the job; they are "apathetic" and suffer from psychological illness, but as long as reasonable working conditions exist, they will not be actively dissatisfied (Murrell, 1978).

### Work Alienation

The definitions of alienation vary but most of them invoke some aspect of the social and technological organization of work, its discipline, mechanization, specialization, hierarchy or social relations and its role as a threat to personal identity (Murrell, 1978).

Seeman (1959), when discussing the meaning of alienation has distinguished several uses of the idea and attempted to state them in a more empirically useful form as powerlessness, meaninglessness, normlessness, isolation and self-estrangement. powerlessness, is the expectancy or probability held by the individual that his own behavior can not determine the occurrence of the outcomes, or reinforcements he seeks. He feels as if he has no control over his own life, it is not within his power to decide his/her future, destiny is in the hands of external forces such as luck or fate or the government. Meaninglessness is a low expectancy that satisfactory predictions about future outcomes of behavior can be made. Normlessness is a high expectancy that socially unapproved behaviors are required to achieve given goals. In isolation, a low reward value is assigned to goals or beliefs that are typically highly valued in the given society, resulting in the kind of tenuousness of social ties that may be described as value uniqueness or deviation from approved means. An isolated person feels lonely and excluded (cited in Manderscheid, et. al., 1975). Later, in 1967, Seeman has produced a more definite definition of work alienation as being on work which is not intrinsically rewarding.

### Coronary Heart Disease

Many researchers have studied the causes of coronary heart disease but have concentrated on factors such as blood lipids, blood pressure, overeating, cigarette smoking, lack of exercise; psychosocial causes were passed off as something unimportant. Recent investigations have suggested that coronary heart disease will occur in a setting of hard work, difficult interpersonal relationships, fatigue, often being precipitated by activities such as arguments and emotional upsets. But coronary heart disease may occur only when there is an existing metabolic abnormality and high blood pressure accompanied by alcoholism and heavy smoking. There is also evidence that increased cholesterol levels may result from stress (Selye, 1976). Cigarette smoking appears to be a well-established risk factor in coronary heart disease, however there is evidence that excessive stress may lead to heavy smoking (Nesbitt, 1973). Responsibility for people at work, work overload and role conflict has been found to be important stress and risk factors in coronary heart disease (House, 1972; Wardwell et.al., 1964; cited in Caplan, 1975).

### Ulcers

Researchers in general support the view that peptic ulcers are disorders in which psychological influences are of the greatest importance. Eusterman and Balfour (1935), has given the impression that the disease is most prevalent amongst those who lead lives entailing great nervous strain and responsibility (cited in Murrell, 1978).

## THEORIES OF ANXIETY

Anxiety is a key concept in this study which is a psychological stress reaction, a response to pressure from

threats to security, to identity, to integrity, to values or to habits (Murrell, 1978). Threat in this sense refers to an individual's idio-syncratic perception of a situation as physically or psychologically dangerous for him. Schoonmaker (1969) has suggested that work stress takes the form of anxiety. According to Schoonmaker's paradigm, anxiety is a response to work stress or arising in the individual himself and because this anxiety may be painful, the anxious person tries to escape, usually by acting defensively. Sometimes this behavior will change conditions and create more stress which will start the process all over again.

For all the above explained reasons, an increase or decrease in the level of anxiety may indicate the degree of pathology in reactions to work stress. Because it is such an important concept, it will be reviewed in some detail. Several psychological models have explained the concept of anxiety from different points of view. The James-Lange theory emphasize the interaction between emotions and physiological variables whereas the theory of Cannon stressed the importance of physiological changes in the body (Candland, 1977). In this study; psychodynamic, behavioristic, cognitive and existentialistic models of anxiety will briefly be explained.

#### THE PSYCHOANALYTIC VIEW OF ANXIETY

According to Freud, the first experiences of anxiety in human life occurs at birth. When the infant is no longer able to gratify his/her physiological needs automatically as in uterus, hence not capable of obtaining gratification, a diffuse tension arises. Then, he perceives that he can not live without the attention of his mother and any perception of the absence of the mother gives the signal of anxiety (1923). This primary anxiety he says, sets the patterns for all subsequent anxiety reactions (Levitt, 1967).



With the development of the ego and superego, externally imposed standards and realistic limitations begin and it becomes impossible to gratify the "id" needs as in the first months of life. A new kind of anxiety now arises. "The conflict between id impulses and the standards of the superego together with realistic limitations of the external world as perceived by the ego, gives rise to anxiety" (Mizrahi, 1982). This result is seen as an inability of the ego, because the primary function of the ego is to keep the individual's emotional stability by preventing the conscious experience of anxiety from arising.

Freud has distinguished three types of anxiety; reality, moral and neurotic anxiety (Wolman, 1965). In reality anxiety, the specific unpleasurable state of tension indicates that there is an objective danger in the external world. The source of anxiety is known or recognized. In neurotic anxiety, the person does not know such a "real" danger. Neurotic anxiety begins when the instinctual demands of the id are exceed the ego's tolerance level and it is the fear that the instincts of the id will get out of control, will cause the individual to show unacceptable behaviors. When an individual does something which is contrary to the moral values of the superego or even the thinks of doing it, this gives rise to feelings of anxiety. So, this fear of the conscience is moral anxiety.

#### THE BEHAVIORISTIC VIEW OF ANXIETY

Behaviorists have regarded anxiety as a learned drive based upon an innate tendency to avoid pain (Krech et.al., 1974; Martin, 1971). According to this view, anxiety begins with the attachment of pain to a particular stimulus. If the fear is very strong, it may become extended to objects or situations which are similar to the original fearsome

stimulus. Behaviorists did not make a distinction between fear and anxiety and anxiety could occur in situations when there is no objective danger.

#### THE COGNITIVE VIEW OF ANXIETY

Cognitive theorists have indicated that the subjective interpretation and evaluation of inner and environmental conditions may bring on the feelings of anxiety (Candland, 1977). A situation which is objectively non-threatening may arouse feelings of anxiety for a particular person. The combination of the particular situation and individual with his/her subjective interpretations and evaluations of this situation results in anxiety. The cognitive model then, perceives anxiety as the subjective evaluation of inner and environmental conditions.

#### THE EXISTENTIAL VIEW OF ANXIETY

According to this view, existential anxiety is a sui generis experience. Contrary to conventional psychological theories, anxiety is not seen as an illness, disease or a dysfunction. It is healthy, normal, natural, hence need not to be cured. Neurotic anxiety on the other hand, is accepted as a denial of the truth in us and it is something dangerous (Koestenbaum, 1978). In this view, the denial of existential anxiety leads to a lack of meaning in life. It is a fear of anxiety, a second order anxiety, that is, anxiety about anxiety. When we are anxious, we experience the truth. But when we are anxious about being anxious, we are sick and limit our potential for enjoying life (Koestenbaum, 1978).

## MEASUREMENT OF ANXIETY

Projective techniques like the Rorschach Test and the Thematic Apperception Test are very much valuable in the measurement of anxiety, however, the interpretation of these tests are partly subjective and will not be discussed here.

The objective measurement of anxiety has begun with the development of the Manifest Anxiety Scale (MAS) by Taylor (1953). It is a measure of a general "trait" or predisposition to experience anxiety, not an immediate state. The test has been taken from the 550 items of the MMPI.

Another scale constructed by Mandler and Sarason (1952), the Test Anxiety Questionnaire (TAQ), measures the test anxiety reactions of adults.

The IPAT anxiety scale was developed by the Institute for Personality and Ability Testing (Cattell and Scheier, 1961; cited in Spielberger and Gaudry, 1971). The test identifies sixteen personality traits. A number of these trait measures contain items which appear to be measuring anxiety.

In contrast to those scales, the Subjective Stress Scale (SSS), (Kerle and Birolek, 1958) and Affect Adjective Check List (AACL), (Zuckerman, 1960) scales are appropriate if a measure of response to emotional stimulation is required. It is advantageous to be able to measure either situational anxiety or anxiety proneness with the same instrument. This capacity of the Affect Adjective Check List is also found in the State-trait Anxiety Inventory (STAI), which will be presented below (Spielberger and Gaudry, 1971).

