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Stress and stress management among geoscientists in the U.S. petroleum industry, August 1984: An analysis

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STRESS AND STRESS MANAGEMENT AMONG GEOSCIENTISTS IN THE U.S. PETROLEUM INDUSTRY, AUGUST, 1984: AN ANALYSIS

BY

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ABSTRACT

For the past three years, employment in the petroleum industry has declined significantly. This, along with many other factors, has created a potentially stressful situation similar to the petroleum industry recession of the late 1950s. A four page "Stress Questionnaire" mailed to 1000 geoscientists in the U.S. petroleum industry in August, 1984, concludes that geoscientists appear to be coping very well with their potentially stressful situation.

These geoscientists rated themselves considerably up-to-date with respect to their professional discipline and show a strong need to grow and develop. They are very personally involved in their work and at least some of the major satisfaction in their lives comes from work, yet they have other important activities outside of work.

Among the 504 respondents (50.4% response rate, excluding retirees and blank responses), the majority are not overly depressed, anxious, or resentful; and they have high levels of self-esteem and hope for the future. However, many indicated a need for stress and stress management seminars.

The three main stressors among petroleum geoscientists are (1) meeting time schedules, (2) too much work/too little time, and (3) lack of proper resources. Their major methods of coping with stress are (1) physical exercise, (2) talking

with a friend, and (3) analyzing and eliminating the cause of stress. If time and opportunity were available, geoscientists would (1) exercise, (2) rest and relax, and (3) apply time management techniques to cope with stress.

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I. INTRODUCTION

A. BACKGROUND

In the past 40 years the United States petroleum industry has experienced a series of cycles. Several factors, such as the demand for petroleum products, government regulations, the Organization of Petroleum Exporting Countries (OPEC) activities, and worldwide oil and gas production, have influenced these up and down times. All of these factors directly or indirectly affect the price of petroleum and, as shown in Figure 1., the price of petroleum has had a close correlation to employment in the petroleum industry for the past 15 years. In 1981 the price for crude petroleum soared to a peak of $31.77/barrel. Shortly thereafter, in 1982, employment in petroleum exploration, production, and refining hit an all time high of 438,000 employees. Within two short years, the employment dropped off to 407,000, a loss of 30,600 employees, or approximately a 7% decline. A decline in price preceded this drop in employment with an average annual 1984 price of $26.10 per barrel of crude petroleum.

B. THE NATURE OF THE PROBLEM

How has this recent decline in the petroleum industry affected its employees, in particular its geophysicists and

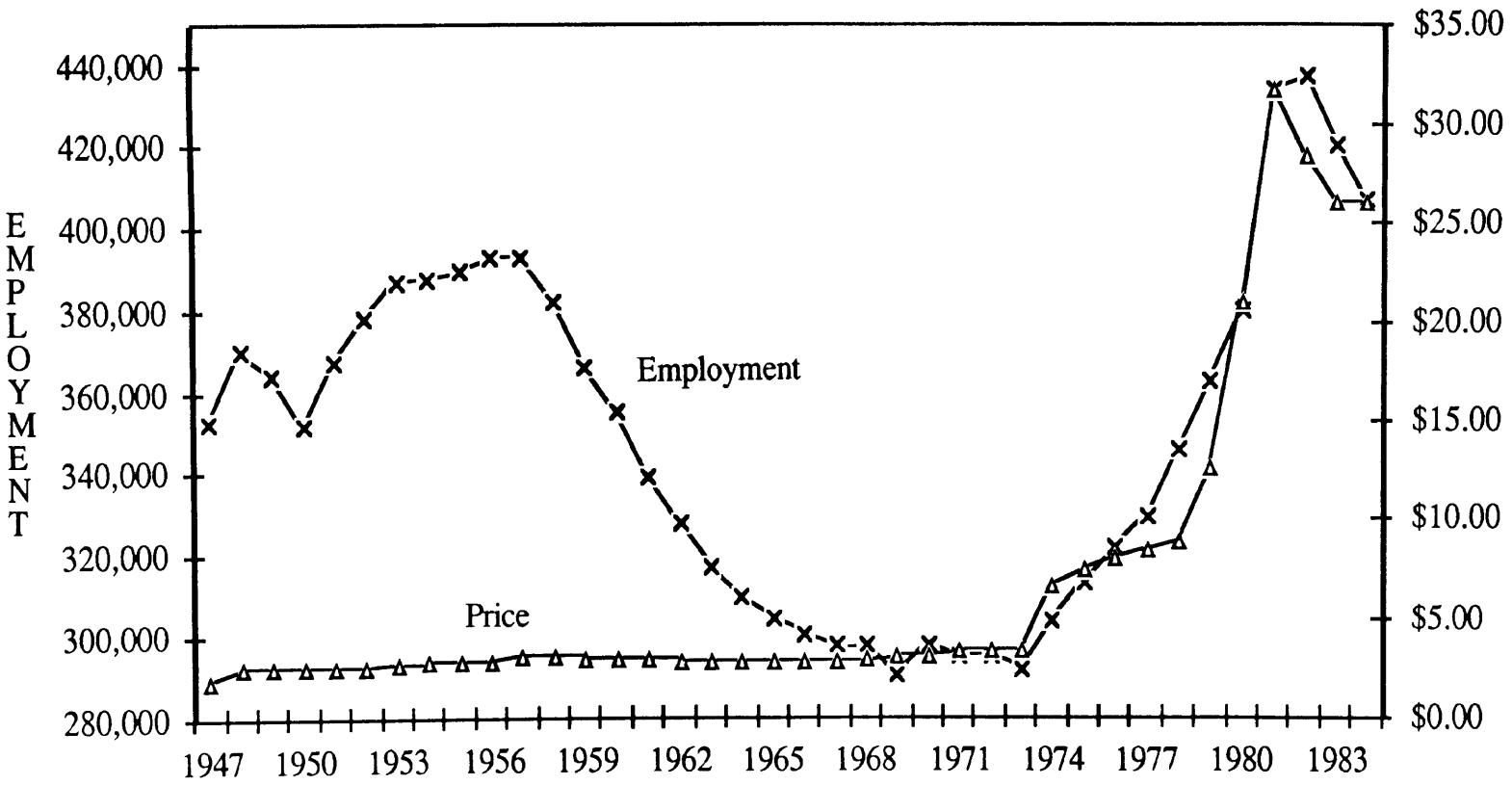

Figure 1. U.S. Average Annual Petroleum Employment and Price, 1947-1984

geologists? Do they find themselves in a stressful situation? Are they confident of their technical abilities? Is work the most important thing in their life? What are their key stressors? How do they cope with everyday stress?

C. OVERALL OBJECTIVE

In an attempt to answer some of these and other questions, the author conducted a nationwide survey in August, 1984, relating to stress and stress management among geoscientists in the petroleum industry. This thesis is an analysis of the results of this survey.

II. REVIEW OF LITERATURE

Much has been written during the past several decades about stress and stress management. However, very little research has been conducted in this area with regard to engineers, scientists, and in specific, geoscientists.

Many different approaches and terminology have been applied to stress and coping with stress. The American Heritage Dictionary defines stress as the "importance, significance, or emphasis placed upon something" and distress as "to cause anxiety or suffering . . . to worry or upset." In the context of this paper, stress and distress will be defined in accordance with the American Heritage Dictionary definitions. Eustress will be defined as positive stress, the stress of achievement, triumph, and winning (Selye, 1974). Stressors are the stimulus or pressure factors to which our bodies respond.

Almost all sources agree that stress is a necessity to lead a normal, productive, and healthy life. For the human body to function properly physically and chemically, a certain amount of stress is essential. The body reacts the same chemically to eustress, positive stress, as it does to distress, negative stress (Romanos, Wise, and Sewards, 1982). Therefore, to fuction properly, the type of stress is not nearly as important as the amount of stress.

Often eustress and distress can be the same thing. For instance, meeting a time schedule can be a eustress, a stimulant to accomplishing and completing a project. If this time schedule were extremely short for the intended project, it could function as a distress, applying too much pressure on an individual. Obviously not all individuals react the same to the same stressors and the same amount of stress. It has been suggested by psychologists and researchers that engineers and scientists have greater demands in their jobs that create higher levels of stress (Badawy, 1983). These demands include the demand to produce, the demand to create, the demand to develop, and the demand to maintain areas of expertise in rapidly advancing high technology sciences. Another demand many engineers and scientists face is the responsibility to manage other engineers, scientists, and technicians.

In 1983, lost productivity in United States companies caused by stress which resulted in psychological problems is estimated to be over $17 billion (Badawy, 1983). Physical disorders resulting from stress, such as cardiovascular diseases, ulcers, strokes, and chronic fatigue cost companies another $60 billion a year (Badawy, 1983). This stress may or may not be caused primarily by a job situation or work environment, but the results of the stress do affect the individual's work performance and the company's productivity.

At the other end of the spectrum, too little stress can cost the company money also. Equitable Life conducted a study in which they discovered 16% effectiveness was lost in individuals experiencing low levels of stress. This is approximately equivalent to 20% of the employee's salary and even greater than 20% if the employee is a manager (Production Engineering, 1984).

Companies are beginning to recognize the fact that stress among their employees is a key factor to the success and profitability of their companies. NCR Corporation of Dayton, Ohio, has implemented an Employee Assistance Program in which employees may confidentially and at company costs consult with professional counselors concerning personal and/or work related problems. The objective is for each employee to reach his or her full job potential. NCR has found this program to benefit both the company and the employee. Managers at NCR have found this program useful as a supervisory tool in deterring employee inefficiency. NCR employees have utilized and taken advantage of the program, mostly on a volunteer basis. Extremely positive feedback from the employees has been the result (Production Engineering, 1984).

Most researchers and authors have suggested that whereas in many cases stress (distress) cannot be completely eliminated, it can be reduced. Some options are better management and more informed management. Exercise, outside

interests and a healthy diet also contribute to lower levels of distress. Other crucial factors are recognizing one's own work patterns and stress producers and adjusting accordingly, and clear communication between subordinate and boss concerning job roles, job functions, and career expectations.

Those who experience extremely low levels of stress on a regular basis are probably underemployed. This is a common phenomenon during recession times and it is especially difficult for the highly educated to contend with due to the fact that these individuals are usually thinkers and are often times frustrated with too little opportunity for creativity or too much time on their hands. The term underemployment is used to describe any employed individual who is more highly skilled than the job requires. This is an area of study that has been receiving more attention in recent years.

Economic situations can also be a source of stress. Since 1981, it is estimated that one quarter of the 20,000 independent wildcat drillers declared bankruptcy, folded, or were bought by larger companies or conglomerates (Ivey, 1985). This is a result of the current recession in the petroleum industry.

At the present time, one million Americans call in sick every day (Rutz, 1985). That is one out of every 200 people in the United States work force. Many of these

illnesses may be stress induced by our fast paced society and constant exposure to events, decision making, and future uncertainties.

Geoscientists are subject to many of the same stressors as are other engineers, scientists, and other professionals and nonprofessionals; however, what these stressors are, how intense they may be, and how petroleum geoscientists react to and cope with these stressors has not previously been researched or analyzed.

III. DEFINITION OF RESEARCH

A. SAMPLE SIZE AND SELECTION

One thousand geologists, geophysicists, geological engineers and other geoscientists were randomly selected from various petroleum, particularily geophysical petroleum, sources. Geographic locations encompassed 36 states, including Alaska and Hawaii, with the majority in Texas, Oklahoma, Colorado, and California.

B. RESPONSE RATE

Five hundred and fourteen (51.4%) responded to the questionnaire. This is a significantly high response rate in light of the fact that no monetary or other incentives were used. Some researchers have attempted to set response rate standards to determine the degree of reliability of individual surveys. This has been a difficult task to accomplish, however, due to the variety of questionnaires, sample and sample sizes, the nature of the research, the type of analysis, and the sought after results. Valid responses range anywhere from 10-15% to 100%.

To collaborate with the high response of personal interviews, the American Research Foundation recommends an 80% response rate for mail surveys to be representative and reliable. Paul Erdos, a professional mail surveyor, has set a negative response rate limit at 50%. Erdos does, however,

state that this 50% figure is a guideline and can vary depending on the survey and the nature of the research. It is the opinion of the author that for this particular survey a 25-30% response would have been more than adequate and representative of the whole industry.

