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STRESS, EXERCISE, JOB SATISFACTION AND PERFORMANCE:
AN INTERACTIVE PROCESS MODEL

BY

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THESIS

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ABSTRACT

Stress in organizations is a critical phenomenon of our times. Research to date has focused on specific job-related stressors such as role conflict, ambiguity and supervisory relationships utilizing satisfaction and performance as outcome variables. Results have often been ambiguous and non-conclusive. However, a variety of common physiological responses have been found to play a major role in stress reaction and management. Furthermore, numerous studies have demonstrated a moderating effect of exercise on physiological stress responses. This correlational study, based on a hypothetical Interactive Process Model of Stress Correlates, where fitness is the measure of stress, proposed to link stress-related variables with job satisfaction and performance. It was hypothesized that a positive relationship between fitness and performance/satisfaction would emerge. However, analyses of data from sixty-four engineers at a major corporation in Orlando, Florida, found no such relationships. Presented here are a review of pertinent literature, study results and examination of why a relationship between fitness and performance/satisfaction may not be as straightforward as predicted.

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INTRODUCTION

The need for increased participation by organizations in stress management becomes evident when national health statistics are considered. DuBrin (1984) estimates an annual decrease in productivity due to stress-related disorders to be \$17 billion. The general cost of stress dysfunction to organizations is estimated to be as high as \$60 billion annually. Schuler (1980) cites a \$45 billion cost towards peptic ulcer and cardiovascular disease alone. And from a more general perspective, 8% of the Gross National Product was allocated to health care in 1974 (Beehr & Newman, 1978).

Despite this hard data and a growing awareness of the stress phenomenon, stress research has been a neglected area of inquiry within traditional industrial/organizational (I/O) psychology (Beehr & Newman, 1978; Schuler, 1980). The major reasons for this are thought to be the complexity of stress and general disagreement about the nature of stress (DuBrin, 1984).

Job satisfaction has been one of the most frequently studied variables as predictor of job performance in I/O psychology (Muchinsky, 1983). Most often, the studies have

concentrated on the effects of specific job-related stressors on job satisfaction and performance. Gupta and Beehr (1979) investigated underutilization of skills; whereas work overload, role conflict and ambiguity were the focus of attention by Burke (1976), Jackson (1983) and Cooper and Marschall (1976).

Additionally, environmental conditions (Cooper & Marschall, 1976) and stressful supervisory relationships (Potter & Fiedler, 1981) have been investigated. Negative relationships between these job factors and job satisfaction and performance have been demonstrated.

Although no causal direction between job satisfaction and performance can be reliably concluded, Clegg (1983), in a multi-correlational study suggests that "correlations between behavior (performance) and subsequent affect (satisfaction) are larger than their counterparts between affect and subsequent behavior" (p. 92). The findings support his contention that many empirical studies have failed to consider reverse causation and third-factor variables. Additionally, Clegg notes that the "...majority of the studies ignore consideration of biographical and situational factors" (p. 92).

Stress, as a biographical factor, has been linked with job satisfaction. Schuler (1980) conceptualizes stress as a dynamic condition resulting from interaction of an

individual's perceptions with the environment. The first of these perceptual factors is an opportunity for the individual to be, have or do what is desired. The environment then places constraints and/or demands on the person, which can interfere with smooth attainment of the desired outcome. A most crucial component is the uncertainty of resolution, which is intimately anchored to the importance of outcome.

Implicit in this notion is the role of individual differences in needs and values. Schuler posits needs as physiologically and psychologically based, whereas values contribute to behavioral requirements. In effect, this line of reasoning argues that the psychological, physiological and behavioral dimensions are biographical factors which relate directly to opportunities, constraints and demands. In other words, stress is viewed as a holistic phenomenon.

Since an ongoing concern of organizations is to increase motivation (effort) toward greater over-all effectiveness, it might be useful at this time to establish a relationship between stress and motivation. In order to illustrate this more clearly, one can interlace Schuler's notion with the three components of Expectancy/valence theory of motivation (Porter & Lawler, 1968).

These three segments are:

(1) performance-outcome expectancy: the anticipation that job performance will actually lead to a rewarding outcome.

(2) valence: the value placed on the outcome.

(3) effort-performance expectancy: the perception by an individual that effort will lead to the required performance.

Schuler's "opportunity" can easily be linked to performance-outcome expectancy and the "importance of outcome" is analogous to the concept of valence. Finally, uncertainty of resolution can be likened to effort-performance expectancy. The intervening variables within this combined model are constraints and demands. It is these constraints and demands, to the extent that an individual perceives their presence, which are the potential stressors. From this perspective the intricacy of the stress phenomenon relative to motivation becomes apparent.

To further complicate the situation, stress reaction is not limited to one modality at a time; rather, it is manifested in any combination as follows: Physiological (headache, hypertension, heart disease, ulcers, etc.); Affect (sadness, depression, anxiety, etc.); Cognitive (distractibility, altered perceptions, etc.); Behavioral (impatience, uncoordination, aggression, etc.).

Beehr and Newman (1978) break down these reactive modes into categories which they refer to as "Facets of the Job Stress-Employee Health Research Domain." These seven facets are further broken down into elements:

Environmental facet: Includes 38 job environment elements such as role-job demands and expectations as well as task characteristics. Also included are organizational characteristics and conditions.

Personal facet: Is comprised of 31 elements related to psychological condition, physical condition, life stage and demographics (age, sex, race, etc.).

Process facet: Includes psychological processes such as perceptions, response mode, etc. and physical processes (i.e., neurological, chemical, etc.).