## A STATE-TRAIT CONCEPTION OF ANXIETY

The State-Trait Anxiety Inventory (STAI) was developed by Spielberger and Gorsuch (1966). The test measures two distinct anxiety concepts, state anxiety (A-State) and trait anxiety (A-Trait).

State anxiety (A-State) is a transitory emotional state or condition which is characterized by subjective, consciously perceived feelings of tension, apprehension and heightened autonomic nervous system activity. A-States may vary in intensity and fluctuate over time.

Trait anxiety (A-Trait), refers to relatively stable individual differences in anxiety proneness. It is a continuous and general personality variable. A-Trait seems to imply that, sometimes a predisposing background makes an individual ready to perceive a wide range of objectively nondangerous conditions as threatening, and to respond to them with A-State reactions. A-State reactions in this instance, are disproportionate in intensity to the degree of the objective danger (Spielberger, 1966). It is assumed that past experiences in some way determine individual differences in anxiety-proneness. Because of these dispositions, some people see certain types of situations as dangerous and respond to them with A-State reactions. Obviously, stimuli that have little or no threat value for an individual would not elicit an A-State response. On the other hand, to an objectively painful, threatening stimulus, most subjects will respond with higher levels of A-State regardless of their A-Trait levels (Spielberger, 1966).

As it can be seen from the above discussions, these two concepts are not totally independent. An individual who

has a high level of trait anxiety will react with a high level of state anxiety. According to Le Compte and Öner", a person with high trait anxiety will often and quickly show higher state anxiety under stress conditions" (1976, p.53).

There is an extensive body of research on the State-Trait Anxiety Inventory which will not be reviewed here. The only study to be presented is Öner's (1977), since her aim was to investigate the effect of stress conditions on anxiety. The findings of the study were as follows; normals and physically ill patients demonstrated similar levels of anxiety under regular conditions, while they differed under stress conditions. The psychiatric patients had higher anxiety levels under all conditions. In short, the study shows that normals, physically ill patients and psychiatric patients had an important amount of increase in their state anxiety scores under stress conditions.

## THE CONCEPT OF INTERNAL-EXTERNAL LOCUS OF CONTROL

The concept of external versus internal control has emerged as an important intervening or personality variable in measuring the effects of environmental factors on psychological reactions. The term was first introduced by J.B.Rotter (1966). The effect of a reinforcement following some behavior depends upon whether or not the person perceives a causal relationship between his own behavior and the reinforcement. When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then it is perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces around him. If an event is interpreted this way, it is said to result from a belief in

external control. If the person perceives the event as being contingent upon his own behavior or his own relatively permanent characteristics, it is said to result from a belief in internal control.

There has been an extensive amount of research done on internal-external control. Summarizing the whole area, it can be said that internal control is associated with confident, competent, independent and achievement orientation behaviors (Phares, 1984). Internals are said to be in control of themselves and are not open to manipulating efforts. Another important characteristic of internals is that they try to seek information about their environment, so that they can be in control of the reinforcements that follow their behavior. In behaviors relating to their health, it is expected that internals would be sensitive to health messages, would like to have detailed information about their health conditions, would exert some personal control and responsibility, hence be less susceptible to physical and psychological hazards. These views have been supported by various studies cited by Phares (1984). In the area of social action, it is said that internals are very much active especially if they believe in a social cause. In a study by Strickland (cited in Phares, 1984), it was found that internals were more active in the socio-political realm than externals. They were also found to be "better adjusted, less anxious, less likely to be classified with psychiatric labels than externals" (Phares, 1984, p.514).

External control is associated with conforming and compliant behaviors (Phares, 1984). Since they feel that they can not control the outcomes of their own behavior, they do not try to seek information about their environment. Phares reports that this seems to be the most basic difference between internals and externals and that there are consistent

data about it (1984). In the area of health related behavior, externals were found to be less information seeking about their health conditions, less prone to participate in physical activities, weight reduction programmes, hence more prone to hypertension and heart attacks than internals (Strickland, 1979; cited in Phares, 1984). However these results are not always clear cut. A Turkish researcher Kayahan (1983), could not find a causal relationship between external locus of control and weight. Having the opposite characteristics of internals, externals are not expected to be achievement oriented. In social action, internals have been found to be more active than externals. However, in studies of Strickland (1965) and Lao (1970), black externals were found to be more active in changing matters of discrimination and repression than black internals. This is a good example of the view that, relationships between behavior and personality variables may change as the culture changes, it is impossible to predict a behavior as a simple product of internal-external beliefs (Phares, 1984). There may be conditions to lessen or even reverse simple internal-external beliefs. For example, while internals have been found to be better adjusted, and less anxious, than externals, the reverse may also be true. It can be argued that external beliefs promote anxiety; perhaps anxiety stimulates externality.

From the above discussions, we can be led to the belief that it is better to be an internal under all circumstances, However, whether it is good to be internally or externally oriented will change according to the situation. For example, the adjustment of an internal is not easy under conditions which make personal control difficult to obtain. Under these conditions, an external belief system would be more adaptive and useful. Reviewing the relevant research, Phares reports that warm, protective, positive and nurturant families often produce internally oriented children. On the social level,

individuals who have little access to power, mobility and material advantages would tend to be externally oriented (1984). In a study by Kağıtçıbaşı (1972), part of the internal-external scale have been used in Turkey and, it was found that there was not a positive correlation between family control and a belief in external control. The results of the Kağıtçıbaşı's study also showed that warm, kind, positive families do not necessarily produce internally controlled children.

## THE CONCEPT OF PERCEIVED DANGER

One can see from a review of the above literature, that the concepts of stress, anxiety, internal-external control all have elements of a cognitive approach to psychological functioning. That is, whether a person feels stressed, anxious, responsible for his fate all depend largely on how he perceives his environment and his own abilities. Therefore it seemed reasonable that, in studying workers' reactions to mining work, one would have to assess how much danger the workers perceived in their daily work lives. Accordingly a scale was constructed to measure workers' evaluations of aspects of their lives assumed to be physically and psychologically dangerous, harmful, challenging, such as threat to their life, death, illnesses, future, family, so on...

## THE IMPLICATIONS OF THE LITERATURE AND THE RATIONALE OF THE STUDY

As it has been explained in the beginning, studies on the psycho social well being of the workers of coal mines are scarce. However, the work of coal miners possibly contains strong sources of anxiety and their health problems might be at least partly stress-mediated. In the light of the



literature reviewed, it can easily be observed that, these people are an important target for a study on mental health. This study offers a possibility to investigate the relationship between work and health in an occupational field suspected to be highly stressful.

In the present study, the differences in the state-trait anxiety levels between two groups of coal miners who work under different stress conditions were observed. Working in an environment which presumably contains strong sources of stress, underground coal miners are expected to have higher anxiety scores than coal miners who work on the surface. In Öner's study (1977), it was found that normals, physically ill patients and psychiatric patients had significant amount of increase in their state anxiety scores under stress conditions. Since underground working conditions can be said to be more stressful, it is expected that underground workers should suffer more anxiety.

However, very often other variables intervene between environmental conditions and self reports on anxiety levels. These intervening variables usually have to do with how the individual interprets his environment, to what causes he attributes things that happen to him and his reactions. That is, these variables are cognitive in nature. It was felt that two such variables that would be meaningful in this context would be; a) a belief in internal versus external control, that is whether the miner perceives his situation to be due to his own behavior or not, and b) the degree to which the miner perceives his situation as being dangerous.

Externally controlled people are anticipated to have lower anxiety scores than internally controlled individuals. It is assumed that people who believe in luck, chance or fate, will not perceive the occurrence of a stressful event as the

result of their own behavior, and will accept their situation with resignation or fatalism rather than being anxious about it.

Another assumption is that perceived danger (the subjective probability of a dangerous event) is an important stress source for the individual at work. It was seen as a threat to security, hence may lead to feelings of anxiety.

To summarize, the overall objective of the study is to investigate the relationships between stressful working conditions, anxiety, internal-external control and perceived danger in a coal mine.

On the basis of the above discussions, the following hypotheses will be tested in this study.

## HYPOTHESES

1- Coal miners who work underground will have higher state and trait anxiety scores than coal miners working on the surface.