To achieve the high response rates of 50-80-90%, researchers often enclose incentives of $0.25, $0.50, and $1.00 with the questionnaires. No such incentives were used in this survey, yet a high response was received, which indicates an interest on the part of the participants in stress and stress management in the petroleum industry.

Of the 514 respoondents, several were retired and a few stated that they have no stress and returned blank questionnaires. Age varied from 23 years to 85 years, with a mean age of 37.7 years, including retirees. The remainder of the analysis has been based on 504 responses, which is excluding retirees and blank questionnaires.

C. QUESTIONNAIRE COMPOSITION

The questionnaire itself is composed of five different parts. The first part is an attempt to determine the respondents' needs individually and with regard to employment for security, friendship, self-esteem, and development; and the degree of involvement and satisfaction derived from their work.

The second part consists of a self ranking in

professional obsolescence and nine areas of standard analysis such as self-esteem, anxiety, burden of responsibility.

The third part is composed of a list of 30 job related stressors. The respondents were asked to rank their top six stressors. This along with part five of the questionnaire are the most important and significant parts of this survey.

Part four is personal data information. Part five lists 20 ways of coping with stress. Respondents were asked to indicate methods they use now and methods they would use if time and opportunity were available.

All of these questions combined were chosen to determine job satisfaction, stress factors, methods of coping with stress, and geoscientists' needs in the petroleum industry. The work involvement, strength of needs, overall adjustment, and professional obsolescence questions were chosen and revised from several sources including "The Definition and Measurement of Job Involvement" (Lodahl and Kejner, 1965), "An Automated Self Report Technique" (Hunt, Schupp, and Cobb, 1966), "Obsolescence and Professional Career Development" (Kaufman, 1974), and "Professionals In Search of Work" (Kaufman, 1982).

The personal data section was developed specifically for this survey by the author; and the job related stressors and coping with stress lists were slightly altered from

standard lists of such data.

The cover letter and four page questionnaire sent to each of the 1000 geoscientists is contained in Appendix A.

IV. RESULTS

A. PERSONAL DATA INFORMATION

Eighty-nine percent of the respondents were male and 11% female; 75% are married and 25% single. The number of dependents ranged from 0 to 7, with a mean value of 1.6 dependents.

A Bachelor of Science degree was the most common level of education (48%). Thirty-one percent hold a Master's degree, 16% have a PhD, all have completed high school, and 4% have completed some college. The remaining 1% have a BA, MA, MBA, or MD.

Geophysics and geology rank the highest in the area of collegiate study. Forty-six percent studied geophysics, 28% geology, 11% physics, 5% mathematics, 2% geological engineering, and 10% other. One hundred and twenty-six individuals indicated a second area of study. Of these, 56% indicated geology, 17% mathematics, 11% physics, 5% geological engineering, 2% geophysics, and 9% other.

Years of experience ranged from one year to 67 years, with a mean value of 14.2 years.

The size of the company varied from a major (44%), to a small independent (19%), large independent (17%), subsidiary of a major (11%), and other (9%). Seventy percent of the respondents work for petroleum companies, 11% are consultants, 4% are in government work, 2% are self

employed, 2% are in academia, 2% in mining, and 9% other.

From this information the typical respondent, or the average geophysicist in the petroleum industry, is a married male approximately 38 years of age with two children. He majored in geophysics with a minor in geology, he holds a Bachelor of Science degree, has 14 years experience, 16 subordinates (7 professional and 9 nonprofessional), and he works for a major petroleum company.

Professional titles ranged from geologist and geophysicist to Chairman of the Board and President.

B. JOB STRESSORS

Stress in the work force is necessary and vital. Too little stress as well as too much stress results in inefficiency which means thousands of lost dollars to the company and dissatisfaction and frustration to the employee. There is a challenge in obtaining and maintaining a proper balance of stress for each individual.

The geoscientists responding to this questionnaire found meeting time schedules and too much work/too little time to be their main job related stressors. Other major stressors included lack of proper resources (facilities, people), lack of or miscommunication, lack of control and "real" authority, multiple repsonsibilities (disciplines and organiations), presentations, technical problems, lack of functional support, interpersonal relationships, job future

Table I.

Intrinsic To Job Stressors

Stressor	1	2	3	4	5	6	Total	Rank
1. Meeting time schedules	71	50	41	35	29	12	238	1
19. Too much work/ too little time	63	44	46	27	20	18	218	2
4. Lack of proper resources	39	33	35	32	30	22	191	3
11. Technical problems	27	20	31	23	19	22	142	7
25. Extremely fast pace	11	18	17	8	16	15	85	14
22. Extra time committment	7	13	8	11	13	10	62	19
21. Program responsibility	3	3	5	14	7	11	43	23
14. Work environment	3	5	9	9	12	4	42	24
20. Too little work/ too much time	2	2	7	7	4	2	24	28

Table II.

Role In Organization Stressors

Stressor	1	2	3	4	5	6	Total	Rank
15. Lack of Control	28	36	32	28	22	15	161	5
27. Job ambiguity	9	17	15	17	17	12	87	13
16. Performance appraisals (others)	1	18	8	11	12	15	65	18

Table III.

Career Development Stressors

Stressor	1	2	3	4	5	6	Total	Rank
3. Boss interference	25	17	21	9	14	11	97	10
17. Performance appraisals (self)	10	7	12	10	4	16	59	20
18. Salary	2	3	11	11	10	12	49	21

Table IV.

Organizational Structure Stressors

Stressor	1	2	3	4	5	6	Total	Rank
9. Lack of functional support	3	21	12	21	20	14	91	12
7. Company policies (restrictions)	12	15	15	14	12	12	80	15
5. Company policies	16	14	9	13	9	13	74	16
12. Meetings	6	20	14	8	1	4	71	17
2. Meeting budgets	9	12	5	7	3	9	45	22
8. Marketing support	2	3	4	6	1	4	20	29

Table V.

Relations Within Organization Stressors

Stressor	1	2	3	4	5	6	Total	Rank
28. Lack of or mis-communication	35	19	31	35	24	37	181	4
13. Presentations	34	18	22	21	16	26	137	8
10. Interpersonal relations	12	13	15	17	23	15	95	11
29. Competition	2	9	8	8	20	18	65	18
24. Interface with many people	2	5	6	8	9	5	35	25
23. *Constant exposure* to management	2	2	1	6	8	8	27	27

Table VI.

Organizational Interface With Outside Stressors

Stressor	1	2	3	4	5	6	Total	Rank
26. Multiple responsibilities	16	26	22	33	34	19	150	6
6. Customer interference and whims	4	5	7	7	4	5	32	26
30. Other comments	41	26	14	17	16	14	128	9

uncertainty, and poor or inadequate management.

The last two job related stressors, job future uncertainty (grouped together with company mergers) and poor or inadequate management were the top two write-in responses to this section (n=13 and n=11, respectively). These are not particularily high responses except for the fact they are write-in comments. This indicates concern in these two areas among the respondents.

Along these lines one individual commented "Insecurity in employment is directly due to the merger of Gulf with Chevron. It gives one the feeling of total hopelessness in one's career plans. My entire employment . . . has been under extreme insecurity."

However, others commented they do not feel they work in a high stress environment, and that they have very modest stress, if any at all.

Ranked at the bottom of job related stressors were constant exposure to management (some commented that too little exposure to management created stress in their job), too little work/too much time (although several consultants indicated this was a problem right along with too much work/too little time in the "feast or famine" work situation of many consultants), marketing support, interface with many people, program responsibility, and salary.

Whereas salary did not appear to be a major stressor, it was sometimes a source for other factors to be stressors.

One individual commented that his job was "an unintellectually stimulating job with no challenge or future, but with a salary so good you can't quit". Another expressed concern "because large dollar amounts are spent on ideas I originate from an inexact science".

Some of the other comments relating to job stressors were colleague incompetence and lack of committment (n=9), lack of time for outside activities (n=5), long commute (n=4), company transfers: too many (n=3), too few (n=2), and company or work place politicking (n=3). Four found travel to be a stressor while two found travel to be a method of coping with stress.

Working alone in isolated remote places, lack of company provided training, obvious favoritism of some employees, indecisiveness on the part of one's self or others, making errors, and government regulations and ambiguities are some of the other 128 write-in responses to "other" job related stressors.

These stressors can be subdivided into six major categories: (1) intrinsic to job, (2) role in the organization, (3) career development, (4) organizational structure, (5) relations within organization, and (6) organizational interface with the outside.

Four of the top ten stressors among petroleum geoscientists were intrinsic to job: meeting time schedules, too much work/too little time, lack of proper

resources (facilites, people), and technical problems. Job future uncertainty would also fall under this category. Of the remaining top ten stressors, lack of control and "real" authority pertains to role in the organization, lack of functional support fits under organizational structure, lack of or miscommunication and interpersonal relations are stressors involving relations within the organization and multiple responsibilities is a part of organizational interface with the outside.

Clearly, those stressors which are intrinsic to the job stand out as the major stressors to geoscientitsts in the petroleum industry. Surprisingly, career development ranked very low as a job related stressor.

Job stressors vary from individual to individual, but they also vary for the same individual at different time periods. One gentleman commented that "age affects many answers (to the questionnaire)--things changed priority-wise from 20 years ago". He regards his work as interesting but now finds that the "gung-ho" is gone and he now considers his family, friends, retirement plans, and financial security much more important.

Another gentleman, who retired at the age of 70 and is now 81, does not remember being under stress. Mr. H. W. Peace, II, Vice President of Hadson Petroleum Corporation's Exploration Division, experiences no stress, job related or otherwise. He enjoys his job, family, and leads a very

Table VII.

Methods of Coping with Stress - I

Method used now	Percent
1. Physical exercise	65.4
2. Talking with a friend of family member	54.7
3. Analyze and try to eliminate the cause of stress	53.9
4. Maintain a healthy diet and nutrition plan	52.9
5. Rest and relaxation	51.3
6. Learning not to worry	44.1
7. Quiet time alone	43.4
8. Mentally controlling stress levels	34.1
9. Confronting the source of stress	27.5
10. Prayer	18.8
11. Alcohol	17.6
12. Internalize the stress	17.2
13. Use of time management techniques	16.8
14. Smoking	11.9
15. Verbal aggression	11.1
16. Overeating	9.1
17. Meditation	8.5
18. Professional counseling	3.0
19. Tranquilizers	1.8
20. Physical aggression	1.6
21. Other	10.5

peaceful life.

Tables I. through VI. categorize the job stressor results according to stressors one through six (stressor 1 being the greatest stressor), total responses, and rank out of 30 job related stressors.

C. COPING WITH STRESS

Whether experiencing eustress or distress, an individual needs to respond to the chemical reactions taking place within one's body which are activated by the stress.

Therefore, the geoscientists were asked to indicate their present methods of handling stress and how they might cope with their existing stress if they had the time and opportunity.

From their responses, the most common method of coping with stress among geoscientists in the petroleum industry is physical exercise. Of the 65% that exercise, 59% participate in sports, 35% jog, 22% lift weights, aerobic exercising draws 20%, and 9% are involved in other exercise such as swimming, walking, golf, fishing, hunting, biking, tennis, raquetball, and other sports. Many participate in more than one athletic endeavor, therefore, these percentages do not total to 100%.

Fifty-five percent talk with a friend or family member to help cope with their every day stress. Fifty-four percent analyze and try to eliminate the cause of the

stress. Fifty-three percent maintain a healthy diet. Fifty-one percent opt for rest and relaxation. Forty-four percent are learning not to worry. Forty-three percent spend quiet time alone. One respondent noted that jogging is the equivalent of quiet time alone for him.

Thirty-four percent attempt to mentally control stress levels. Twenty-eight percent confront the source of stress. Nineteen percent use prayer as a method of coping with stress and eighteen percent use alcohol.

Seventeen percent internalize the stress; 52% with headaches, 36% with muscle tension, and 15% with ulcers. Seventeen percent use time management techniques, 12% smoke, 11% use verbal aggression, 9% overeat, 9% meditate, 3% seek professional counseling, 2% use tranquilizers, and 2% use physical aggression.

Some other methods of coping with stress employed by geoscientists are hobbies and outside interests, reading, music (both in listening and in playing), watching television (old John Wayne movies, sports, entertainment), vacationing, organizing, avoiding responsibility or stressful situations, rationalizing, and developing patience. One individual commented that his two year old daughter is a great stress reducer. Another responded that "you set priorities, do the best job you can, and learn not to worry about or apologize for not doing the impossible".