Organizational and Human Consequences facets: The latter subsumes elements related to psychological, physical and behavioral dimensions (totaling 31 elements on a continuum from mild to very serious such as suicide). The former lists 12 elements relating to changes in profits, withdrawal behavior, obtaining raw materials and so forth.

Adaptive Responses facet: Includes 12 responses by the organization, by the individual, as well as by third parties (family, friends, outside institutions, etc.).

Time: This facet interacts with the other categories. It relates to the development of stress, stress response and

consequences, as immediate, short-term and or long-term. Selye (1956) substantiates this through his findings that stress is additive.

It does not require much imaginative power to realize how considerable are the potential permutations. Clearly, stress is a powerful mediator in the functional ability of employees.

The terms "job satisfaction" and "job performance" then embrace the numerous variables presented thus far. Considering the many modalities and the multiple sources capable of provoking stressful responses, it is not surprising that research results are often contradictory, confounded and surprising. For instance, Gupta and Beehr (1979) found a positive correlation between absenteeism and turnover (withdrawal behavior), yet age and tenure alone predicted withdrawal almost as well as job behavior.

A study by Palmore (1969), demonstrated an even more salient outcome in that work satisfaction was found to be the best predictor of longevity instead of some long-held assumptions (e.g., parents' life span). Work satisfaction was defined as a person's reaction to general usefulness and the ability to perform a social role.

A final example of the complexity of stress effects concerns the relationship between intelligence level and

satisfaction/performance. *The stressor, as an independent variable, was the relationship with one's superior. Results revealed that performance and satisfaction under stress decreased as intelligence increased (Potter & Fiedler, 1981).

To briefly summarize, the ideas presented so far demonstrate stress as a broad and multidimensional phenomenon. The interaction of individual and organizational variables are so vast that attempts to isolate and measure a particular variable as the contributing factor to stress present great difficulty. The molecular approach appears a limited endeavor at this time.

Furthermore, even though traditional studies of job satisfaction and job performance have positively affected the organizational environment (DuBrin, 1984), stress, and its consequences to individuals and organizations, continues to accelerate.

In view of the foregoing broad conceptualizations of stress, there emerges a need for a more auspicious approach to deal with this far-reaching menace of our time. Selye (1956) and others (French & Caplan, 1973; Russek & Zohman, 1958; Bardin & Peterson, 1967; Davidson, Smith & Levine, 1978) have demonstrated that a most reliable index of stress is physiological measurement.

In almost all cases, stress is accompanied by physiological symptoms of the nervous and the endocrine (or hormonal) systems (Selye, 1956). Physical activity, in turn, reduces this excess physiological activity. This suggests, within Clegg's (1983) context, that the physiological dimension might possibly classify as a third factor variable in the satisfaction/performance dyad.

Daily lifestyle circumstances as well as job-related events clearly influence stress response. Shaw and Riskind (1983), in a correlational study of 32 job dimensions and 18 stress variables (totaling 575 computations) found 141 significant correlations. It seems reasonable to infer that these specific job-related variables do influence the level of job satisfaction/job performance. It is of course uncertain whether "high stress" occupations are due to job characteristics or whether individuals with stress predispositions choose certain occupations.

In a 1982 study by Lester, Leitner and Posner, two stress components were identified from a test battery (Girdano & Everly, 1977) administered to 206 participants in stress-management training seminars. Six tests loaded highly on the first factor: frustration, time pressure, boredom/loneliness, self-confidence, Type A personality, and anxiety. These aspects appear to be "a general stress factor relating to current feelings and behavior" (p. 326).

The second factor relates to recent stressful life events and correlated with poor eating habits. It is not unreasonable to suppose that these factors would correlate with job satisfaction and job performance.

Reduction of stress in all modalities seems a desirable goal then; not only to enhance the lives of individuals but as a means to obtain the highest degree of organizational effectiveness through employee performance. One avenue to pursue in this objective is to reduce the physiological effects of stress which have been implicated in personality variables as well. Tillman (1965) demonstrated a difference between a highly physically fit group and a low physically fit group. The group high on fitness was more socially oriented and expressed more interest in group interaction. They also expressed feeling less tension. In the work world, results of this type suggest increased group cohesiveness.

Another study found an increase in pleasantness and activation and a decrease in sadness, depression and anxiety after exercise (Nowlis & Greenberg, 1979). Folkins (1976) measured mood after physical training and subjects reported a decrease in anxiety and depression compared to the control group. Collingwood (1972) measured increased self-concept, self-acceptance, emotional/interpersonal functioning and increased intellectual ability after physical training of subjects. These results suggest the physiological state as

an antecedent to various affective and cognitive manifestations of stress.

To briefly review the studies cited here, the following effects were related to improved physical fitness after training exercise:

A decrease in: Anxiety, depression, sadness, tension.

An increase in: Pleasantness, activation, self-assurance, extroversion, interest in people and group interaction, intellectual functioning.

These elements are very much akin to those test variables which loaded so highly on one of two stress factors identified by Lester et al. (1982) as "general stress factors relating to current feelings and behavior."

One can further safely posit that these same elements detract from or enhance job satisfaction/performance, regardless of their origins (job related or non-job related).

The heuristic approach can be simplified if the physiological modality becomes the target for improvement (facilitating more effective job performance and increasing feelings of satisfaction). A hypothetical Interactive Process Model of stress correlates (see Appendix A) graphically depicts the multi-directional nature of stress effects.

The center cell represents the physiological state. The cells in the middle circumference indicate the means through which stress manifests itself. Lastly, the outer cell group represents the external stimuli impinging on an individual. The negative arrows indicate a two-directional negative impact of stress. The positive arrows represent an outward, one-way direction after stress decrease which, after reaching the middle cells, becomes two-way once more.