2- Internally-controlled coal miners will have higher state and trait anxiety scores than externally controlled coal miners.

3- Coal miners who perceive high danger will have higher state and trait anxiety scores than coal miners who perceive low danger.

### III. METHOD

#### SUBJECTS

This study was carried out on a group of coal miners who work in the Kozlu area of Zonguldak Coal Mine Industry. 100 male coal miners; 50 working underground, 50 working on the surface were the subjects of the study. The underground workers in Kozlu were separated into two groups; the first group of workers were called "gruplu" and were chosen as the subjects of this study. They were heavy workers with a heavy load and, hence were permitted to work there with monthly intervals. The second group was called "daimi" and not forced to take intervals, since they were working in relatively less dangerous and heavy work areas than the first group of workers. The number of workers in the first group were higher than the second group. A group of underground and surface coal miners were selected as the subjects of the study, because underground coal miners were thought to have strong sources of stress in their work place compared to the surface working coal miners.

#### MATERIALS

The Turkish adaptation of the State-Trait Anxiety Inventory (Le Compte and Öner, 1976), the Internal-External Scale (Rotter, 1966), a Perceived Danger Scale plus a

Questionnaire were used as testing materials in the study.

#### THE STATE-TRAIT ANXIETY MEASURE

The State-Trait Anxiety Inventory contains two separate self-report scales to measure A-State and A-Trait.

The A-State scale includes 20 items. The subject is asked to indicate how he feels at a particular moment in time. He is required to respond to each item by rating the intensity of his feelings on a 4-point scale with the following categories: Not at all; somewhat; moderately so; very much so.

The A-Trait scale consists of 20 statements that ask people to describe how they generally feel. The subject responds to each item by rating himself on the following 4-Point scale: Almost never; sometimes; often; almost always.

The State-Trait Anxiety Inventory is considered to be a very carefully developed instrument from both theoretical and methodological standpoints. Both English and Turkish forms have high internal consistency and test-retest reliability (Spielberger, et.al., 1970; Le Compte and Öner, 1976).

After the translation and back translation procedures, the adaptation of the STAI was prepared by Le Compte and Öner (1976). It shows high degrees of internal consistency and test retest reliability.

The Turkish form of the State-Trait Anxiety Inventory was prepared in four different experimental forms and applied to 200 male and female lycée students with English as the language of instruction . These experimental forms were; code

A English form, code B Turkish form, code C and D were mixed language forms. The items of code C and D were selected randomly both from Turkish and English forms. The items that were in English in code C were in Turkish in code D and the items that were in Turkish in code C were in English in code D. These four experimental forms were administered randomly to four male and four female student groups. Two weeks later, the subjects who answered the English form the first time received the Turkish form, the subjects who answered the Turkish form took the English form. So that, every subject has answered each item both in Turkish and in English forms. The results did not show a significant difference between the English and Turkish forms. In another study of Le Compte's, the results were accepted as confirming the construct validity of the STAI scales. Because, in this study, the stable characteristic of trait anxiety scores against the variation of state anxiety scores was confirmed.

In recent years, State-Trait Anxiety Inventory was employed on different subject groups such as; students, normals, psychiatric patients, physically ill patients, surgery patients, substance abusers.

#### THE MEASURE OF LOCUS OF CONTROL

In his study of chance and skill effects on expectancies for reinforcement, Phares (1957), made the first attempt to measure individual differences in a generalized expectancy or belief in external control as a psychological variable (cited in Rotter, 1966). In this study, Phares has developed a Likert-type scale with 13 items stated as external attitudes and 13 as internal attitudes. Phares' work was developed by James' (1957). James revised Phares' test and wrote 26 items plus filler items based on the items which appeared to be most successful in Phares' work. The James-Phares scale has

been used in research involving correlates of individual differences in a generalized expectancy for internal-external control. Liverant, Rotter and Seeman, developed the test further, subscales were used for different areas such as achievement, affection, general social and political attitudes; and control for social desirability (cited in Rotter, 1966).

A hundred forced-choice items were reduced to a 60-item scale by Liverant on the basis of internal consistency criteria. After the item analysis of the 60-item scale, items to measure more specific sub areas of internal-external control were left. By eliminating those items, the scale was reduced to 23 items relating to the internal-external dimension. The final version of the Internal External Scale includes 29 forced-choice items in which 6 filler items are used to make more ambiguous the purpose of the test. Items in the test are related to the subjects' belief about the nature of the world, that is, they are concerned with the subjects' expectations about how reinforcement is controlled. As a result, the test is accepted as a measure of a generalized expectancy.

The test-retest reliability of the scale was measured. For a one month period, results seem quite consistent in two different samples; coefficients varying from .60 to .83 were obtained (Rotter, 1966). Relatively lower reliabilities for a two month period (coefficients varied from .49 to .61) were found. These lower reliabilities seen, might be related to the fact that, the first test was given under group conditions and the second test was individually administered. Correlations of the 60-items I-E Scale with the Marlowe-Crowne Social Desirability Scale ranged between -.35 and -.40 (Rotter, 1966).

There are two alternatives for each item in the test. Subjects are asked to make a choice between the two alternatives

of each item. They are required to select the one with which they agree more strongly. The score is the total number of external choices.

9 of the 29 items of the I-E Scale have been translated and used by a Turkish researcher (Kağıtçıbaşı, 1972). 29 items of this scale have been used in another research in Turkey (Kayahan, 1983).

In our study, 10 internal-external choices of the scale (I-E) are used.

#### PERCEIVED DANGER MEASURE

A Perceived Danger Scale was prepared to assess the subjects' appraisal of the significance of a harmful, threatening or challenging event. This process was believed to be determined by the cognitive and affective functions of the individual (Lazarus, 1966).

There are 16 items in the scale. Subjects are asked to make a choice between two respond alternatives (yes or no), in 6 of the 16 items of the csale. A score of (0) or (5) is given to the choices.

In 10 of the 16 items, subjects are required to respond to each of them on a 5-point scale and a score between (1) and (5) is given to the choices. Four items of the scale were reversed, other six items were direct in scoring.

Items on the scale included situations likely to have happened in the past or likely to happen in the future of a coal miner, that is, "anticipated" sources of danger. The most highly scored items were those which revealed the subject's appraisal of a high degree of danger.

## QUESTIONNAIRE

A questionnaire is used in the study to search some demographic variables such as age, education etc... It contains 34 questions, 6 of them are open-ended questions.

The Perceived Danger Scale constructed by the author was embedded in this questionnaire, the Perceived Danger Scale items were numbers 31-45 and 48.

## PROCEDURE

With the permission of Zonguldak Coal Mine Industry, workers were visited during their leisure time. Each test was given individually by the experimenter in interview format. After the explanation of the aim of the study; the instructions and the statements of each scale plus questionnaire were read to each subject and their choice has been marked.



#### IV. RESULTS

The results of this study will be presented in three steps. First the mean scores received by the subjects on the State-Trait Anxiety Inventory (STAI), Internal-External Control (I-E) and Perceived Danger (P.D.S) Scales will be presented; then the results relating to the hypotheses will be given. In the last step additional results will be presented, such as the results relating to the questionnaire and the interactions between the independent variables (The mean scores of the subjects for the three scales are presented on Table 2). The mean score for the I-E scale of underground miners was found to be 5.92. Considering that the maximum score obtainable is 9, this mean score shows that underground coal miners are on the external end of the internal-external continuum. On the other hand, the mean score of the surface miners on this scale was found to be 2.02, which shows that surface miners are on the internal end of the internal-external continuum. The difference between them is significant ( $t=-8.12$ ,  $p<.001$ ).

The mean score received by the underground miners on the P.D.S was 46.30, whereas the mean score of the surface miners for the same scale was 31.68. This difference is also significant ( $t=-6.24$ ,  $p<.001$ ). These results show that underground miners perceive higher danger than surface miners.