A third individual returned a blank questionnaire with

Table VIII.

Methods of Coping with Stress - II

Method if time and opportunity were available	Percent
1. Physical exercise	31.1
2. Rest and relaxation	19.6
3. Use of time management techniques	15.3
4. Analyze and try to eliminate the cause of stress	12.1
5. Quiet time alone	11.9
6. Learning not to worry	11.7
7. Maintain a healthy diet and nutrition plan	11.5
8. Mentally controlling stress levels	11.1
9. Confronting the source of stress	6.9
9. Meditation	6.9
10. Professional counseling	5.7
11. Talking with a friend or family member	5.4
12. Prayer	1.0
13. Alcohol	0.6
13. Verbal aggression	0.6
14. Overeating	0.4
14. Physical aggression	0.4
15. Internalize the stress	0.2
15. Smoking	0.2
16, Tranquilizers	0.0
17. Other	1.6

the comment, "I'm no longer employed by Gulf--in fact, I'm hiking the Pacific West Trail and have made it a point not to worry about money related matters for awhile--as long as I can afford it".

When asked how they would cope with stress if time and opportunity were available, many responded that they would continue using the same methods that they are presently employing. Of those that would do differently, the majority again said physical exercise (31%), with sports and jogging heading the list (36% and 33%, respectively). Twenty-one percent would attend aerobics classes, 21% would go for weight lifting, and 3% would be active in other exercise.

Twenty percent would rest and relax more often if time allowed, 15% would apply time management techniques if they had the opportunity, 12% would analyze and try to eliminate the cause of stress, 12% would spend quiet time alone, and 12% would learn not to worry. Eleven percent would maintain a healthy diet and 11% would try to mentally control stress levels.

Interestingly, 6% would seek professional counseling if time and opportunity were available. This is twice as many as the 3% that currently seek professional counseling.

Some have changed their method of coping with stress in recent years. One responded that "I didn't do some of these (methods of coping with stress) before I was layed off at a major oil company, but have learned now that I come

first and the company second". Another commented that the ways of coping depend on the amount of stress, and another believes that stress levels are much higher in big money making corporations (such as oil companies).

Still others replied that they do not consider their job to be stressful or, at least, they refuse to allow them to be. Others find stress to be a positive and invigorating influence, virtually nonexistent, or unenjoyable but could use stress to their advantage.

One repondent, who retired in 1970 and will soon be 85 continues to work on a volunteer basis. He comments that "I have been extremely fortunate in that in all of my career I have done only very interesting work . . . starting in the year 1917 up to the present, 1984". He survived the depression of the 1930's, the oil slump of the 1950's, and he currently has 30 patents to his name. His primary technique for coping with stress is working alone and doing what he does best, inventing, and staying away from administrating.

The results for coping with stress now and if time and opportunity were available are tabulated in Table VII. and in Table VIII.

Currently many petroleum companies and corporations are actively attempting to meet their employees needs in the area of coping with stress. Several petroleum companies now have swimming pools, jogging tracks, weight rooms, and

tennis courts available to their employees before and after work or during the lunch hour. Other companies have country club facilities available to their employees in the evenings and on weekends and holidays.

While some companies have courses in time management techniques, these are usually reserved for management personnel. There is a strong interest in this area among all levels of geoscientists and it would be advantageous for petroelum companies to take note of this fact. Time taken to achieve a balance of stress on the part of the company and on the part of the employee is important and well worth the time sacrificed.

The correct balance of stress is achieved when an individual is motivated (by eustress) but is not overly anxious or concerned (by distress).

D. OVERALL SATISFACTION

Individual and employment needs, work involvement, professional obsolescence, and socio-psychological questions were presented to the geoscientists to determine their overall satisfaction with life and work.

1. Personal Versus Employment Needs. Individuals differ in regard to the strength of needs, such as the need for security, developing friendships, self-esteem, and growth and development. Eight statements were presented to determine the geoscientists' needs in these areas

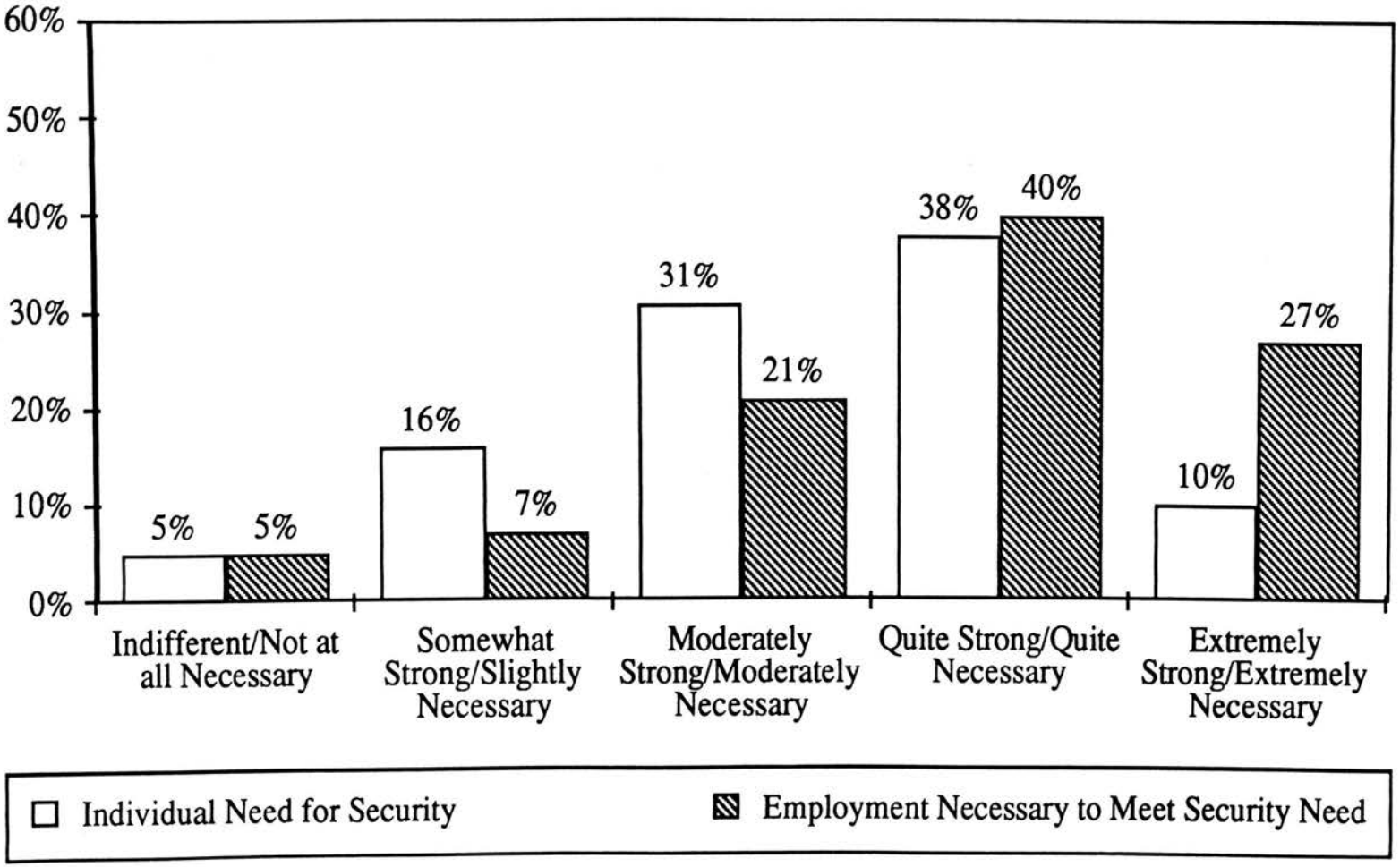

Figure 2. Comparison Between Individual Need for Security and Necessity of Employment to Meet Security Need

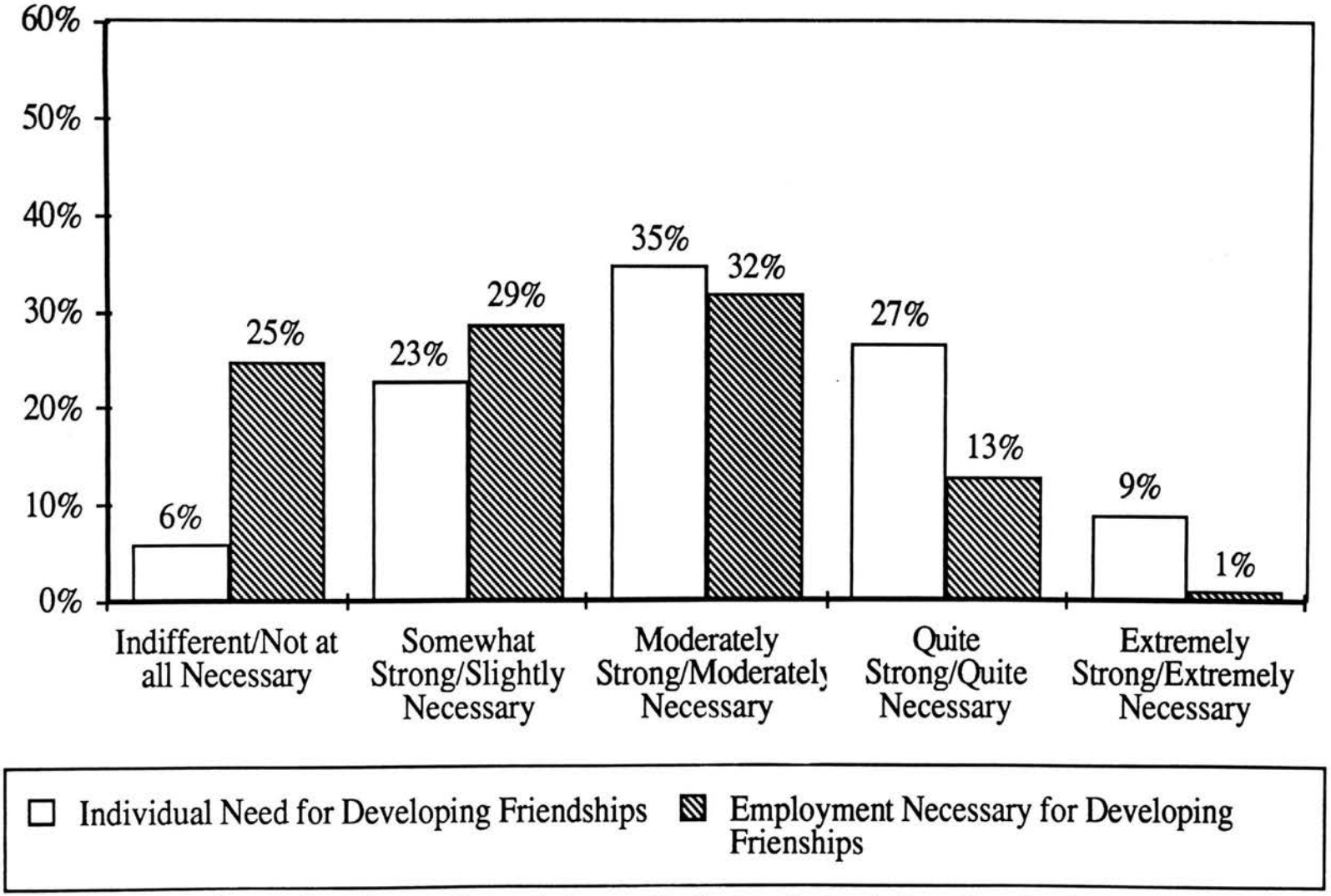

Figure 3. Comparison Between Individual Need for Developing Friendships and Necessity of Employment to Meet Need for Developing Friendships