In effect, the reduced stress state of the body affects all other variables, internal and external to the individual, in a positive way.

The Interactive Process Model suggests the following:

(1) The Model assumes that the physiological state reliably plays a central role in stress response and management.

(2) The Model assumes that stress variables have reversal effects as illustrated by arrows -/+.

(3) Targeting a decrease in physiological stress reaction through exercise produces a positive one-way impact on the other stress variables. Those modalities will continue a two-directional influence in a reversal effect (Clegg, 1983).

(4) Assuming that job performance/job satisfaction is a dyadic relationship, this implies that when the body

becomes a target for stress reduction, the other variables will also be affected. This will produce a better feeling (job satisfaction) and a better functioning (job performance) individual.

The effects can be preventive as well. Ledwidge (1980) states "...endurance training lessens the biological response to physical stressors" (p. 128). Based on the Interactive Process Model, this would build resistance to the daily, cumulative stresses experienced on the job and in one's personal life.

* Simply stated, the evidence strongly supports the notion that physical fitness lowers stress.* Since stress levels have been found to influence job behaviors, it is suggested here that lowered stress levels will positively influence those job behaviors.

The experimental hypothesis to follow will attempt to establish stress as a third-factor variable and a subsequent relationship between fitness level and the job satisfaction/performance dyad. Physical fitness level will be the independent variable and job satisfaction/job performance will be the dependent variables.

METHOD

Subjects

Two hundred fifty-nine employees in the Engineering Department at the Power Generation Operations Division of Westinghouse Corporation in Orlando, Florida, were asked to participate in the study. Members of this department include engineers and clerical support personnel (managerial, professional and non-exempt employment status).

Instruments

The Job Descriptive Index (JDI) (see Appendix B), developed by Smith, Kendall and Hulin (1969), was completed by each subject to assess job satisfaction. Satisfaction measurements include five job facets: supervision, pay, promotion, co-workers and the work itself. The Job

Descriptive Index features a dichotomous scale ("yes" to signify satisfaction, "no" to indicate dissatisfaction and a "?" for indecisiveness on a particular item). Test-retest (16-month interval) reliability is reported as $r = .57$ by Muchinsky (1983).

Fitness level of each subject was assessed through a questionnaire (see Appendix C), using the Cooper (1977) point system where each activity is weighted according to type, duration and frequency and summed for an overall fitness score. Fitness levels are then dichotomized into

five fitness levels ranging from very poor to excellent. Additionally, the questionnaire solicited demographic data including age, gender, length of employment and employment status.

Participants in this study were asked to list their overall performance score in the indicated spot on the Fitness survey form. Performance appraisals are conducted company-wide on an annual basis using the TEAMS method (Edwards & Sproull, 1985). TEAMS is a two-part appraisal method which inputs peer and supervisor evaluations to arrive at a performance score for each employee.

Procedure

Approximately one week prior to the administration of the questionnaires, potential participants received an announcement (see Appendix D) from the Manager of Human Resources Development informing them of the study and its purpose and assurance of complete confidentiality. The volitional nature of participation was also emphasized. Additionally, the researcher made a brief presentation to inform department heads of the purpose (i.e., to determine how fitness level contributes to performance) and to answer any questions. The scientific nature of the study was stressed and assurance given that no one except the researcher would have access to the data.

On the day of survey administration, supervisors received packets each of which contained the forms to be completed. A signed consent form (see Appendix E) was returned along with the completed questionnaires to the researcher. Participants were informed that the cut-off time for return of the completed forms was three days. Upon completion, the employee placed the forms in a sealed envelope which was directly delivered to the researcher via intercompany mail. During questionnaire administration, the researcher was available at a designated area to address any concerns on the part of the participants.

Analysis of Results

Several statistical procedures were utilized as follows:

After scoring and tabulating the JDI and Fitness data, Bivariate Regression Analyses were conducted of all variables to determine the existence of a relationship between any two variables.

Multiple Regression Analyses and semi-partial correlations were then performed to determine the unique variance contributed by each of the independent variables (age, gender, length of employment and fitness) to each of the dependent variables, performance and satisfaction.

A Pearson Product Moment Correlation Coefficient was obtained to determine the relationship between the two dependent variables, Job Performance and Satisfaction.

To determine any differences between managers and professionals on any of the measured variables, means and standard deviations were calculated for each and computed t scores were obtained.

RESULTS

Means, Standard Deviations and Ranges

Of the 259 engineers who were surveyed, 25% (n = 64) responded with complete, usable data. Of these, 20 were managers and 44 were professional engineers without managerial responsibility. Of the 64 respondents, only 4 were female; thus females and males were combined into one group and gender was dropped as an independent variable. It was also anticipated that there would be three employment levels (managerial, professional and non-exempt). However, there were no respondents in the non-exempt category. The independent variables under consideration are: age, years with company, employment level (management or professional engineers) and aerobic points. Job Performance and Satisfaction ratings are the dependent variables.

Analysis of frequency and range of scores for each of the variables are listed in Table 1 and indicate several skewed distributions.

"Age" ranges from 24 to 63 but almost 50% of respondents are 51 or older. There is a significant difference between the average age of managers and professionals ($t(62) = 2.652$, $p < .05$), with managers ($\underline{M} = 50$) eight years older than the professionals ($\underline{M} = 42$).