TABLE 2- Mean values, standard deviations and t-values of the above ground and underground workers on the I-E, P.D.S and STAI Scales

Variables	Groups	$\bar{x}$	S.d.	t
(I-E)	Surface	2.02	2.25	-8.12*
	Underground	5.92	2.53	
(P.D.S)	Surface	31.68	11.89	-6.24**
	Underground	46.30	11.55	
STAI (A-State)	Surface	35.48	12.06	-5.34***
	Underground	48.46	12.22	
STAI (A-Trait)	Surface	36.06	8.89	-6.92****
	Underground	48.06	7.84	

\* d.f = 98,  $p < .001$

\*\* d.f = 98,  $p < .001$

\*\*\* d.f = 98,  $p < .001$

\*\*\*\* d.f = 98,  $p < .001$

The mean score of the underground miners on the STAI (A-State) was 48.46. The mean score received by the surface miners on the STAI (A-State) was 35.48. The difference is significant ( $t=-5.34$ ,  $p<.001$ ) and shows that underground miners' level of state anxiety is higher than surface miners'.

The mean score received by the underground miners on the STAI (A-Trait) was 48.06, however the mean score of the surface miners on the same scale was found to be 36.06. The difference between them is also significant ( $t=-6.92$ ,  $p<.001$ ). The results show that trait anxiety of underground miners is higher than surface miners'.

## RESULTS RELATING TO THE HYPOTHESES

A stepwise multiple regression analysis was conducted to test the hypotheses and to determine the predictive relationship between the three independent variables; surface/underground working conditions, I-E scores, P.D.S scores and the dependent variables, state and trait anxiety. These results are presented on Table 3 for A-State and on Table 4 for A-Trait.

Hypothesis one stated that coal miners who work underground will have higher state and trait anxiety scores than coal miners working on the surface. Both the results of the t-tests previously cited and the results of the regression analysis for surface versus underground conditions indicates that the difference in state anxiety between the two groups is significant ( $F=28.67$ ,  $p<.001$ ). These results confirm hypothesis one for state anxiety. The difference in trait anxiety between the two groups is also significant ( $F=46.48$ ,  $p<.001$ ). The result of the regression analysis plus the previously cited t-test results confirm hypothesis one for trait anxiety.

TABLE 3- The Results of the Multiple Regression Analysis for the Relation Between Location, I-E Scores, P.D.S Scores and A-State for Each Variable

Variables	D.F.	Sum of Squares	$\bar{x}$ Square	F
Location	1. 98.	4238.01 14486.74	4238.01 147.82	28.67*
I.E.	2. 97.	4763.26 13961.48	2381.63 143.93	16.55*
P.D.S	3. 96.	8216.43 10508.31	2738.81 109.46	25.02***

\*  $p < .001$

\*\*  $p < .001$

\*\*\*  $p < .001$

TABLE 4- The Results of the Multiple Regression Analysis for the Relation Between Location, I-E Scores, P.D.S Scores and A-Trait for Each Variable

Variables	D.F.	Sum of Squares	$\bar{x}$ Square	F
Location	1. 98.	3283.29 6922.82	3283.29 70.64	46.48*
I.E.	2. 97.	3346.79 6859.31	1673.39 70.71	23.66**
P.D.S	3. 96.	4960.54 5245.56	1653.51 54.64	30.26***

\*  $p < .001$

\*\*  $p < .001$

\*\*\*  $p < .001$

Hypothesis two stated that internally controlled coal miners will have higher state and trait anxiety scores than externally controlled coal miners. The F value shown on Table 3 indicates that, internal and external workers have significantly different state anxiety levels ( $F=16.55$ ,  $p<.001$ ). The difference is in the direction of higher state anxiety for internal workers. Thus hypothesis two is confirmed for state anxiety. The F value shown on Table 4 shows that, internal and external workers have significantly different trait anxiety levels ( $F=23.66$ ,  $p<.001$ ). This difference is also in the direction of higher trait anxiety for internal workers and the hypothesis is confirmed for trait anxiety.

Hypothesis three stated that coal miners who perceive high danger will have higher state and trait anxiety scores than coal miners who perceive low danger. The results on Table 3 indicate that there is a significant difference between workers who perceive high and low danger, with those who perceive high danger showing more state anxiety ( $F=25.02$ ,  $p<.001$ ). On Table 4, it is possible to see the significant difference between workers who perceive high and low danger, with those who perceive high danger showing more trait anxiety ( $F=30.26$ ,  $p<.001$ ).

Summarizing the regression analysis, the F values on Tables 5 and 6 show the levels of significance attained as each new predictive variable is added to the regression equation. This indicates that the independent variable of location (surface versus underground) is the best predictor of the STAI, A-State and A-Trait scores.

The addition of the independent variable of the I-E Scale scores to the equation does not add much predictive power to that of location. That is, knowing the I-E scores of the subjects does not help us in improving our prediction of the

TABLE 5- Summary Table for the Multiple Regression Analysis on the Relationship Between Surface/Underground Conditions, I.E Scores, P.D.S Scores and A-State

Variables	Multiple R	R <sup>2</sup>	B	Beta	F
Location	0.48	0.23	10.03	0.36	11.5*
I.E	0.50	0.25	-0.98	-0.22	5.0**
P.D.S	0.66	0.44	0.49	0.50	31.6***

\* d.f = 1,98,  $p < .001$

\*\* d.f = 2,97,  $p < .05$

\*\*\* d.f = 3,96,  $p < .001$

TABLE 6- Summary Table for the Multiple Regression, Analysis on the Relationship Between Surface/Underground Conditions, I.E Scores, P.D.S Scores and A-Trait

Variables	Multiple R	R <sup>2</sup>	B	Beta	F
Location	0.57	0.32	8.15	0.40	15.2*
I.E	0.57	0.33	-0.34	-0.10	1.3**
P.D.S	0.70	0.49	0.33	0.45	29.6***

\* d.f = 1,98,  $p < .001$

\*\* d.f = 2,97,  $p > .05$

\*\*\* d.f = 3,96,  $p < .001$

A-State scores to a great degree ( $F=5.0$ ,  $p<.05$ ). The I-E scores of the subjects does also not help us in improving our prediction of the A-Trait scores to a significant degree ( $F=1.3$ , n.s). However the addition of the independent variable of the P.D.S scores does add significantly to the predictive power of the equation. That is, knowledge of people's attributions about danger helps us improve on our prediction of the A-State scores to a significant degree ( $F=31.6$ ,  $p<.001$ ). Knowing about people's attributions about danger also helps us in improving our prediction of the A-Trait scores to a significant degree ( $F=29.6$ ,  $p<.001$ ).

Altogether the three independent variables account for almost half of the variance ( $R^2=.44$ ) in the A-State scores, mostly through the predictive contributions of the location and P.D.S variables, which is an important result. Altogether the three independent variables account for almost half of the variance ( $R^2=.49$ ) in the A-Trait scores, mostly through the predictive contributions of the location and P.D.S variables, which is also an important result.

Further multiple regression analyses were conducted for surface and underground subjects seperately to determine if there were any interaction effects. The results for the surface group are presented on Tables 7 and 8, for A-State and A-Trait respectively. The results for both A-State and A-Trait indicate that there is no significant interaction between the I-E and P.D.S variables ( $F=.03$  and  $F=.27$  respectively, both n.s).

The results of the regression analysis for the underground group are presented on Tables 9 and 10 for A-State and A-Trait. The results for both A-State and A-Trait indicate that there is no significant interaction between the I-E and P.D.S variables ( $F=.12$  and  $F=1.34$  respectively, both n.s).