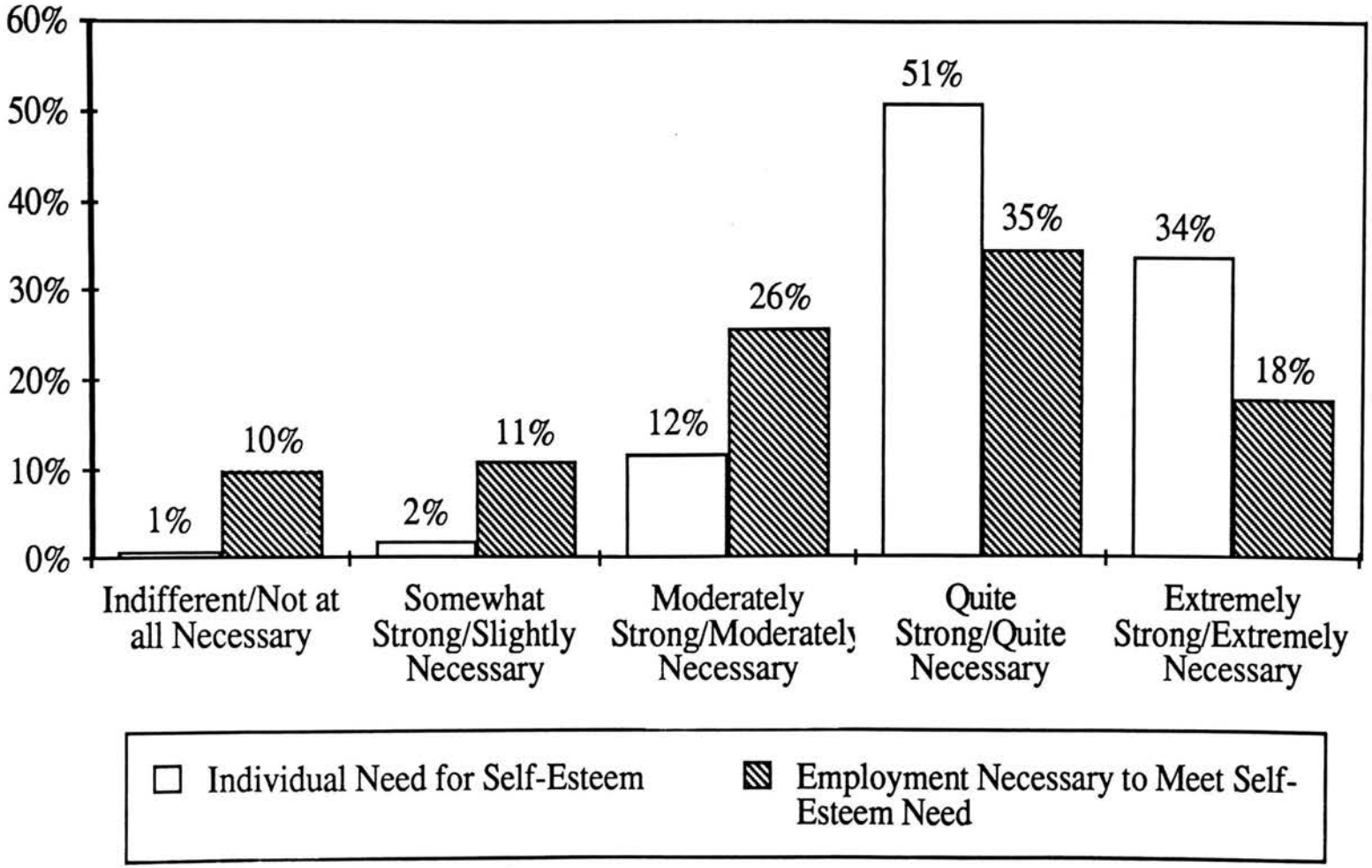

Figure 4. Comparison Between Individual Need for Self-Esteem and Necessity of Employment to Meet Self-Esteem Need

individually and with regard to employment.

The need to feel secure is quite to moderately strong among petroleum geoscientists and being employed is quite to extremely necessary for them to feel secure. Figure 2. is a graph of the results to the questions referring to individual security and employment security. These statistics indicate that employment is very important to geoscientists in their need for security.

Developing friendships and the necessity of employment for developing friendships are moderately strong needs in geoscientists' lives. A rather high percent (25%) responded that employment is not at all necessary for developing friendships. These results indicate that geoscientists have a moderate to strong need to develop friendships but that work is moderately to not at all necessary to meet this need. See Figure 3. for the complete results to the two developing friendship questions.

Self-esteem needs ranked high among geoscientists. Sixty-five percent of the respondents said that it is a quite strong to extremely strong need for the respondents to have self-esteem. However, 61% indicated employment is only quite necessary to moderately necessary to meet this self-esteem need. Therefore, self-esteem is a very important factor in most geoscientists' lives and employment is important to meet this need, but employment is not as important as the need itself (see Figure 4.).

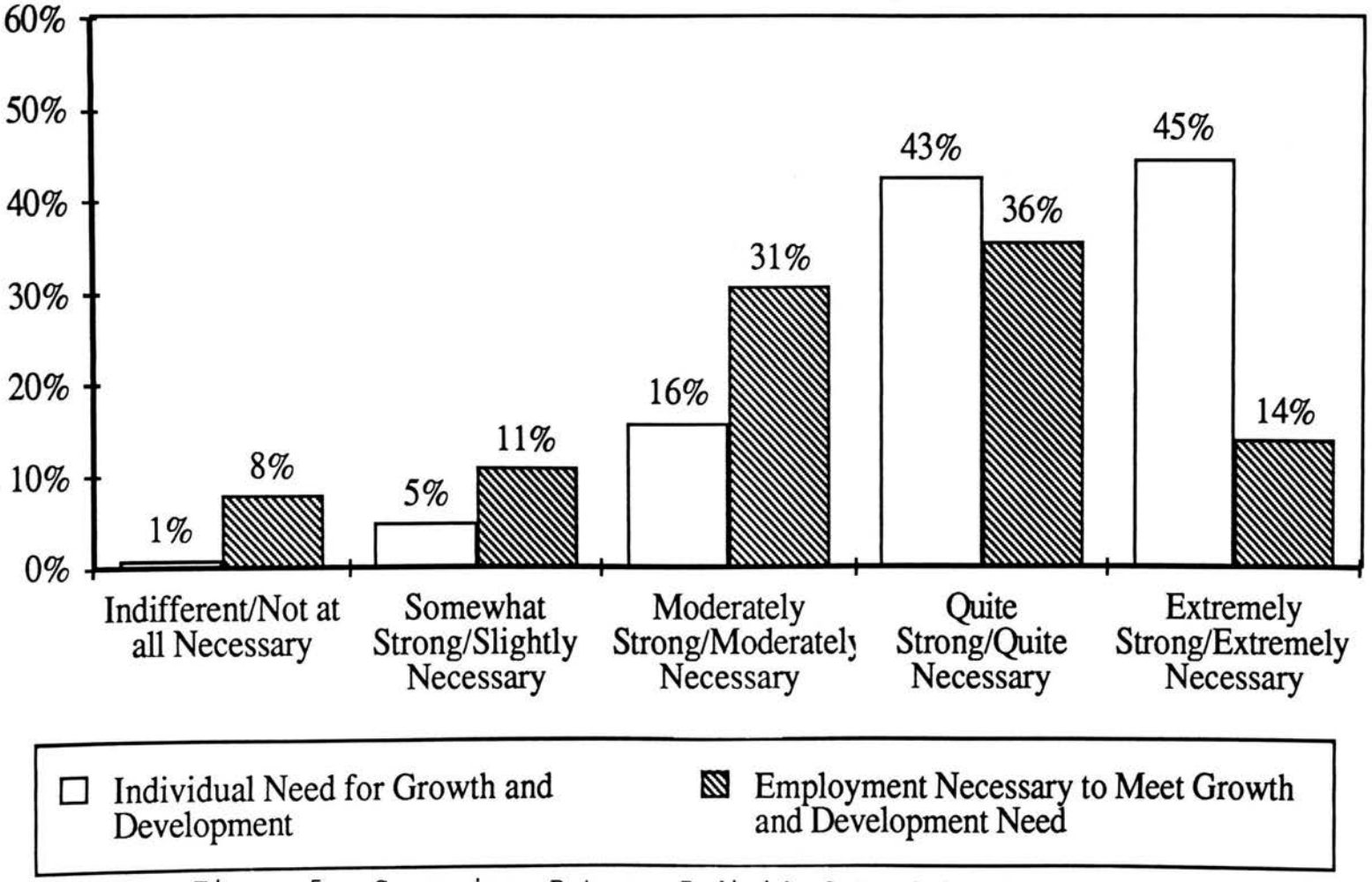

Figure 5. Comparison Between Individual Need for Growth and Development and Necessity of Employment to Meet Growth and Development Need

Responses to growth and development were similar to those of self-esteem. The geoscientists have a quite strong to extremely strong need to grow and develop whereas they find employment only quite necessary to moderately necessary to grow and develop (see Figure 4.).

2. Work Satisfaction. Six questions were instrumental in determining work satisfaction and work involvement. Responses varied considerably in this section.

In response to the first work satisfaction question, 34% tended to disagree that the major satisfaction in their life comes from work, 33% tended to agree. Fifteen percent were uncertain, 10% strongly agree and 8% strongly disagree. Therefore, geoscientists are fairly evenly split as to whether their major satisfaction in life comes from work. Refer to Figure 6. for a graphical representation of these percentages.

In response to the second work involvement question, 37% tended to disagree that their work is only a small part of who they are, while 30% tended to agree. Sixteen percent strongly agree, 10% are uncertain, and 7% strongly disagree that work is only a small part of who they are. Therefore, work is a significant part of many of these professionals' lives, yet a large percent find work to be a small part of their lives. Refer to Figure 7. for the graphical representation.