TABLE 1
 MEANS, STANDARD DEVIATIONS AND RANGES
 OF ALL VARIABLES

Variable	ALL (n = 64)	MANAGERS (n = 20)	PROFESSIONALS (n = 44)	t (62)
<u>Age</u>				
Mean	44	50	42	2.652*
Standard Deviation	12.06	9.3	12.33	
Range	24-63	35-63	24-63	
<u>Years with Company</u>				
Mean	20	26	17	2.830*
Standard Deviation	11.83	8.77	11.94	
Range	2.5-44.5	11-41	25-44.5	
<u>Aerobic Points</u>				
Mean	18.98	11.65	22.32	2.089*
Standard Deviation	19.43	13.65	20.50	
Range	0-85.07	0-52	0-85.07	
<u>Satisfaction</u>				
Mean	215	224.25	211.32	1.1
Standard Deviation	39.41	35.72	39.89	
Range	109-279	123-261	109-279	
<u>Performance</u>				
Mean	45.5	48.5	44.27	2.368*
Standard Deviation	6.87	6.83	6.37	
Range	29-59	30-59	29-58	

* $p < .05$

The "Number of Years" employed by the company has a median of 18 and ranges from 2.5 to 44.5. Not surprisingly, managers have spent significantly longer employment time with the company ($t(62) = 2.830$, $p < .05$) than the professional engineers with means of 26 and 17 respectively.

The "Aerobic Points" variable has a considerable positive skew. Points range from 0 to 85.07 with 58% of respondents rating "poor" (< 15 points); 17% rating "fair" (15 to 29 points); 17% rating "good" (30 to 50 points), and only 6.4% rating "excellent" (> 50 points). Managers and professionals, on the average, differ significantly on this variable with the professionals being more physically fit than the managers ($t(62) = 2.089$, $p < .05$). The mean number of aerobic points was 22.32 for the professionals and 11.65 for managers.

There is considerable negative skew on the "satisfaction" variable. The range is from 109 to 279 with 70% of respondents scoring 200 or above. No significant difference emerged between managers and professionals whose means are 224.25 and 211.32 respectively ($t(62) = 1.1$, $p > .20$).

The "performance" raw scores range from 29 to 59, with 77% of respondents scoring 41 or higher. Managers ($M = 48.5$) and professionals ($M = 44.27$) also differed significantly on their performance ratings ($t(62) = 2.368$, $p < .05$).

Bivariate Regression Analysis

As shown in Table 2, none of the independent variables correlated significantly with either of the dependent variables (Satisfaction and Performance). Pearson correlation coefficients range from $\underline{r} = -.10$ to $r = .15$. From among the intercorrelations between independent variables, "Age" and "Years with Company" resulted in the only significant Pearson correlation coefficient ($\underline{r} = .89$, $\underline{p} < .05$). Pearson correlation coefficients for the other independent variables range from $\underline{r} = -.12$ to $\underline{r} = .08$. Also, no significant relationship exists between the two dependent variables, Satisfaction and Performance ($\underline{r} = .13$, $\underline{p} > .05$).

Multiple Regression Analysis

Dependent Variable: Performance

Table 3 reveals that, in combination, the three independent variables (age, years with company, aerobic points) produced a non-significant multiple correlation coefficient of $\underline{R} = .27$, contributing 7% to the variance of the dependent variable ($\underline{F}(3,60) = 1.539$, $\underline{p} = .21$).

"Years with Company" emerged as the only variable having a significant semipartial correlation ($\underline{sr} = .07$, $\underline{p} = .036$) but it contributes only .4% to the dependent variable variance when the other independent variables are partialled out of the equation. Neither "Age" nor "Aerobic Points" contributed any significant variance to Performance

TABLE 2
 BIVARIATE CORRELATIONS
 ALL VARIABLES

Variable	Age	Years with Company	Aerobic Points	Satis- faction	Perform- ance
Age	1.00				
Years with Company	.89*	1.00			
Aerobic Points	-.12	-.08	1.00		
Satis- faction	.12	.11	-.10	1.00	
Performance	.04	.15	-.0211	.13	1.00

n = 64

* $\underline{p} < .05$

TABLE 3
 MULTIPLE REGRESSION COEFFICIENTS
 DEPENDENT VARIABLE: PERFORMANCE

INDEPENDENT VARIABLE	B	P	sr	sr ²
Age	-.27	.08	.05	.0023
Years	.33	.036*	.07	.0049
Aerobic Points	-.01	.69	.0012	.0000

$$\underline{R} = .27$$

$$\underline{R}^2 = .07$$

$$\text{Intercept} = 51.16$$

$$\underline{F}(3, 60) = 1.539$$

$$\underline{p} = .21$$

$$n = 64$$

$$* \underline{p} < .05$$

scores ($\underline{sr} = .05$, $\underline{p} = .08$ and $\underline{sr} = .0012$, $\underline{p} = .69$, respectively).

Dependent Variable: Satisfaction

In combination, the three independent variables (Age, years with Company and Aerobic points) resulted in a multiple $\underline{R} = .15$ and an $R^2 = .02$, $\underline{p} = .68$). As shown in Table 4, none of the independent variables account for any unique variance of the dependent variable. Semipartial correlations for Age, Years with Company and Aerobic Points respectively are $\underline{sr} = .0007$, $\underline{p} = .67$; $\underline{sr} = .0005$, $\underline{p} = .66$; and $\underline{sr} = .0080$, $\underline{p} = .49$.

The non-significant, semi-partial correlations for fitness with both dependent variables are the results which relate directly to the major hypothesis.

TABLE 4
 MULTIPLE REGRESSION COEFFICIENTS
 DEPENDENT VARIABLE: SATISFACTION

INDEPENDENT VARIABLE	B	P	sr	sr ²
Age	.19	.67	.0007	.0000
Years	.17	.66	.0005	.0000
Aerobic Points	-.18	.49	.008	.0001

$$\underline{R} = .15$$

$$\underline{R}^2 = .02$$

$$\underline{F}(3, 60) = .447$$

$$\text{Intercept} = 206.82$$

$$\underline{p} = .68$$

n = 64

DISCUSSION

For this population, no significant relationship exists between fitness and satisfaction/performance. One relationship that emerges is that the older an engineer is, the longer the employment time within the company. Also, managers score higher on their performance ratings. Professionals, on the other hand, participate in more exercise than do managers.