TABLE 7- Summary Table for the Multiple Regression Analysis on the Interaction Between I.E and P.D.S Scores and A.State (Surface Group)

Variables	Multiple R	R <sup>2</sup>	B	Beta	F
I.E	0.15	0.02	-0.27	-0.05	0.01
P.D.S	0.39	0.15	0.37	0.36	3.26
Interaction	0.39	0.15	0.94	0.08	0.03*

\* d.f = 3,46,  $p > .05$

TABLE 8- Summary Table for the Multiple Regression Analysis on the Interaction Between I.E Scores and P.D.S Scores and A-Trait (Surface Group)

Variables	Multiple R	R <sup>2</sup>	B	Beta	F
I.E.	0.19	0.04	-0.56	-0.14	0.11
P.D.S	0.38	0.15	0.22	0.28	1.99
Interaction	0.39	0.15	0.22	0.26	0.27*

\* d.f = 3,46,  $p > .05$



TABLE 9- Summary Table for the Multiple Regression Analysis on the Interaction Between I.E and P.D.S Variables and A-State (Underground Group)

Variables	Multiple R	R <sup>2</sup>	B	Beta	F
I.E	0.49	0.24	-2.49	-0.52	1.09
P.D.S	0.67	0.45	0.40	0.39	1.98
Interaction	0.67	0.45	0.16	0.17	0.12*

\* d.f = 3,46,  $p > .05$

TABLE 10- Summary Table for the Multiple Regression Analysis on the Interaction Between I.E and P.D.S Variables and A-Trait (Underground Group)

Variables	Multiple R	R <sup>2</sup>	B	Beta	F
I.E	0.39	0.15	-2.49	-0.81	2.54
P.D.S	0.64	0.41	0.15	0.23	0.65
Interaction	0.65	0.43	0.37	0.58	1.34*

\* d.f = 3,46,  $p > .05$

The findings of this study can be summarized as follows;

1- Surface miners were internally controlled whereas underground miners tend to be externally controlled.

2- Underground miners perceived higher danger than surface miners.

3- Underground coal miners had higher state and trait anxiety than surface coal miners.

4- Internally controlled miners had higher state and trait anxiety than externally controlled miners.

5- Miners who perceive high danger had higher state and trait anxiety than miners who perceive low danger.

6- Location and degree of perceived danger were the best predictors of the state and trait anxiety in the coal miners.

7- There were no interaction effects between internal-external control and perceived danger.

## RESULTS RELATING TO THE QUESTIONNAIRE

Some demographic and social characteristics of the coal miners were investigated in the Questionnaire. An overview of the important points of the Questionnaire results will be given here. First, the results relating to surface miners will be presented, then the results relating to underground miners will take place.

More than half (58 %) of the surface miners of this study were in the 25-34 age group. A majority (76 %) were born in a small town and were now living in a small town (62 %). The interesting thing was that none of them were born in the city but now (34 %) of the surface miners were living in the city. Thirty six percent of this group were lycée graduates. A majority (70 %) of the surface miners decided that, mining work was their first choice as a job. The most important reasons given for this in response to an open ended question were that; they could not find another job, they had no work experience before, they thought that it would be nice to work in their fathers' profession, they had qualifications to handle this job. When they decided to work in the mines, they chose to become surface coal miners, and eighty percent of them did not change their work position. A minority (20 %) of the surface miners have changed their work position and become an underground worker. The most important reason given in response to an open ended question indicated that, there was an increase in the financial demands of their family, hence they needed more money. But still eighty four percent of these workers preferred to work on surface mines. In the area of health related problems, only ten percent of the surface miners had gastro-intestinal disorders. A great majority (90 %) had no significant health problems. Only thirty six percent of these people had some little expectation that they would be happy in the future, twelve percent of them had no expectations for their future life.

More than half (52 %) of the underground miners of this study were between 35-44 age group. A great number (72 %) of these workers were born in a small town but now were living in villages (62 %). They were graduates of primary school (48 %) and twenty percent of them had no education. More than half (68 %) of these workers' fathers had worked underground mines, but the interesting thing was that workers of this

study did not want their son to work in mines (62 %), especially underground. A great majority (94 %) of these workers replied that they have chosen underground mine work as a job in the first instance. Their reasons given in response to an open ended question indicated that; they could not find any other job with social security facilities, it was their fathers' job, it was like a family profession, they could not think of other possibilities, they were paid good money and their families had no other income, there were no other alternatives to earn a living because they did not have qualifications to find another job, they were led to it, it was a "must", they did not know before how it would be to become an underground miner. Reading those views, one may be led to the thought that, many of these workers would like to change their work position and be a surface miner. Only forty six percent of these workers wanted to change their job for less dangerous and less heavy work. However these work positions were again underground mines. The most important reasons given for this choice showed that they were not ready to give up the better financial conditions of the underground worker. Less dangerous and less heavy underground work would be more advantageous for them, but it was not easy to find such a job. Only in the case of an important health problem or an accident, were they sent to do surface work or to a less dangerous underground work by the company. Thus, more than half (52 %) of the underground workers still preferred to have underground work. In the area of health related problems, forty percent of the underground workers had disorders of the respiratory system, thirty four percent of them had gastro-intestinal disorders. Forty eight percent of the underground workers had a little expectation that, they would be happy in the future whereas twenty two percent had no expectation for their future life.

## V. DISCUSSION AND CONCLUSION

The purpose of this research was to investigate the different levels of anxiety between two groups of workers who work under different stress conditions and to search the effects of a personality factor (internal-external control), and a cognitive factor (perceived danger) on this anxiety. As stress is seen as a risk for possibly any illness and anxiety is seen as being one of the most important indicators of mental disturbance, it was felt that this study would give us an idea about the mental health problems of coal miners. It was hoped that it would be possible to identify factors relating to mental health issues which may be found in the work environment versus factors which lie within the individual worker.

The evaluation of the results seems to be totally in line with our expectations; the first hypothesis confirmed that underground coal miners had higher state and trait anxiety than surface coal miners. This result shows us that underground workers are in need of occupational mental health services, because the concern of occupational health is directed to both mentally unhealthy employees and to the factors in the work environment which stimulate mentally healthy behavior (WHO, 1973).

The second hypothesis was also confirmed and shows that internal miners had higher state and trait anxiety than

external miners. It has already been mentioned that different individuals do not react identically to environmental factors. Every individual with his unique personality characteristics brings to the work setting a unique set of ways to react. Every individual develops different methods of coping both consciously and unconsciously with life situations. The rationale of the second hypothesis was that externals who believe in luck, chance or fate will not perceive the occurrence of a stressful event as the result of their own behavior, and will accept their situation with resignation or fatalism rather than being anxious about it. The interesting and important point here is that underground miners were found to be more externally controlled than surface workers whereas they had higher anxiety than surface miners. However controversial this result may seem, with the confirmation of the second hypothesis some explanations can be made. It can be said that underground working conditions are so highly stressful that even to be a believer in luck, chance or fate did not prevent their feelings of anxiety. Or it can be speculated that if they were not externals, if they did not accept their situation with resignation or fatalism, the level of anxiety would be so high that it could be unbearable and lead to serious mental health problems. In this instance, being an external may be a defensive process. Alternatively, it is possible that the extreme stress of the underground conditions, and the fact that underground workers are actually much less in control of their fates, may have led them to receive more external scores. Thus, the personality variable may have been confounded by the realistically stressful pressures of the environment.

In the third hypothesis, it was found that miners who perceive high danger feel more state and trait anxiety than miners who perceive low danger. In other words, as the degree of miners' appraisal of their situation as being dangerous

gets higher, the level of their anxiety gets higher. Another result that could be related and evaluated with the third hypothesis was that underground miners were found to be higher danger perceivers than surface miners. The results show us that these workers feel imagined or real threats to their physical security in exposure to occupational hazards. What really counts is not the objectively measurable level of danger but the danger perceived by the individual in relation to the amount he expects, because threat is defined as occurring when an individual feels inadequate to deal with a situation (Murrell, 1978). One of the most important determinants of stress in the psychosocial environment is the discrepancy (as perceived by the subject) between the individual's expectations and perceived reality with respect to the characteristics of the environment (WHO, 1973). This discrepancy can be positive but can also be negative; sometimes someone may find less than he expects, it depends upon whether expected level is higher or lower than reality. While perceived danger can be seen as consisting of real and imagined threat, it seems reasonable to expect that for the miners of this study, the proportion of real threat is higher than the proportion of imagined threat.

The most important result of this study was that location was one of the most effective predictors of anxiety among coal miners. This shows us that the physical aspects of the environment are important stress factors for coal miners, hence may have an adverse effect on their psychological health. These conditions may lead to inefficient work or job dissatisfaction which may in turn have an effect on the mental health of these workers. The stressors in the physical environment may highly influence behavior, impair communication, influence emotional states, interfere with cognitive processes such as attentiveness and perception, and may lead to serious stress reactions as anxiety, accidents and psychosomatic disorders.