Most geoscientists do not believe that the most

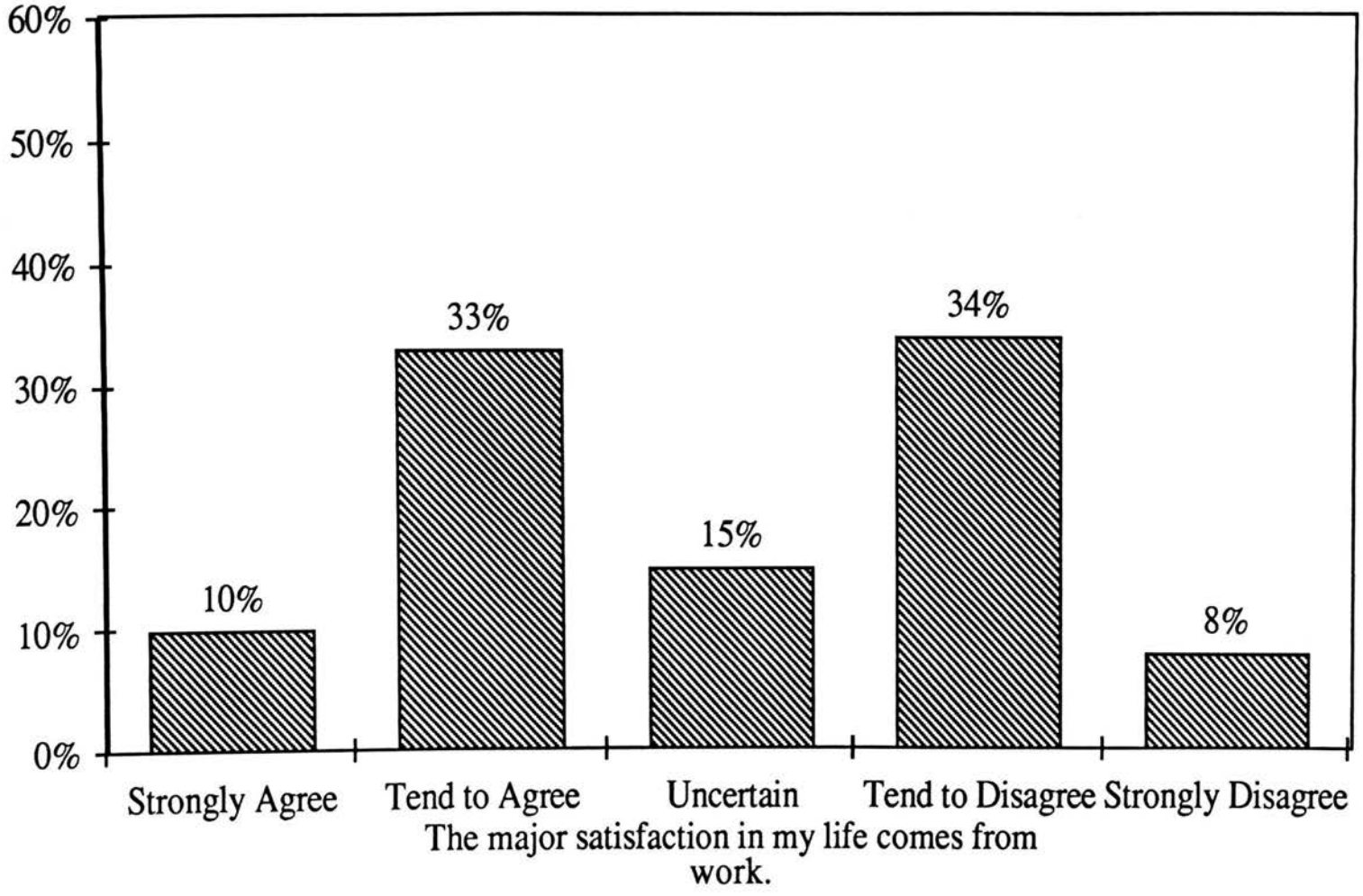

Figure 6. Work Satisfaction Instrument #1

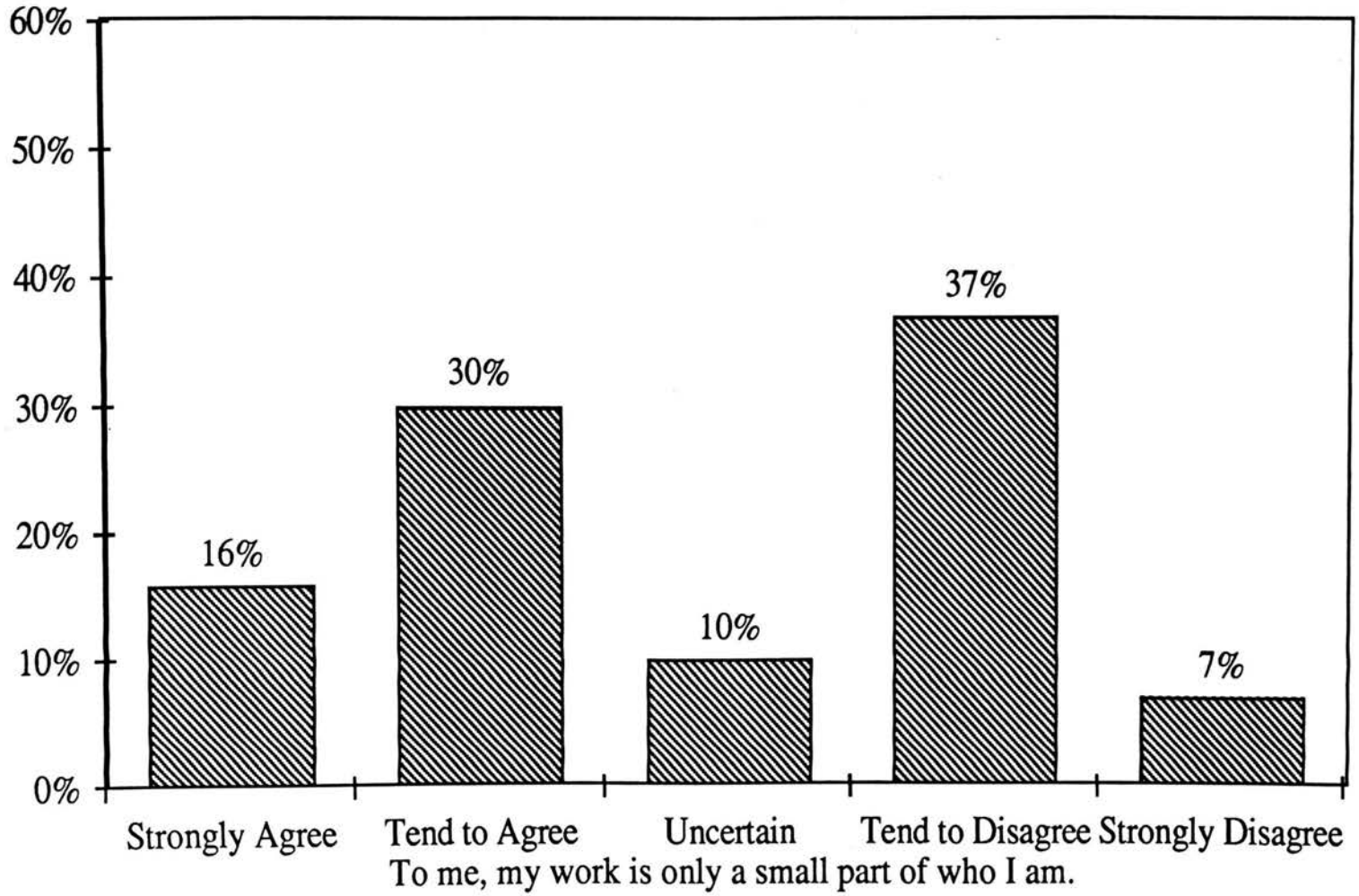

Figure 7. Work Satisfaction Instrument #2

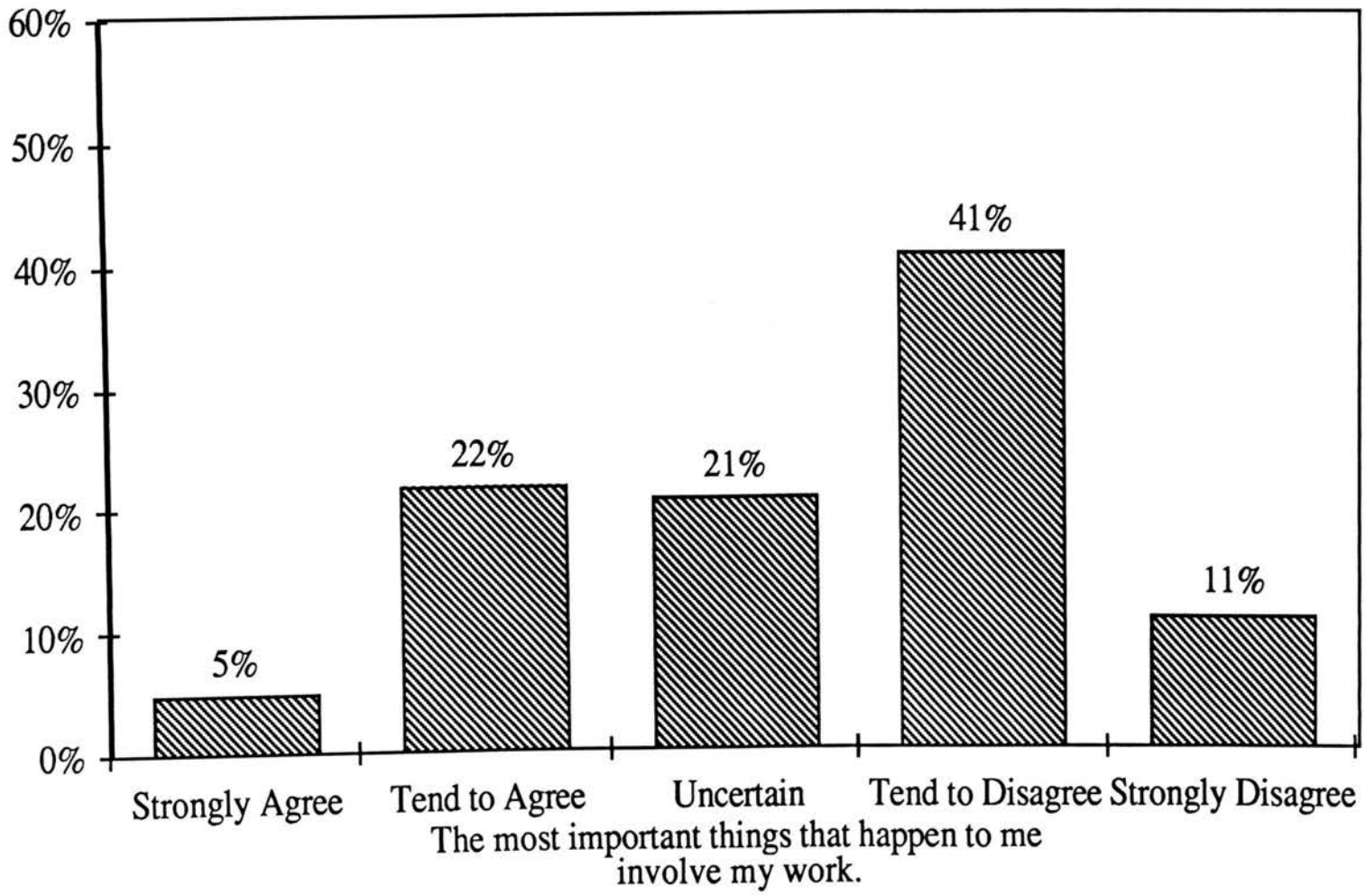

Figure 8. Work Satisfaction Instrument #3

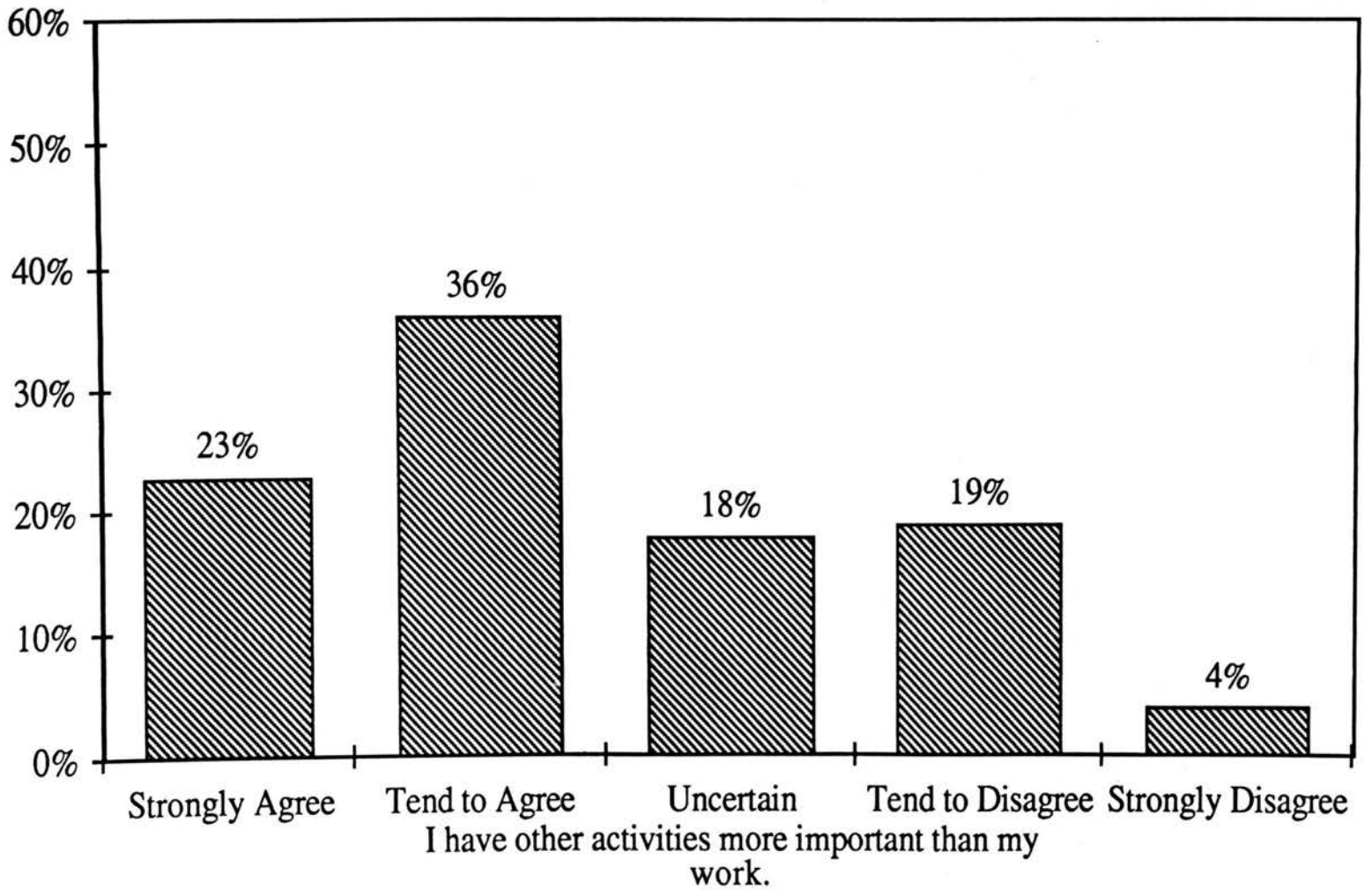

Figure 9. Work Satisfaction Instrument #4

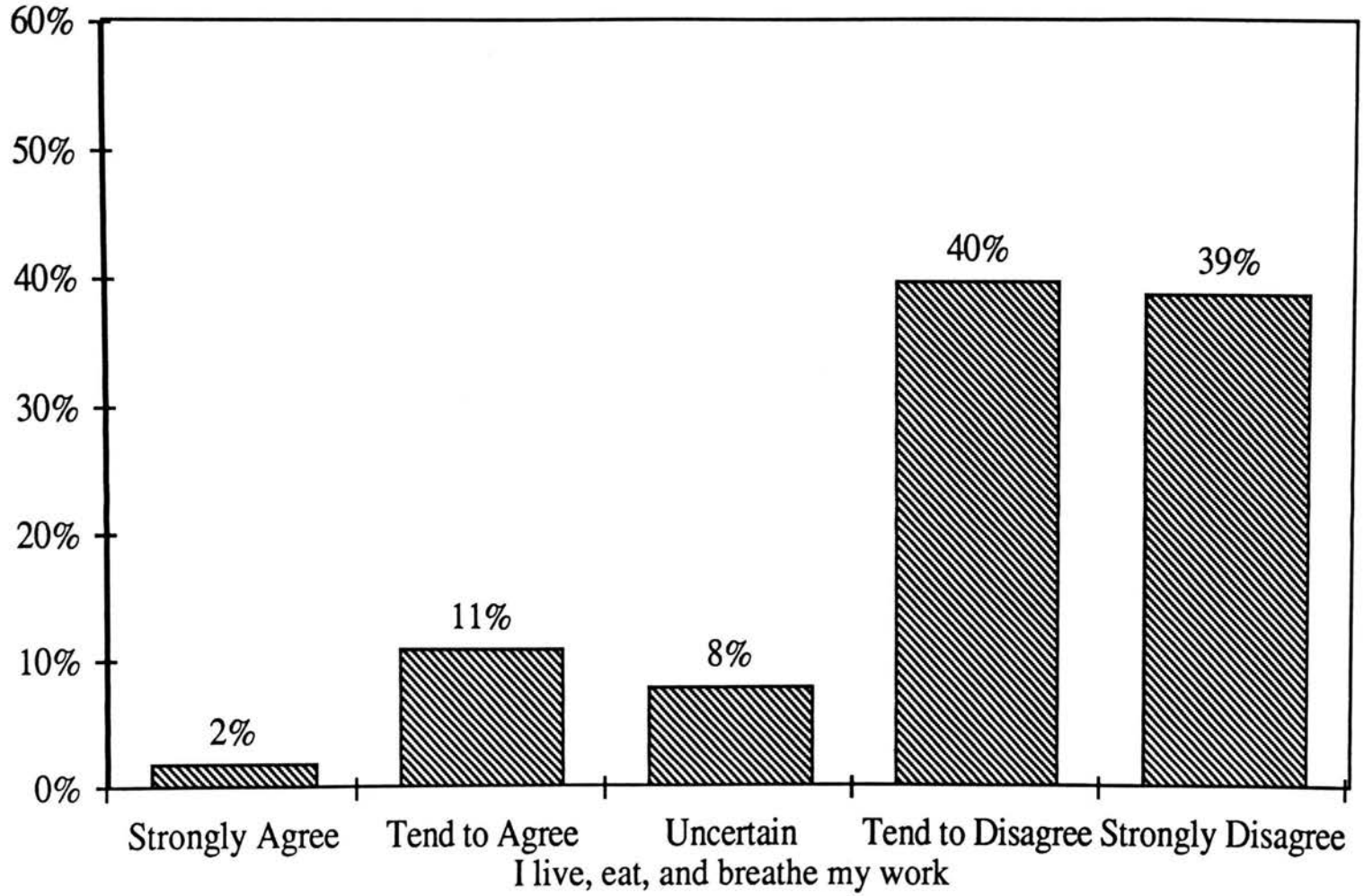

Figure 10. Work Satisfaction Instrument #5

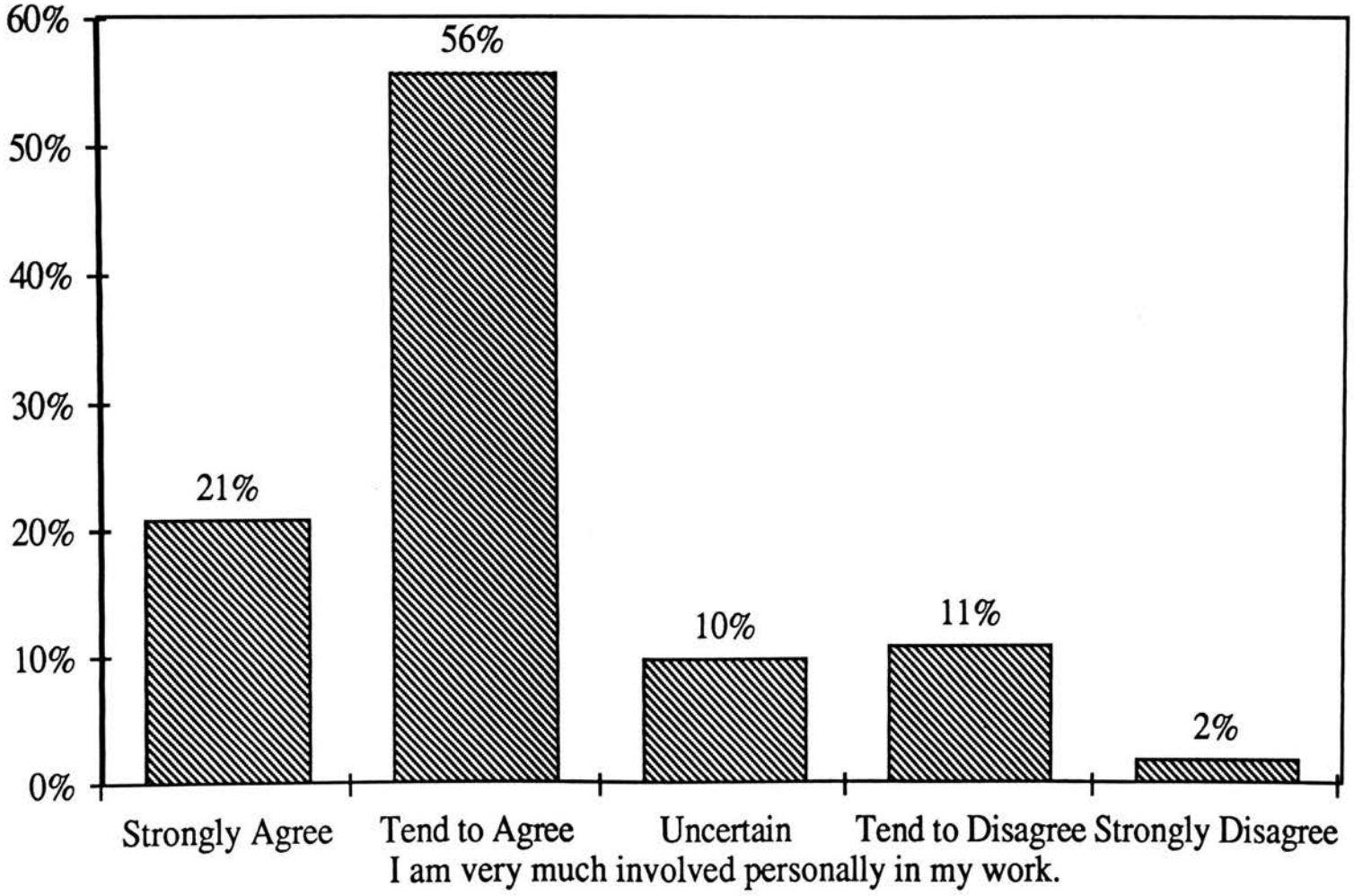

Figure 11. Work Satisfaction Instrument #6

important things that happen to them involve their work (see Figure 8.). Forty-one percent tend to disagree, 22% tend to agree, 21% are uncertain, 11% strongly disagree, and 5% strongly agree that "the most important things that happen to me involve my work".

These results are consistent with the response to "I have other activities more important than than work," where 59% tend to agree or strongly agree that they have other activities more important than work. Eighteen percent are uncertain, 19% tend to disagree that other activities are more important than work, and 4% strongly disagree. Refer to Figure 9. for the response to this question.

For the most part, petroleum geoscientists do not live, eat, and breathe their work with 40% and 39% tending to disagree and strongly disagree, respectively. Eleven percent tend to agree, 8% are uncertain, and 2% strongly agree that they live, eat, and breathe their work. (See Figure 10.).

Fifty-six percent of the respondents tend to agree that they are very much involved personally in their work. Twenty-one percent strongly agree, 11% tend to disagree, 10% are uncertain, and 2% strongly disagree. (Refer to Figure 11.).

These results indicate that geoscientists have other activities outside of work and work is not their total life, yet they are very much personally involved in their work and

at least some of their major satisfaction in life comes form their work.