The question then is: Why is there a lack of relationship between fitness and satisfaction/performance as previously hypothesized? A critical look at the underlying assumptions which led to this experimental hypothesis is in order.

Fitness As A Measure of Stress

The assumption of fitness (through exercise) as a valid measure of stress level may be erroneous. Though it has been amply demonstrated that stress and physiology are related (Selye, 1956) it is not known exactly how. Furthermore, individuals differ in their perceptions of, and responses to, stress. For the high achiever all the exercise in the world may be ineffective in reducing stress, but working 14 hours a day may do so. For the more

"laid-back" individual, on the other hand, a greater-than-average amount of physiological arousal (stress) may be necessary in order for that individual to be a highly rated performer. Physical exercise may actually deplete the energy needed toward major effort.

Bunker (1983), after extensive assessment on many dimensions, found four different coping styles by highly stressed managers. The coping styles were clustered and identified as Adaptive, Stylized, Unconcerned and Denying.

Two subgroups of particular interest are the Adaptive and Stylized managers. Adaptive managers are composed of "Stress Seekers," and they were found to be well adjusted under conditions of stress. Stylized managers, "Stress Avoiders," were not. The coping factors that characterize good adjustment for the Stress Seekers include the ability to identify and then take a direct course of action in order to ameliorate stress sources. Furthermore, according to Bunker (1983), a history of successful identification and resolution of problems builds confidence in the ability to do so in the future. Stress Avoiders, in contrast, tend to deal with symptoms rather than sources of stress, which results at best in temporary respite from its effects. Having been unable to take effective courses of action in the past, the Stress Avoider builds a history of failure in the ability to problem solve.

What is apparently at work here is an entire "mind set." Stress Seekers, for example, view change as an opportunity whereas Stress Avoiders react to change as a threat or demand. Stress Seekers have developed flexible coping styles while Stress Avoiders, lacking a history of successful coping responses, tend to react to all types of stressors in a more rigid manner. Some of these responses are well-known (and demonstrate Bunker's contention that Avoiders deal with symptoms only). Examples would include substance abuse and/or excessive dependency on others.

The individual who vigorously exercises without simultaneously addressing the specific stressors is also reacting symptomatically. From that perspective, as Bunker suggests (private communication, January 3, 1986), exercise is often a form of escape. Consequently, a person can become physically fit through exercise and still be in a highly stressed state. Under this condition, fitness cannot be a valid measure of stress and fitness as a third factor variable may be so limited as to make it very difficult to capture in meaningful summary statistics.

Interdependency Of Stress Variables

This second major assumption is whether variables depicted in the Interactive Process Model are as interdependent as hypothesized. This assumption is possibly the most erroneous of all and not totally unrelated to the

assumption that the amount of exercise is an accurate measure of stress.

Although there is little doubt that exercise ameliorates a stressed physiological status, it does not necessarily follow that the benefits extend to any or all of the other variables identified in the Model. A person can be stressed and still perform well. Alternately, a poor performance appraisal may not be a source of stress for all individuals. And in some cases, inattention and distractibility due to stress may not affect the quality of job performance. Also, a person may suffer cognitively, but feel neither sad nor act carelessly. A headache does not necessarily cause poor interpersonal behavior. Exercise may improve none, all or some of the stress symptoms and in any combination. And finally, if exercise is used as an escape, any improvement can be only temporary unless the source of stress is actively confronted.

Satisfaction, performance and stress may also act as orthogonal factors. DuBrin (1984) compares the meaning of satisfaction with motivation. Satisfaction refers to feelings of contentment while motivation refers to the effort expended toward a goal. Thus, an individual may be dissatisfied but still be motivated to work hard for some reason such as economic gain or professional reputation.

Sometimes a worker may not be motivated to work hard yet feel perfectly satisfied.

Some individuals may also use one part of their lives to compensate for another. A very satisfying and involved career may make up for an unhappy home life and vice versa, at least for a while. The idea of a happy balance between love, work and leisure may be just an ideal for many people. Yet perhaps in the aggregate, people do find ways to maintain reasonable emotional and functional equilibrium.

The two assumptions just questioned, fitness as a valid measure of stress and the interdependency of stress-related variables, underscore the complexity of stress phenomena. Following is an examination of factors which may have influenced the outcome of this particular study. Perhaps it will shed further light on the complexities and confoundings inherent in attempting to study a phenomenon as complex as stress.

Restriction of Range

* One major limitation is lack of data variability. For example, a preponderance of respondents (75%) rated between very poor to fair in fitness level while only 25% approached a good to excellent level of fitness. Additionally, almost 50% of the respondents are aged 51 or older. Performance and satisfaction ratings were likewise skewed; in both cases, ratings leaned heavily into the upper ranges. It is

possible that the range restriction is legitimate. That is to say, any poor performers and/or dissatisfied employees may have terminated employment (see below).

In summary, most of the variables under study were not normally distributed within this population.

Contamination of Dependent Measure

Although peer evaluations in general have been found frequently to be more reliable than supervisory ratings (Latham & Wexley, 1981), the history of this particular organization may have affected rating reliability. The first peer appraisal was followed by a force reduction. The next year, another lay-off was preceded by the second annual peer performance appraisal. It seems likely that employees related the two events. The data in this study are the result of the third such appraisal. It is quite possible that the negative skew and lack of variability in the performance ratings reflect a more cautious approach by employees in the evaluation of co-workers.