Moreover, one result of the study shows that a personality factor (Internal-External Control) was not such an effective predictor of anxiety among coal miners. On the other hand, while theoretically it was not a main focus of this study, perceived danger as a cognitive variable was a strong predictor of anxiety in coal miners. According to Murrell (1978), anxiety is related to stress caused by feelings of threat. Threat could be directed to the security of a person, in this instance, the anxiety reaction is thought to be much more strong. Perceived danger is such an effective predictor of anxiety that it may be the precursor or one of the precursors of the psychosomatic (such as gastro-intestinal) disorders of underground coal miners.

It has been emphasized in the literature reviewed that in gastro-intestinal disorders, psychological influences may be of greatest importance. It is most prevalent amongst those who lead lives in great nervous strain and responsibility. In this study, the stressful effect of both physical location and perceived threat becomes abundantly clear when one sees that about ninety percent of surface workers suffer no serious physical illnesses. However forty percent of underground workers suffer from respiratory disorders, and more significantly, about thirty four percent suffer from gastro-intestinal problems which, as stated above are psychosomatic disorders par excellence. It is also interesting that the proportion of psychosomatic disorders is quite close to the proportion of the traditional diseases of mine workers, respiratory diseases. This indicates that the psychological stress is almost as strong as the physical demands on the underground worker.



This study did not aim to test a theory of stress or anxiety. However the empirical results are such that they seem to underline the usefulness of a particular theoretical model of stress. Specifically, the fact that a cognitive variable, perceived danger is a better predictor than a personality variable, internal external control, would seem to indicate that cognitive appraisal of one's situation is a more central variable than personality factors in explaining stress reactions. Thus, these results can be taken as being supportive of Lazarus's model of stress.

From the above results obtained, it appears that mine work, especially underground coal mine work contains strong sources of stress. Occupational stress leads to serious psychological and physiological disturbances, is also an important factor in accident causation (WHO, 1982). All these factors shows us that the area of mine work should be given serious attention, because miners are in great need of preventive mental health services which is a concern of occupational mental health. The objectives of occupational mental health are directed to fostering factors in the work environment which stimulate mentally healthy behavior and to alleviating psychiatric disturbance. In addition to the personal and family suffering relating to mental disturbance, industrial efficiency is also seriously affected by the psychological state of the workers. Thus, attention to these matters would be helpful both in terms of the well being of the workers and their families, and the effectiveness of industrial production.

## REFERENCES

- Burchfield, S. Life change, coping and healthy status: An exploratory investigation.
- Candland, D.K., Fell, J.P., Keen, E., Leshner, A.I., Plutchik, R. and Tarpy, R.M. (1977). Emotion. Belmont: Wadsworth.
- Caplan, R.D., Cobb, S., French, J.R.P., Harrison, R. and Pinneau, S.R. (1975). Job demands and worker health: Main effects and occupational differences. Washington, DC: U.S. Department of Health Education and Welfare.
- Frankel, C. (1965). The love of anxiety. New York: Harper and Row.
- French, J.R.P., Caplan, R.D. and Marrow, A.J. (ed.). (1972). The failure of success. New York: Amacom.
- Garfield, S.L. (1983). Clinical Psychology (2 nd ed.). New York: Aldine.
- Gaudry, E., and Spielberger, C.D. (1971). Anxiety and educational achievement. Syndney: Wiley and Sons.
- Herrera, H. (1978). Work stress perceived by physicians. Paper on Environmental Stress, Life Crises, and Social Adaptation. Cambridge: NATO Advanced Study Institute.

- Johnson, J.H., and Sarason, I.G. (1978). Recent developments in research on life stress (Report No. SCS-LS-006).
- Kağıtçıbaşı, Ç. (1972). Sosyal değişimin psikolojik boyutları, Ankara: Türk Sosyal Bilimler Derneği.
- Kahn, R.L., Wolfe, D.M., Quinn, R.P., Snoek, J.D. and Rosenthal, R.A. (1964). Organizational stress: Studies in role conflict and ambiguity. New York: Wiley.
- Kalimo, R. (1980). Stress in work: Conceptual analysis and study on prison personnel. Scandinavian Journal of Work, Environment and Health, 6, 9-16.
- Kayahan, S. (1983). An investigation of the psychological correlates of weight. Unpublished master's thesis, Boğaziçi University, Istanbul.
- Koestenbaum, P. (1978). The new image of the person: The theory and practice of clinical philosophy. Connecticut: Greenwood Press.
- Kornhauser, A. (1965). Mental health of the industrial worker. New York: Wiley.
- Krech, D., Crutchfield, R.S., and Livson, N. (1974). Elements of psychology. New York: Alfred A. Knopf.
- Lazarus, R.S. (1966). Psychological stress and the coping process. New York: McGraw-Hill.
- Levitt, E.E. (1967). The psychology of anxiety. Indianapolis: Bobbs-Merrill.

- Lippincott, J.B. (1968). Aspects of anxiety (2nd ed.). Philadelphia: Author.
- Manderscheid, R.W., Silbergeld, S., and Dager, E.Z. (1975). Alienation: A response to stress. Journal of Cybernetics, 5, 91-95.
- Martin, B. (1971). Anxiety and neurotic disorders. New York: Wiley and Sons.
- Mizrahi, C. (1982). The hospitalization experience and state-trait anxiety among different diagnostic groups. Unpublished master's thesis, Boğaziçi University, Istanbul.
- Murrell, H. (1978). Work stress and mental strain: A review. Work Research Unit Occasional Paper (6).
- Occupational Mental Health (Report of a Meeting), World Health Organization/OCH/83.4.
- Öner, N., Le Compte A. (1983). Sürekli durumluk/sürekli kaygı envanteri el kitabı. İstanbul: Boğaziçi Üniversitesi Yayınları.
- Oskay, Ü. (1983). Geçiş dönemi tipi olarak Zonguldak kömür havzası maden işçisi. İzmir: Ege Üniversitesi Edebiyat Fakültesi Yayınları.
- Phares, E.J. (1984). Introduction to personality. Columbus: Merrill.
- Psychosocial Factors and Health of Migrant Workers (Report of a Meeting), World Health Organization/OCH/80.5.

Psychosocial Factors in Injury Prevention (Report of a Meeting),  
World Health Organization/OCH/83.4.

Rotter, J.B. (1966). Generalized expectancies for internal  
versus external control of reinforcement. Psychological  
Monographs: General and Applied, 80 (1, whole No.609).

Sarason, I.G., Johnson, J.H., and Siegel, J.M. (1978). Assessing  
the impact of life changes: Development of the life  
experiences survey. Journal of Consulting and Clinical  
Psychology.

Selye, H. (1956). The stress of life. New York: McGraw-Hill.

Selye, H. (1974). Stress without distress, New York:  
Lippincott.

Solso, R. (ed.). (1973). Contemporary issues in cognitive  
psychology: The Loyola symposium. Washington, DC:  
Winston and Sons.

Spielberger, C.D. (ed.). (1966). Anxiety and behavior. New  
York: Academic press.

Spielberger, C.D., and Sarason, I.G. (1975). Stress and anxiety  
New York: Wiley.

Wild, B.S. and Hanes, C. (1976). A dynamic conceptual framework  
of generalized adaptation to stressful stimuli (Psycho-  
logical Reports, 38, 319-334).

Wolman, B.B. (1960). Contemporary theories and systems in  
psychology. New York: Harper and Row.

APPENDIX A

THE QUESTIONNAIRE

AND

THE PERCEIVED DANGER SCALE

Bu anket Boğaziçi Üniversitesi Psikoloji Bölümü Lisansüstü öğrencisi Deniz Karaveli tarafından mezuniyet tezi için uygulanmak üzere hazırlanmıştır.

Sizden aşağıdaki soruları mümkün olduğu kadar içtenlikle cevaplamanızı, her bölümün sorularını cevaplamadan önce ilgili talimatları dikkatle dinlemenizi rica eder, yardımlarınız için teşekkür ederim.