3. Socio-Psychological Factors. On the whole, geoscientists appear to be a mentally and emotionally healthy group of people as indicated by the responses to Section 2 of this survey. The following is a summary of nine areas of socio-psychological interest that show that the majority of geoscientists in the U.S. petroleum industry are not overly depressed, anxious, or resentful and that they have high levels of self-esteem and hope for the future.

Anomie: These days I get the feeling I'm just not a part of things. Forty-five percent tend to disagree, 29% strongly disagree, 14% tend to agree, and 2% strongly agree. Therefore, 74% definately feel a sense of belonging.

Self-esteem: I often feel that my life is very useful. Fifty-four percent tend to agree, 22% strongly agree, 15% are uncertain, 8% tend to disagree, and 1% strongly disagree. Earlier in this paper, it was determined that petroleum geoscientists have high self-esteem needs. The response to this question indicates that 76% believe their life is useful and are therefore meeting their self-esteem needs.

Anxiety: I worry about things that might happen to me. Thirty-eight percent tend to disagree while 29% tend to agree. Fifteen percent are uncertain, 13% strongly disagree, and 5% strongly agree. Therefore, one third of

the respondents are not particularily anxious about the future, but 29% tend toward anxiety about what might happen to them. This division may be due in part to the instability of the petroleum industry at the present time.

Depression: As bad as things are they never seem hopeless. Although many of the geoscientists express anxiety for the future, 91% consider their individual situations to be hopeful. Forty-seven percent tend to agree, 44% strongly agree, 5% are uncertain, 2% tend to disagree, and 2% strongly agree.

Irritation: Even important things seem to irritate me. The wording of this particular statement was confusing to many and, therefore, the results to this particular question may be invalid. Forty percent tend to disagree, 23% are uncertain, 17% strongly disagree, 17% tend to agree, and 3% strongly agree.

Aggression: I sometimes feel like arguing with my family and friends. Forty-one percent tend to disagree, 30% tend to agree, 17% strongly disagree, 10% are uncertain, 2% strongly agree. Therefore, most geoscientists are not overly aggressive; however, almost one third of the respondents tend toward aggression.