Other Issues

Response Bias

Anastasi (1982) discusses the inherent possibility that self-report inventories may be biased toward socially desirable answers. ~~It~~ It is not difficult to imagine that employees, despite promise of confidentiality by the researcher, may opt to supply answers that make them look

good, "just in case" the information ends up in the employer's hands. Thus, on the Job Descriptive Index, where attitudes toward work are measured, some employees may not have provided a true measure about how he/she really feels about the immediate supervisor or co-workers. In another instance, the deception may not be deliberate. For instance, there may be a discrepancy about perception of exercise frequency and how much exercise an individual really participates in.

Conclusion

Although no relationship between physical fitness and performance/satisfaction was demonstrated in this study, attempts to do so should continue. If possible, rigorous experimental designs should be utilized so that valid conclusions based on empirical evidence can be drawn. For reasons already cited, little conclusive evidence of the benefits of exercise on performance/satisfaction currently exists. However, a recent study by Tenneco, Inc. ("New Fitness Data," 1984; Bernacki & Baun, 1984) of 3,231 white collar workers, demonstrated a significant positive relationship between exercise adherence and above-average job performance scores. Interestingly, for poor job performers there was a negative correlation with fitness which strongly suggests other unaccounted-for variables. Also found were significant reductions in absenteeisms and medical cost reimbursements in the case of exercising women.

Hoffman and Hobson (1984) draw on some simpler studies to support the notion of the benefit to employers of physically fit employees.

To convince employers of this and to gain their cooperation in promoting wellness cultures within organizational settings, research would ideally focus on the benefits to the bottom line. This would entail gathering baseline "hard" data including absenteeism, tardiness, productivity, health care costs, performance ratings, etc. and perceived stress levels, satisfaction, etc., of employees. Employees would then be randomly divided into control and experimental groups with the experimental group participating in an exercise program. The control group would participate in unaerobic exercise (without the cardiovascular component) such as floor calisthenics or working out on body-building equipment. In that way both groups would have a belief of benefit accrual. This controls for the potential confounding of results due to psychological benefit only. Post-measures of all variables would be gathered and within-group as well as between-group comparisons made. Focusing on within-group comparison controls for individual differences in stress management. If exercise does have a positive effect on the measured variables, such an effect might show up when individuals are utilized as their own controls.

Any research which depends so heavily on subjective independent and dependent measures is fraught with potential confoundings. ~~✗~~ Motivating a random sample to participate in, and stick with, an exercise program is another difficulty. ~~✗~~ Perhaps the drop-outs are those who treat stress symptomatically; in perceiving that their underlying stressors have not been resolved, they quit. It may be possible to learn something from this subgroup if appropriate measurement criteria could be identified. If these individuals measure high on stress factors and low on performance, for example, they can be singled out for counseling in how to cognitively deal with their stressors. Or, it may come to light that a particular drop-out group works in a single division with common work-related stressors.

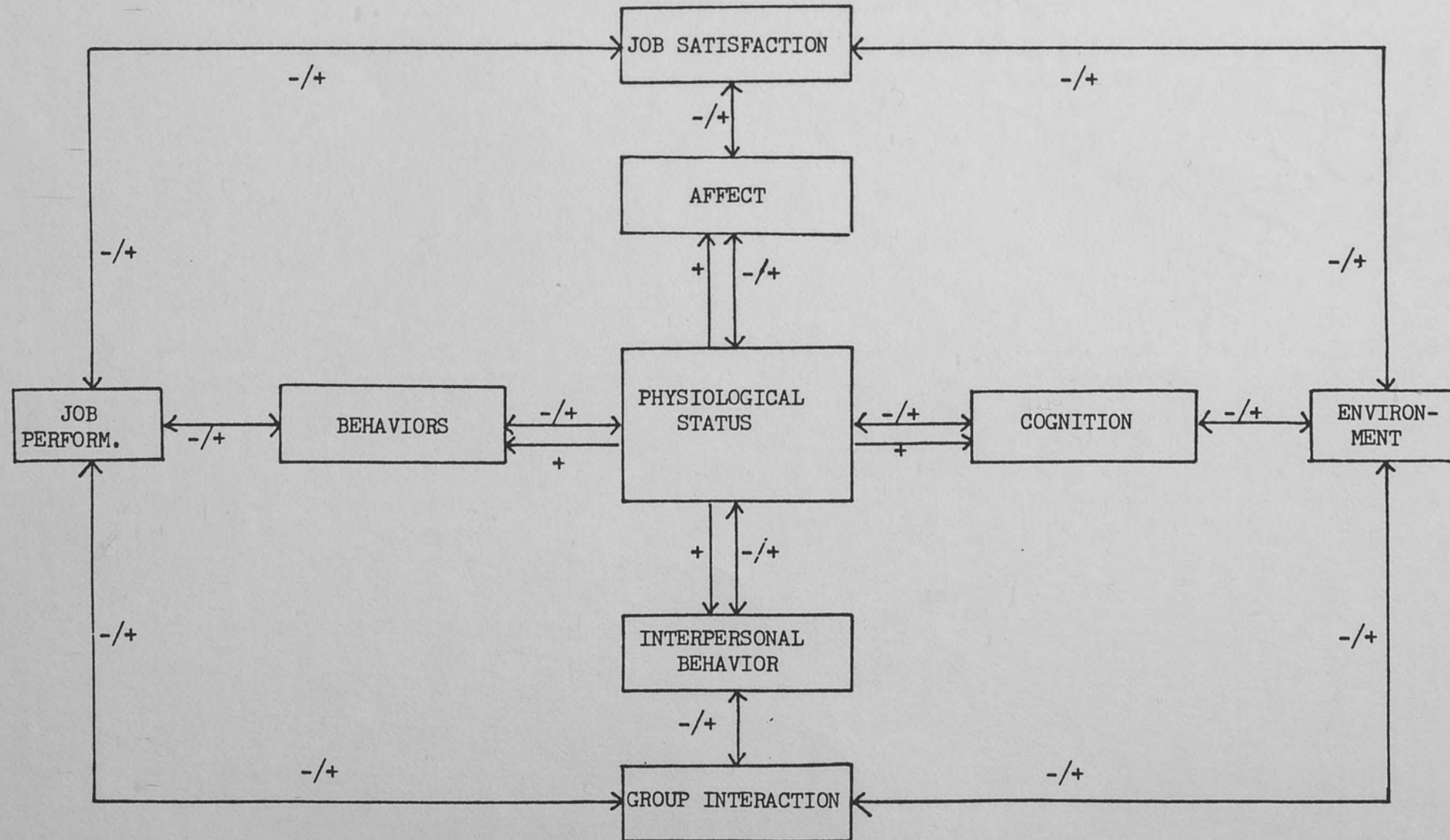
~~✗~~ Although results of this study do not support the hypothesis that fitness levels are related to either performance or satisfaction, there is sufficient data from other studies to suggest that an organization is well served if exercise facilities become part of the working environment. ~~✗~~ If that is not feasible, educational programs could be implemented on a regular, systematic basis. Additionally, physically fit employees could be accorded some type of recognition. The goal would be to create a