1- Yaşınız:

65 ve yukarısı  
55-64  
45-54  
35-44  
25-34  
25 ve altı

2- Doğum Yeriniz:

1- Şehir-adı      2- Kasaba-adı      3- Köy-adı

3- Halen Oturduğunuz Yer:

1- Şehir-adı      2- Kasaba-adı      3- Köy-adı

4- Tahsil Dereceniz:

1- Hiç okumamış  
2- İlkokula devam etmiş  
3- İlkokulu bitirmiş  
4- Ortaokula devam etmiş  
5- Ortaokulu bitirmiş  
6- Liseye devam etmiş  
7- Liseyi bitirmiş  
8- Üniversiteye devam etmiş  
9- Üniversiteyi bitirmiş

5- Medeni Durumunuz:

1- Evli      2- Bekâr      3- Dul      4- Boşanmış      5- Diğer

6- Evli iseniz ilk eşiniz mi?

1- Evet      2- Hayır

7- İlk eşiniz değilse önceki eş veya eşlere ne oldu?

1- Öldü      2- Boşandık

8- Kaç çocuğunuz var?

1- Hiç yok      2- 1-2      3- 3      4- 4      5- Daha fazla



- 9- Yetişkin oğlunuz varsa işi nedir?  
1- Kömürde 2- Başka 3- Boşta
- 10- Kömürde çalışıyorsa çalıştığı bölüm aşağıdakilerden hangisidir?  
1- Yeraltı 2- Yerüstü
- 11- Küçük erkek çocuğunuz varsa onun da kömürde çalışmasını ister miydiniz?  
1- Hiç istemezdim 2- Olabilir 3- Bilmiyorum  
4- Epey isterdim 5- Mutlaka isterdim
- 12- Babanız aşağıdaki işlerden hangisinde çalışırdı?  
1- Çiftçi 2- Esnaf 3- İşçi 4- Kömürde 5- Diğer
- 13- Babanız kömürde işçi ise çalıştığı veya çalışmış olduğu bölüm aşağıdakilerden hangisidir?  
1- Yeraltı 2- Yerüstü
- 14- Babanız hayatta mı?  
1- Evet 2- Hayır
- 15- Babanız hayatta değilse ölüm nedeni işi ile ilgili midir?  
1- Evet 2- Hayır
- 16- Şu andaki işiniz aşağıdaki bölümlerden hangisinde?  
1- Yeraltı 2- Yerüstü
- 17- Yeraltında çalışıyorsanız yaptığınız iş nedir?
- 18- Yerüstünde çalışıyorsanız yaptığınız iş nedir?

19- Kaç yıldır bu işte çalışıyorsunuz?

1- 1-5      2- 5-10      3- 10-15      4- 15-20      5- Daha fazla

20- Madencilik ilk işiniz mi, daha önce başka işlerde çalıştınız mı?

1- İlk      2- Başka işlerde çalıştım

21- Madencilik ilk işinizse bu işi ilk olarak seçme nedeniniz nedir?

22- Madencilğe girmeden önce sigortalı bir işte çalıştınız mı?

1- Evet      2- Hayır

23- Madencilğe girmeden önce sigortalı bir işte çalışmış iseniz bu iş aşağıdakilerden hangisidir?

1- Orman      2- Yol      3- İnşaat işçisi      4- Diğer

24- Madencilğe girmeden önce başka işlerde çalışmış iseniz neden madencilğe yöneldiniz?

25- Madene girdiğinizde ilk işiniz aşağıdaki bölümlerden hangisinde idi?

1- Yeraltı      2- Yerüstü

26- Madende çalışmaya başladıktan sonra yine kömürde çalışmak üzere iş değiştirdiniz mi?

1- Evet      2- Hayır

27- İş değiştirerek neye yöneldiniz?

1- Yeraltı      2- Yerüstü

28- Neden?

29- Yeraltında mı, yerüstünde mi çalışmayı tercih ediyorsunuz?

1- Yeraltı 2- Yerüstü

30- Neden?

31- Madene inmeden önce size hazırlık eğitimi veriliyor mu?

1- Evet 2- Hayır

32- Madende birlikte çalıştığınız arkadaşlarınızın dikkatine güveniyor musunuz?

1- Hiç güvenmiyorum 2- Biraz güveniyorum 3- Fikrim yok  
4- Epey güveniyorum 5- Çok güveniyorum

33- Kendi dikkatinize güveniyor musunuz?

1- Hiç güvenmiyorum 2- Biraz güveniyorum 3- Fikrim yok  
4- Epey güveniyorum 5- Çok güveniyorum

34- Madende kullandığınız aletlere güveniyor musunuz?

1- Hiç güvenmiyorum 2- Biraz güveniyorum 3- Fikrim yok  
4- Epey güveniyorum 5- Çok güveniyorum

35- Fiziksel emniyetiniz bakımından madende alınan teknik önlemlere güveniyor musunuz?

1- Hiç güvenmiyorum 2- Biraz güveniyorum 3- Fikrim yok  
4- Epey güveniyorum 5- Çok güveniyorum

36- İdarede çalışan teknik elemanlar sizce yeterli midir?

1- Evet 2- Hayır

37- Kendiniz işiniz ile ilgili bir kaza geçirdiniz mi?

- 1- Evet 2- Hayır

38- İşiniz ile ilgili bir kaza geçirdi iseniz bu hayatınızı ne kadar etkiledi?

- 1- Hiç etkilemedi 2- Biraz etkiledi 3- Fikrim yok  
4- Epey etkiledi 5- Çok etkiledi

39- Gelecekte kaza olması ihtimali sizce nedir?

- 1- Kesinlikle olamaz 2- Zayıf bir ihtimal  
3- Bilmiyorum 4- Olabilir 5- Mutlaka olur

40- Kaza olursa ailenizin geçimi nasıl sağlanır?

- 1- Başka çalışan var  
2- Toprak var, işliyoruz  
3- Maaş bağlanabilir  
4- Açıkta kalırız  
5- Belirsiz

41- Başınıza bir iş kazası gelme ihtimalini düşünerek kuruntu yaptığınız olur mu?

- 1- Evet 2- Hayır

42- Bu kuruntular varsa sizi işinizi yapmaktan alıkoyuyor mu?

- 1- Hiç etkilemiyor 2- Az etkiliyor 3- Fikrim yok  
4- Epey etkiliyor 5- Çok etkiliyor

43- Bu kuruntular yüzünden huzurunuz bozuluyor mu?

- 1- Hiç 2- Ender olarak 4- Bazen 4- Çok zaman  
5- Her zaman

44- Ailenizden iş değiştirmeniz için baskı oluyor mu?

- 1- Hiç olmuyor 2- Ender olarak oluyor 3- Bazen oluyor  
4- Epey baskı oluyor 5- Çok fazla baskı oluyor

45- Fiziksel şikayetiniz var mıdır?

- 1- Evet 2- Hayır

46- Varsa bunlar nedir?

- 1- Mide-barsak ile ilgili
- 2- Kalp-damar sistemi ile ilgili
- 3- Beyin-damar sistemi ile ilgili
- 4- Solunum sistemi ile ilgili

47- Bu şikayetleriniz yüzünden revire gider misiniz?

- 1- Hiç
- 2- Nadiren
- 3- Arada sırada
- 4- Sık sık
- 5- Her zaman

48- Revirdekimuayene ve bakımdan memnun musunuz?

- 1- Evet
- 2- Hayır

49- Gelecekte en kötü beklentiniz nedir?

- 1- Ölüm (ecel dışı)
- 2- Kötürüm kalmak
- 3- Kör olmak
- 4- Madencilikle ilgili bir hastalığa yakalanmak
- 5- İş kazası
- 6- Diğer

50- Gelecekte umutlu musunuz?

- 1- Hiç umutlu değilim
- 2- Biraz umutluyum
- 3- Olabilir
- 4- Epey umutluyum
- 5- Çok umutluyum

## APPENDIX B

### THE INTERNAL - EXTERNAL LOCUS OF CONTROL SCALE

Aşağıda a ve b olarak verilen çift cümlelerin hangisinin daha doğru olduğunu düşünüyorsanız onun önüne X işareti koyunuz. İşaretlemeniz gerektiğini düşündüğünüzü veya doğru olmasını arzu ettiğinizi değil, gerçekten doğru olduğuna inandığınızı işaretleyiniz. Bazı çift cümlelerin her ikisi de fikrinize uygun olabilir veya ikisi de fikrinize uygun olmayabilir. Böyle bir durumda da gene bu iki cümleden fikrinize biraz daha uygun olanı seçiniz. Her çift cümleyi kendi başına ele alınız, ona göre cevap verirken diğer çift cümlelere verdiğiniz cevapların tesirinde kalmayınız.