Social Support: I believe that others really care about me. The majority of the respondents believe others support them. Fifty-three percent tend to agree with this statement, 20% strongly agree, 15% are uncertain, 9% tend to

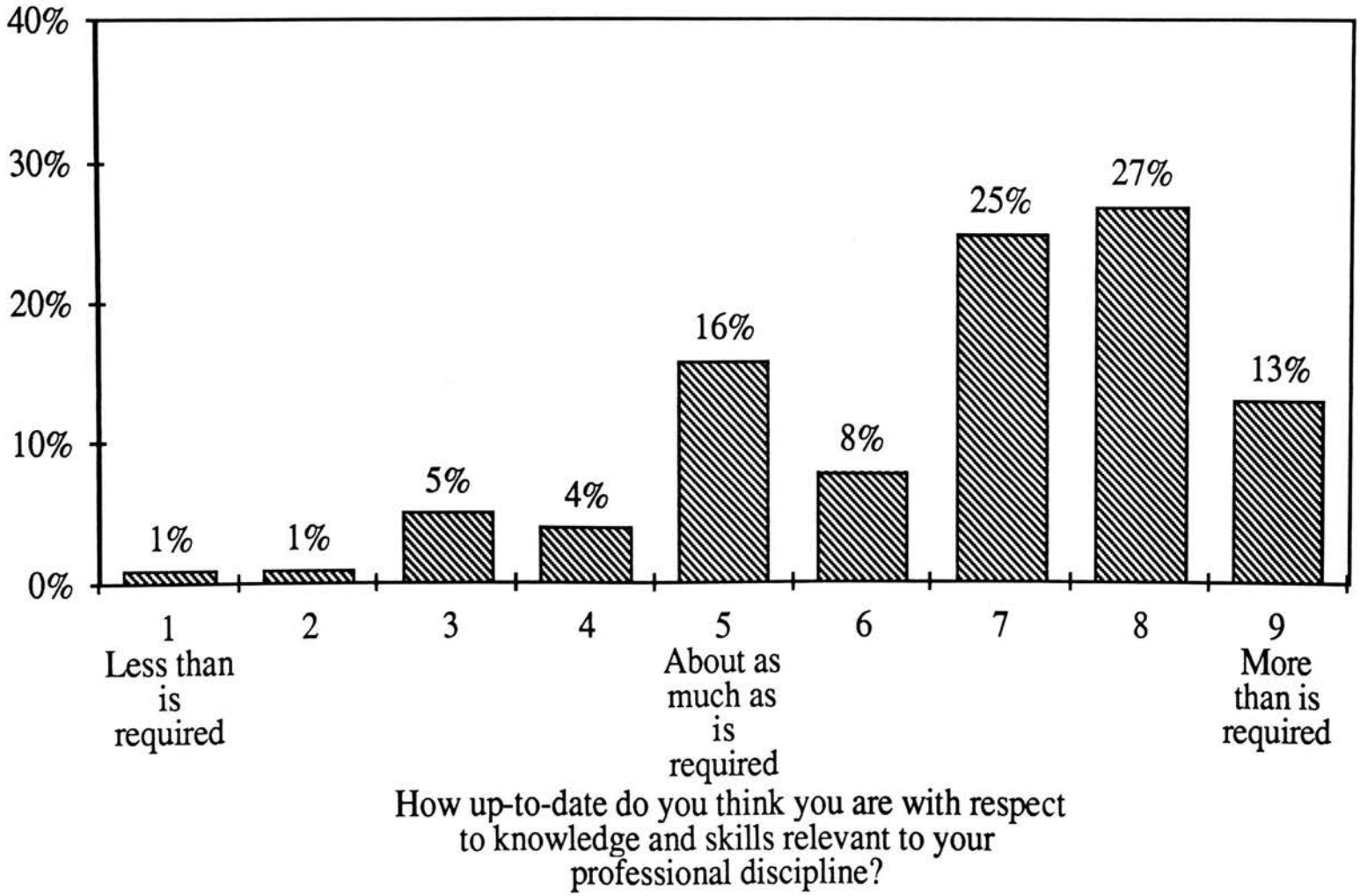

Figure 12. Self Rating Among Petroleum Geoscientists of Their Professional Obsolescence

disagree, and 3% strongly disagree. Some commented that there is a distinction between who cares for them--that family and friends are concerned, but that employers and co-workers are not.

Resentment: When I look back on what has happened to me, I feel resentful. Although many indicated they have had high and low times in their careers, and that the low times have been very difficult, a large percent (85%) do not feel resentful for past events or occurrances in their lives. Forty-seven percent strongly disagree that they feel resentful, 38% tend to disagree, 7% are uncertain, 6% tend to agree, and 2% strongly agree.

Responsibility: I feel burdened with responsibility. Most geoscientists do not feel burdened with responsibility. Forty-one percent tend to disagree, 22% tend to agree, 21% strongly disagree, 12% are uncertain, and 4% strongly agree in response to this question.

Responses to all nine of these socio-psychological factors can be found in Appendix B: Overall Satisfaction Statistics.

4. Professional Obsolescence. Geoscientists ranked themselves very highly in regard to how up to date they are with respect to knowledge and skills relevant to their professional discipline. On a scale from 1 to 9 with one being considerably less than up-to-date, 27% rated themselves at 8, 25% at 7, 16% at 5, and 13% at 9. It is

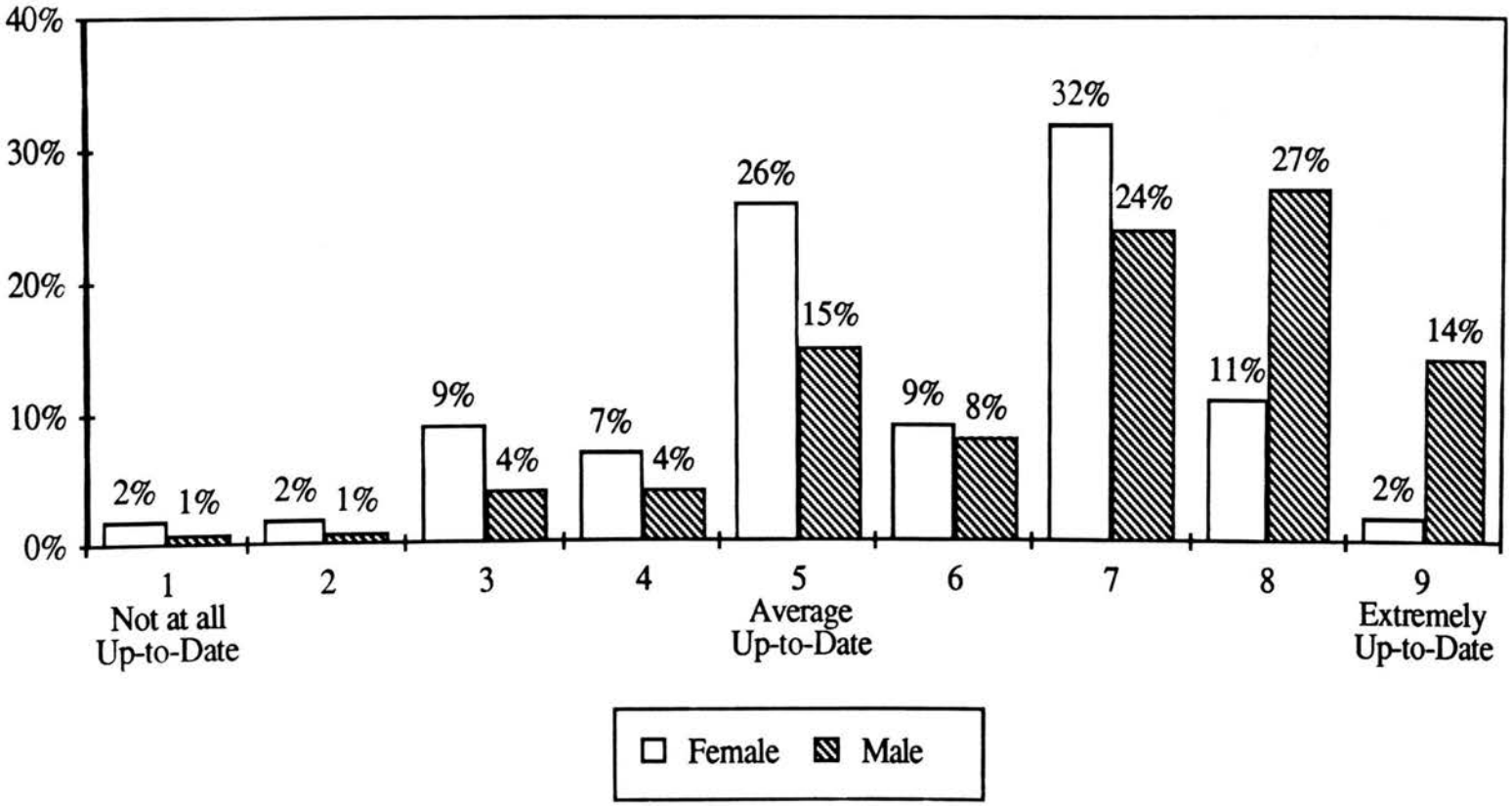

Figure 13. A Comparison Between Male and Female Responses to Professional Obsolescence

important to keep in mind that this response is not indicative of how up-to-date an individual actually is, but rather how up-to-date an individual perceives he is with respect to his professional discipline. Refer to Figure 12. for the complete results to this question.

Interestingly, the men tend to consider themselves more up-to-date professionally than the females. Forty-six percent of the women rated themselves 1 to 5 (considerably less than to about as much as up-to-date professsionally as they need to be), while only 25% of the men ranked themselves 1 to 5. The majority (32%) of the women ranked themselves at 7 (slightly more than up-to-date). The majority of the men (29%) ranked themselves at 8. Only 11% of the females ranked themselves at 8, and only 2% at 9 (considerably more than up-to-date). Fourteen percent of the males ranked themselves at 9. (See Figure 13.).

E. CROSS TABULATIONS

Many cross tabulations within this survey have been analyzed (refer to Appendix C). This section highlights the more outstanding and unusual results of these tabulations.

1. Personal Versus Employment Needs. A cross tabulation analysis of individual needs and employment to meet needs reveals that employment is necessary for most geoscientists for feel secure whether their need to feel secure is high or low.

Friendships are not necessarily derived from the geoscientists' work environment. The necessity for employment to fulfill self-esteem is the same degree or slightly less than the need for overall self-esteem in the majority of petroleum geoscientists' lives.

Finally, those that truly want to grow and develop can find ways to do so outside of work. Those that are not as concerned about growing and developing find work to be a vital and necessary means to grow and develop.

2. Work Satisfaction. Those with less experience (0-13 years) tend to disagree that their major satisfaction comes from work, those with greater than 13 years experience tend to agree that their major satisfaction does come from work. However, these statistics contradict some of the comments from respondents quoted earlier in this paper.

The majority of those who find their life very useful tend to disagree that the major satisfaction in their life comes from work.

3. Burden of Reponsibility. Although one might assume that the greatest burden of responsibility would fall on those with the largest number of subordinates, such is not the case. On the whole, those with 11-50 subordinates feel the least burdened, those with 51-250 feel the greatest burden, while those with 251-1000 subordinates tend to disagree that they feel burdened with responsibility.

The level of education, the number of dependents and

the size of company do not seem to affect the burden of responsibility. The majority of both marrieds and singles tend to disagree that they feel burdened with responsibility, however, a greater percentage of singles feel less burdened. Females feel slightly less burdened with responsibility than their male counterparts and the majority of those with more than 40 years experience feel the least degree of burden with their responsibility.

The academic and mining industries experience a greater burden of responsibility than petroleum, government, self employed and other industries.

4. Professional Obsolescence. The majority of those working for major companies rated themselves slightly lower (at 7) in state of the art technology than those working at small independents and large independents (8), and other types of companies (9). The greatest up-to-datedness was in the 26-40 years experience group. This is the same age group that also experiences the most professional obsolescence (out-of-datedness).

The need to feel secure for up-to-date geoscientists (7-8-9) is not as strong (moderately strong) as for those less up-to-date (1-6), which is quite strong.

Most of those out of date (1-2-3) find their job more necessary to develop friendships (moderately strong) than for those more up to date (4-9) who find their job only slightly necessary to develop friendships.

The majority of those rating themselves as considerably up-to-date (9) had an extremely strong need to have self-esteem and to grow and develop, with others (1-8) having a quite strong need for self-esteem and to grow and develop. All levels felt their jobs were quite necessary to moderately necessary to grow and develop and to have self-esteem.

Considerably out of date individuals (1's) tend to agree that the most important things that happen to them involve their work whereas the majority of the rest (2-9) tend to disagree that the most important things that happen to them involve their work.

There is a trend toward feeling a part of things as up-to-datedness increases. Those responding 1 or 2 to professional obsolescence tend to agree that they feel they are not a part of things, those responding 3-8 tend to disagree, and the majority of those responding with a 9 strongly disagree that they are not a part of things.

As one might expect, those who consider themselves professionally out of date tend to worry more about what might happen to them than those who are up-to-date. Very few consider life hopeless, but the more up-to-date one is, the greater hope one has for the future.

Arguing with family and friends appears to be an outlet for both ends of the spectrum; those very up-to-date and those out of date. The average (middle of the road)

up-to-date individual tends not to argue with family and friends.

All tend to agree that others really care about them and very few feel resentful about things that have happened to them, regardless of professional obsolescence.

Surprisingly, the majority of those who strongly disagree that their life is very useful rated themselves very up-to-date with regard to their profession.