company norm of physical fitness so that eventually a good majority of employees will be physically fit.

In summary, physical fitness for its own sake is a worthy objective. Stress, in addition, continues to escalate and efforts should continue to establish an empirical link between the two. The inherent difficulties, it is hoped, will provide challenge rather than determent. Furthermore, people are living and working longer. And because so much of one's time is spent in the workplace, organizations have potential influence in promoting wellness (including physical fitness). This creates an ideal environment for the continued study of stress, fitness and performance/satisfaction. More critically, perhaps, organizations have the opportunity to educate and encourage employees to identify and manage stress through whatever effective means have been identified of which exercise is only one. It is hoped that more and more employers will do so.

APPENDIX A

INTERACTIVE PROCESS MODEL OF STRESS CORRELATES



- signifies stress state; + signifies stress reduction/absence. Arrows indicate directional stress flow. The arrows marked by a + only, reflect stress reduction after exercise. Hypothetically, this positive effect continues onward to all other variables.

APPENDIX B

THE JOB DESCRIPTIVE INDEX

CODE NUMBER _____

Company _____

City _____

Please fill in the above
blanks and then turn the
page.

Think of your present work. What is it like most of the time? In the blank beside each word given below, write

Y for "Yes" if it describes your work

N for "No" if it does NOT describe it

? if you cannot decide

.....

WORK ON PRESENT JOB

- Fascinating
- Routine
- Satisfying
- Boring
- Good
- Creative
- Respected
- Hot
- Pleasant
- Useful
- Tiresome
- Healthful
- Challenging
- On your feet
- Frustrating
- Simple
- Endless
- Gives sense of accomplishment

Go on to the next page

Think of the pay you get now. How well does each of the following words describe your present pay? In the blank beside each word, put

Y if it describes your pay

N if it does NOT describe it

? if you cannot decide

.....

PRESENT PAY

_____ Income adequate for normal expenses

_____ Satisfactory profit sharing

_____ Barely live on income

_____ Bad

_____ Income provides luxuries

_____ Insecure

_____ Less than I deserve

_____ Highly paid

_____ Underpaid

Now please turn to the next page

Think of the opportunities for promotion that you have now. How well does each of the following words describe these? In the blank beside each word put

Y for "Yes" if it describes your opportunities for promotion

N for "No" if it does NOT describe them

? if you cannot decide

.....

OPPORTUNITIES FOR PROMOTION

_____ Good opportunities for promotion

_____ Opportunity somewhat limited

_____ Promotion on ability

_____ Dead-end job

_____ Good chance for promotion

_____ Unfair promotion policy

_____ Infrequent promotions

_____ Regular promotions

_____ Fairly good chance for promotion

Go on to the next page

Think of the kind of supervision that you get on your job. How well does each of the following words describe this supervision? In the blank beside each word below, put

Y if it describes the supervision you get on your job

N if it does NOT describe it

? if you cannot decide

.....

SUPERVISION ON PRESENT JOB

- Asks my advice
- Hard to please
- Impolite
- Praises good work
- Tactful
- Influential
- Up-to-date
- Doesn't supervise enough
- Quick tempered
- Tells me where I stand
- Annoying
- Stubborn
- Knows job well
- Bad
- Intelligent
- Leaves me on my own
- Around when needed
- Lazy

Please go on to the next page

Think of the majority of the people that you work with now or the people you meet in connection with your work. How well does each of the following words describe these people? In the blank beside each word below, put

- Y if it describes the people you work with
N if it does NOT describe them
? if you cannot decide

.....

PEOPLE ON YOUR PRESENT JOB

- Stimulating
- Boring
- Slow
- Ambitious
- Stupid
- Responsible
- Fast
- Intelligent
- Easy to make enemies
- Talk too much
- Smart
- Lazy
- Unpleasant
- No privacy
- Active
- Narrow interests
- Loyal
- Hard to meet

JOB IN GENERAL

Think of your job in general. What is it like most of the time? In the blank beside each word given below write

Y for "Yes" if it describes your job

N for "No" if it does NOT describe it

? if you cannot decide

___ Pleasant

___ Bad

___ Ideal

___ Waste of time

___ Good

___ Undesirable

___ Worthwhile

___ Worse than most

___ Acceptable

___ Like to leave

___ Better than most

___ Disagreeable

___ Makes me content

___ Inadequate

___ Excellent

___ Rotten

___ Enjoyable

___ Poor

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Revised, January, 1982.