Örnek: a) Bazı insanlar vardır ki nereden bakarsan bak iyi değildirler.

b) Her insanda iyi olan bir yön vardır.

1 - a) Kişilerin hayatlarındaki üzücü olayların çoğuna kısmen şanssızlık neden olur.

b) Kişilerin başına gelen talihsizliklere kendi yaptıkları hatalar neden olur.

2 - a) Sık sık şahit oldum ki "herşey olacağına varır".

b) Kararlı adım atmak yerine kadere inandığımda hep zararlı çıkmışımdır.

3 - a) Başarı çok çalışmaya bağlıdır, şansla hemen hemen hiç ilişkisi yoktur.

b) İyi bir işe girmek esas olarak uygun zamanda uygun yerde bulunmaya bağlıdır.

4 - a) Plân yaptığımda onları başarı ile uygulayacağımdan hemen hemen eminimdir.

b) Çok önceden planlar yapmak her zaman akıllıca bir iş değildir. Çünkü, nasılsa birçok şey iyi veya kötü şansa bağlıdır.

5 - a) Benim için istediğini elde etmenin şansla hiç ilgisi yoktur.

- b) Çoğu kez herşey öylesine şansa bağlıdır ki, ne yapacağımıza karar vermek için yazı tura bile atabiliriz.
- 6 - a) Çoğu kişi hayatlarının ne dereceye kadar tesadüfi olaylar tarafından kontrol edildiğinin farkında değildir.
- b) Gerçekte şans diye birşey yoktur.
- 7 - a) Kişi daima hatalarını kabul etmeğe gönüllü olmalıdır.
- b) Genellikle kişinin hatalarını örtbas etmesi en doğrudur.
- 8 - a) Başımıza gelen kötü olaylar uzun vadede iyileriyle dengelenir.
- b) Birçok talihsiz olay yeteneksizlik, bilgisizlik, tembellik veya üçünün bir arada bulunması sonucu meydana gelir.
- 9 - a) Çoğu zaman başıma gelen olaylar üzerinde çok az etkim olduğunu düşünürüm.
- b) Tesadüf ya da talihin hayatımda önemli bir rol oynadığına inanmayı aklım almıyor.
- 10 - a) Başıma gelen herşey benim davranışlarımla sonucudur.
- b) Zaman zaman hayatımın gidişatı üzerinde yeterli kontrolüm yokmuş gibi hissediyorum.



## APPENDIX C

### THE STATE-TRAIT ANXIETY INVENTORY

## KENDİNİ DEĞERLENDİRME ANKETİ

### STAI FORM A

Aşağıda kişilerin kendilerine ait duygularını anlatmada kullandıkları birtakım ifadeler verilmiştir. Her ifadeyi okuyun, sonra da o anda nasıl hissettiğinizi, ifadelerin sağ tarafındaki alternatiflerden en uygun olanını işaretlemek suretiyle belirtin. Doğru ya da yanlış cevap yoktur. Herhangi bir ifadenin üzerinde fazla zaman sarfetmeksizin şu anda nasıl hissettiğinizi gösteren cevabı işaretleyin.

	<u>Hemen Hiç</u>	<u>Biraz</u>	<u>Oldukça</u>	<u>Tamamiyle</u>
1- Kendimi sakin hissediyorum	(1)	(2)	(3)	(4)
2- Kendimi emniyette hissediyorum	(1)	(2)	(3)	(4)
3- Huzursuzum	(1)	(2)	(3)	(4)
4- Pişmanlık duygusu içindeyim	(1)	(2)	(3)	(4)
5- Kendimi rahat hissediyorum	(1)	(2)	(3)	(4)
6- İçimde bir sıkıntı hissediyorum	(1)	(2)	(3)	(4)
7- İleride olabilecek kötü olayları düşünerek üzülüyorum	(1)	(2)	(3)	(4)
8- Kendimi dinlenmiş hissediyorum	(1)	(2)	(3)	(4)
9- Kendimi kaygılı hissediyorum	(1)	(2)	(3)	(4)
10- Kendimi rahatlık içinde hissediyorum	(1)	(2)	(3)	(4)
11- Kendime güvenim olduğunu hissediyorum	(1)	(2)	(3)	(4)
12- Kendimi sinirli hissediyorum	(1)	(2)	(3)	(4)
13- İçimde bir huzursuzluk var	(1)	(2)	(3)	(4)
14- Çok gergin olduğumu hissediyorum	(1)	(2)	(3)	(4)
15- Sükunet içindeyim	(1)	(2)	(3)	(4)
16- Halimden memnunum	(1)	(2)	(3)	(4)
17- Endişe içindeyim	(1)	(2)	(3)	(4)
18- Kendimi fazlasıyla heyecanlı ve şaşkın hissediyorum	(1)	(2)	(3)	(4)
19- Kendimi neşeli hissediyorum	(1)	(2)	(3)	(4)
20- Keyfim yerinde	(1)	(2)	(3)	(4)

## KENDİNİ DEĞERLENDİRME ANKETİ

### STAI FORM B

Aşağıda kişilerin kendilerine ait duygularını anlatmada kullandıkları birtakım ifadeler verilmiştir. Her ifadeyi okuyun, sonra da genel olarak nasıl hissettiğinizi ifadelerin sağ tarafındaki alternatiflerden en uygun olanını işaretlemek suretiyle belirtin. Doğru ya da yanlış cevap yoktur. Herhangi bir ifadenin üzerinde fazla zaman sarfetmeksizin genel olarak nasıl hissettiğinizi gösteren cevabı işaretleyin.

	<u>Nadiren</u>	<u>Bazen</u>	<u>Çoğu Zaman</u>	<u>Her Zaman</u>
21- Keyfim yerindedir	(1)	(2)	(3)	(4)
22- Çabuk yoruluyorum	(1)	(2)	(3)	(4)
23- Olur olmaz hallerde ağlayacak gibi olurum	(1)	(2)	(3)	(4)
24- Diğerleri kadar mutlu olmayı isterdim	(1)	(2)	(3)	(4)
25- Çabuk karar veremediğim için fırsatları kaçıırırım	(1)	(2)	(3)	(4)
26- Kendimi zinde hissederim	(1)	(2)	(3)	(4)
27- Sakin, kendime hakim ve soğukkanlıyım	(1)	(2)	(3)	(4)
28- Güçlüklerin yenemeyeceğim kadar biriktiğini hissederim	(1)	(2)	(3)	(4)
29- Gerçekte çok önemli olmayan şeyler için endişelinirim	(1)	(2)	(3)	(4)
30- Mutluyum	(1)	(2)	(3)	(4)
31- Herşeyi kötü tarafından alırım	(1)	(2)	(3)	(4)
32- Kendime güvenim yok	(1)	(2)	(3)	(4)
33- Kendimi emniyette hissederim	(1)	(2)	(3)	(4)
34- Sıkıntı ve güçlük veren durumlardan kaçınırım	(1)	(2)	(3)	(4)
35- Kendimi hüznü (kederli) hissederim	(1)	(2)	(3)	(4)
36- Hayatımdan memnunum	(1)	(2)	(3)	(4)

## KENDİNİ DEĞERLENDİRME ANKETİ

### STAI FORM B

	<u>Nadiren</u>	<u>Bazen</u>	<u>Çoğu Zaman</u>	<u>Her Zaman</u>
37- Aklımdan bazı önemsiz düşünceler geçer ve beni rahatsız eder	(1)	(2)	(3)	(4)
38- Hayal kırıklıklarını öylesine ciddiye alırım ki unutamam	(1)	(2)	(3)	(4)
39- Son zamanlarda beni düşündüren konular yüzünden gerginlik ve huzursuzluk içindeyim	(1)	(2)	(3)	(4)
40- Akli başında ve kararlı bir insanım	(1)	(2)	(3)	(4)