APPENDIX C

FITNESS SURVEY

Sex: M F Age: _____ Date: _____ Years with Company: _____ TEAMS Rating: _____

Management: _____ Professional: _____ Non-Exempt: _____ Budget # _____

EXERCISE DATA

Please indicate below types of physical activities you have regularly engaged in during the past year. List the number of days each week you do the activity and the average amount of time you spend on each activity per day.

Example:

<u>Activity</u>	<u>Days/Week</u>	<u>Distance</u>	<u>Units</u>	<u>Duration (hrs,min,sec)</u>
Jog/Run	3/week	2.50	miles	:23:30
Tennis(s)	6/week	3.0	games	2:00:00

<u>Activity</u>	<u>Days/Week</u>	<u>Distance</u>	<u>Units</u>	<u>Duration</u>
Jog/Run	/	___ . __	Miles	__ : __ : __
Walk	/	___ . __	Miles	__ : __ : __
Stationary	/	___ . __	Steps/min	__ : __ : __
Running	/	___ . __	Miles	__ : __ : __
Cycling	/	___ . __	Miles	__ : __ : __
Station	/	___ . __	Miles	__ : __ : __
Cycling*	/	___ . __		__ : __ : __
Swimming	/	___ . __		__ : __ : __
Tennis(s)	/	___ . __	games	__ : __ : __
Tennis(d)	/	___ . __	Games	__ : __ : __
Badminton	/	___ . __	games	__ : __ : __
(singles)	/	___ . __	games	__ : __ : __
Badminton	/	___ . __	games	__ : __ : __
(doubles)	/	___ . __	games	__ : __ : __
Stair	/	___ . __	steps	__ : __ : __
Climbing	/	___ . __	holes	__ : __ : __
Golf	/	___ . __	holes	__ : __ : __
Calisthenics	/	___ . __	**	__ : __ : __
Skip	/	___ . __	**	__ : __ : __
Rope	/	___ . __	**	__ : __ : __
Hockey	/	___ . __	**	__ : __ : __
Soccer	/	___ . __	**	__ : __ : __
LaCrosse	/	___ . __	**	__ : __ : __
Football	/	___ . __	**	__ : __ : __
Skiing	/	___ . __	**	__ : __ : __
Volleyball	/	___ . __	**	__ : __ : __
Handball	/	___ . __	**	__ : __ : __
Squash	/	___ . __	**	__ : __ : __
Wrestling	/	___ . __	**	__ : __ : __

Other:

_____	/	___ . __	**	__ : __ : __
_____	/	___ . __	**	__ : __ : __

* = enter body weight in distance column; resistance in units column.

** = the following activities require duration information only

TFP: _____

APPENDIX D



From : Human Resources/MC-240
WIN : 439-2130 or 439-2128
Date : June 24, 1985
Subject: Survey Questionnaire

To : All Westinghouse Associates (Orlando)

We have been working with Dr. Janet Turnage of The Industrial Psychology faculty at The University of Central Florida to prepare a survey to assist us in developing a stress management program for all Orlando associates.

Accordingly, on Wednesday, June 26th, you will receive in the inter-office mail, the survey questionnaires and necessary instructions. It should take approximately 30 minutes to complete the surveys.

You will note in the instructions that the completed surveys are to be returned to Dr. Turnage. The confidentiality of your response is guaranteed. The only data to be shared with Westinghouse is aggregate (averages and composites) data.

Your answers and opinions are important; this data will be the basis for our future actions regarding stress management program development. Therefore, we urge you to take the time to be responsive.

Please return the surveys to Dr. Turnage, MC-240, no later than Friday, June 28th.

Mary Anne Ciavatta, R.N.

Mary Anne Ciavatta
Human Resources
Administrator/Nurse

Andy Workum

Andy Workum
Human Resources
Development, Manager

Enclosures

MAC/AW:1h

APPENDIX E

CONSENT FORM

To The Participant:

PURPOSE:

The information requested on the following forms is for scientific research purposes only. It is to learn in what way exercise is related to overall performance within the organization and whether exercise makes any difference in how various job aspects are viewed.

PROCEDURE:

- 1) Fitness survey: Please indicate the demographic data where indicated: sex, age, years with company and the position you hold. Also, please fill in your most recent, overall performance appraisal score in the appropriate place. Then, please list the type of exercise you regularly engage in, how many days per week you do this exercise, and how much time you spend doing it.
- 2) Job Descriptive Index: On this form are adjectives describing various job aspects. Please mark "Y" if you agree that that particular word describes your job situation, an "N" if it does not, or a "?" if you can not decide either way.

PLEASE NOTE THE FOLLOWING:

1. Participation is on a strictly voluntary basis. There will be no prejudice if you decide not to participate and you may also withdraw at any time without prejudice.
2. Only the researcher will have access to the information on an individual basis. Any information shared with the employer will be aggregate data (averages and composite numbers) only.
3. The purpose of this consent form is to inform, as well as protect the privacy of, all concerned in accordance with the standards and ethics of the American Psychological Association. These forms will remain in the researcher's possession in a separate file after collection.

Monica Samanic 6/24/85
 Researcher Date

I understand the nature of this study and agree to participate. I understand that participation is voluntary and that I may withdraw at any time without prejudice:

 Participant

 Date

PLEASE RETURN THIS FORM WITH YOUR COMPLETED SURVEYS

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