5. Male Versus Female Statistics. As can be expected, females' needs vary somewhat from male geoscientists' needs. The need for security among female geoscientists is slightly stronger than the same need in the men. Female geoscientists have a stronger need to develop friendships than male geoscientists but employment is not necessarily a means for developing these friendships.

Another male-female variance is in self-esteem. Forty-five percent of the females have an extremely strong need for self-esteem, compared to only 32% of the males. Growth and development also ranked high with the women geoscientists. Again, 45% of the women have an extremely strong need to grow and develop, compared to 33% of the men.

Many women geoscientists tend to argue with family and friends (45%) more than male geoscientists (28%). Forty-two percent of the males and 38% of the females tend to disagree that they sometimes feel like arguing with family and friends.

Most male geoscientists (35%) tend to agree that the major satisfaction in their life comes from work, whereas female geoscientists (48%) tend to disagree.

Female petroleum geoscientists are statistically slightly more resentful than their male counterparts. This feeling was reflected in part by one of the female respondent's comments to her job related stressors: "Feeling I have to conform to someone else's standards of dress, behavior, etc., in order to appear 'professional'. Although a factor for all, it is even more important for women, as many older men still simply don't know how to take women in the work place as professionals."

Finally, 45% of the females and only 34% of the males strongly disagree that they live, eat, and breathe their work.

6. Stressor Cross Tabulations. The greatest stressor for those with a Bachelor of Science degree and those with PhD's is too much work/too little time. The greatest stressor for Master of Science people is meeting time schedules. Lack of proper resources, presentations, and lack of or miscommunication are all equally weighted stressors for those with some college background.

Those individuals with 0 to 5 years experience and 26-40 years experience find meeting time schedules to be their major stressor at work. Those with 41-75 years experience find lack of proper resources to be their main

cause of stress on the job.

Petroleum geoscientists with 51-100 subordinates consider boss interference to be their number one job related stressor. Customer interference and whims is the greatest stress producer for those with 101-250 subordinates, constant exposure to management is stressful to geoscientists who manage 251-500 people and interpersonal relationships is the most prominent stressor for those managing more than 1000 individuals. These subordinates do not represent the span of control of a superior but rather the number of individuals subordinate to the geoscientist.

Lack of control and "real" authority is the greatest job related stressor for most of those working for a subsidiary of a major. Individuals working for other types of companies find meeting time schedules and too much work/too little time to be their main job related stressors.

Invariably, the top two stressors among geoscientists were meeting time schedules and too much work/too little time, regardless of their security, self-esteem, friendship, growth and development needs, their degree of involvement in work, number of dependents, or marital status.

V. A COMPARATIVE ANALYSIS

This survey was also administered to 35 students in an undergraduate engineering class on the campus of the University of Missouri-Rolla in October, 1985. This class was composed of the following:

Major

35% Engineering Management
25% Computer Science
11% Chemical Engineering
11% Electrical Engineering
7% Mechanical Engineering
4% Chemistry
4% Economics
4% Mining Engineering
2% Other

Level

10% Sophomore
38% Junior
45% Senior
7% No Response

33% Female
67% Male

97% Single
3% Married

with a mean age of 21.7 years.

Most of the responses are very similar to those of the geoscientists. However, the need to develop friendships is stronger among students and the necessity of employment for growth and development is stronger among the students.

The students appear to be more anxious than the

geoscientists in that 47% responded that they tend to worry about things that might happen to them (compared to 29% of the geoscientists).

Forty percent of the students tend to argue with family and friends, whereas only 30% of the geoscientists tend toward arguing; and the students feel slightly more resentful.

The majority of the students (38%) rated themselves at 5--about as much as is required--in professional obsolescence. This is significantly lower than the geoscientists' self ratings, perhaps due to lack of experience on the part of the students.

Too much work/too little time and meeting time schedules were the students' major stressors, in accordance with those of the geoscientists. Also at the top of the list were lack of or miscommunication, lack of proper resources, multiple responsibilities, lack of functional support, and competition.

Coping with stress methods varied slightly from the previous survey results with talking with a friend or family member as the number one choice among the students, physical exercise as the number two choice, and learning not to worry as number three.

If time and opportunity allowed, students and geoscientists alike chose physical exercise. Secondly, students would maintain a healthy diet, and thirdly, learn

not to worry. This varies from the geoscientists who would opt for more rest and relaxation and put to use time management techniques.

VI. CONCLUSIONS

Petroleum geoscientists, on the whole, appear to be handling a potentially stressful situation very well. They are not overly anxious or depressed and are surprisingly secure in light of the recent petroleum recession. They also have high levels of self-esteem and hope for the future.

The majority obtain major satisfaction from their work and many are very much personally involved in their work, yet they have other activities that they deem more important than their work. Strong needs for self-esteem and to grow and develop are apparent among the geoscientist respondents.

These geoscientists consider themselves to be very much up-to-date in regard to their professional discipline regardless of who they work for or how much experience they have.

The greatest on the job stressors for petroleum geoscientists are meeting time schedules and having too much work/too little time. Also high on the job related stressor list are lack of proper resources, lack of or miscommunication, lack of control and "real" authority, and job instability.

Coping with stress is handled by these scientists by a variety of methods. Many of the respondents currently apply five or six methods each, including physical exercise,

talking with a friend or family member, analyzing and eliminating the cause of stress, maintaining a healthy diet, and making time for rest and relaxation. If given the opportunity, they would choose more exercise, more rest and relaxation, time management techniques, quiet time alone, and learning not to worry as viable methods of coping with stress.

Several respondents commented that they do not feel stressed or that they are in a stressful environment. This would indicate that they have found the correct balance of eustress and distress for their individual lives. They are to be commended. Many others commented that this type of research in the petroleum industry is long overdue and expressed their encouragement of this project. The response rate alone indicates geoscientists have an interest in and are willing to voice an opinion on stress and stress management in their field of expertise.

At the present time, the majority of the petroleum geoscientists seem to be managing their stress (eustress and distress) quite well. However, as one respondent commented, "Job stress is on the increase in the oil industry due to lower prices and mergers. Effective stress management courses must be developed and implemented as soon as possible."

The main emphasis of this survey has been to determine petroleum geoscientists' current job related stressors, how

geoscientists are presently coping with the stress they experience and how they might cope with stress if given the time or opportunity. This study has been aimed at individuals. Now that this has been accomplished, a study directed at petroleum companies and corporations' methods of coping with and managing stress is in order.

Another area of study that would add insight to this research and would be very informative would be a comparative study of other professionals, engineers, and scientists using the established survey in this thesis.

One further recommended area of study would be a comparative study in other industries and companies, such as A T & T, Wang Laboratories, and DuPont, that are experiencing company mergers, voluntary retirement, and large lay-offs. These cut backs have been steadily increasing in recent years and research concerning stress and stress management in these areas would be beneficial to both the managerial staff and the subordinates in such companies and industries.

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VITA

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While an undergraduate student, Ann worked for Phillips Petroleum Company in Bartlesville, Oklahoma during the summer of 1978, and Tenneco Oil Company in Houston, Texas during the summer of 1979, as a Student Geophysicist and Junior Geophysicist, respectively.

Upon graduation from the University of Missouri-Rolla, Ann was employed by Superior Oil Company as a Geophysicist, and later by Texas Exploration and Drilling Company, Inc., as an Exploration Geophysicist.

She has been enrolled in the Graduate School of the University of Missouri-Rolla since January, 1984 and has held a Graduate Teaching Assistantship since January, 1984.

APPENDIX A.

STRESS QUESTIONNAIRE AND COVER LETTER

Dear Geoscientist:

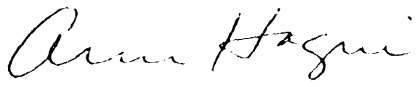
Enclosed is a questionnaire relating to job stress. There have been many surveys conducted in the recent past relating to stress and methods of coping with stress, but there have been few surveys conducted specifically relating to stress experienced by engineers and scientists, and none, to my knowledge, directed specifically to the geosientist.

Here is your opportunity to voice your views and opinions regarding stress and stress management in your chosen field of geoscience! You have been selected from a random sample of geoscientists. Please fill out the questionnaire and return it in the enclosed postage-paid envelope. It will take only a few minutes of your time.

The results will be used in my graduate thesis work at the University of Missouri-Rolla. If the results are comprehensive enough, they will be published at a later date. Please feel free to add any additional comments that you feel are important factors relating to stress as a geoscientist.

Thank you for your support in my graduate work.

Sincerely yours,



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STRESS QUESTIONNAIRE

Individuals differ with respect to the strength of various needs. Please indicate how strongly you need the following (circle one in each line):

	Indifferent	Somewhat Strong	Moderately Strong	Quite Strong	Extremely Strong
To feel secure	1	2	3	4	5
To develop friendships	1	2	3	4	5
To have self-esteem	1	2	3	4	5
To grow and develop	1	2	3	4	5

How necessary is your being employed for your (circle one in each line):

	Not at all Necessary	Slightly Necessary	Moderately Necessary	Quite Necessary	Extremely Necessary
Feeling secure	1	2	3	4	5
Developing friendships	1	2	3	4	5
Having self-esteem	1	2	3	4	5
Growth and development	1	2	3	4	5

Please circle your response--1, 2, 3, 4, or 5--to each of the following six questions:

	Strongly Agree	Tend to Agree	Uncertain	Tend to Disagree	Strongly Disagree
The major satisfaction in my life comes from my work.	1	2	3	4	5
The most important things that happen to me involve my work.	1	2	3	4	5
I have other activities more important than my work.	1	2	3	4	5
I live, eat, and breathe my work.	1	2	3	4	5
To me, my work is only a small part of who I am.	1	2	3	4	5
I am very much involved personally in my work.	1	2	3	4	5

Please circle your response--1, 2, 3, 4, or 5--to each of the following ten questions:

	Strongly Agree	Tend to Agree	Uncertain	Tend to Disagree	Strongly Disagree
These days I get the feeling that I'm just not a part of things.	1	2	3	4	5
I often feel that my life is very useful.	1	2	3	4	5
I worry about things that might happen to me.	1	2	3	4	5
As bad as things are, they never seem hopeless.	1	2	3	4	5
Even important things seem to irritate me.	1	2	3	4	5
I sometimes feel like arguing with my family and friends.	1	2	3	4	5
I believe that others really care about what happens to me.	1	2	3	4	5
When I look back on what has happened to me, I feel resentful.	1	2	3	4	5
I feel burdened with responsibility.	1	2	3	4	5

How up-to-date do you think you are with respect to knowledge and skills relevant to your professional discipline?

1	2	3	4	5	6	7	8	9
Considerably less than		Slightly less than		About as much as		Slightly more than		Considerably more than

. . . is required to effectively carry out new assignments in my job.

Job Related Stressors

Please identify and rank in priority your job related stressors on the six blanks provided below. Listed below are thirty items identified to be stressors. You may choose from this list or select your own.

1. Meeting time schedules
2. Meeting budgets
3. Boss interference
4. Lack of proper resources (facilities, people)
5. Company policies
6. Customer interference and whims
7. Company policy (restrictions)
8. Marketing support
9. Lack of functional support
10. Interpersonal relationships
11. Technical problems
12. Meetings
13. Presentations
14. Work environment (lighting, noise, furnishings)
15. Lack of control and "real" authority
16. Performance appraisals (others)
17. Performance appraisals (self)
18. Salary
19. Too much work, too little time
20. Too little work, too much time
21. Program responsibility
22. Extra time committment
23. Constant exposure to management
24. Interface with many people
25. Extremely fast pace
26. Multiple responsibilities (disciplines and organizations)
27. Job ambiguity
28. Lack of or miscommunication
29. Competition
30. Other_____

Your Job Related Stressors:

1._____

2._____

3._____

4._____

5._____

6._____

Personal Data Information

Male_____ Female_____
Single_____ Married_____
Number of Dependents_____
Education: Level: HS___ Some College___ BS___ MS___ PhD___
Area of Study: Geophysics___ Geology___ Geological Engineering___
Physics___ Mathematics___ Other_____

Years of Experience _____
Professional Title _____

Number of Subordinates: Professional_____ Nonprofessional_____
Size of Company: Small Independent_____ Large Independent_____ Major_____
Subsidiary of Major_____ Other_____
Type of Company: Academic_____ Government_____ Petroleum_____ Mining_____
Consulting_____ Self employed_____ Other_____

Coping With Stress

The items listed below are ways to cope with stress. Please mark the items you use most frequently.

Method used now		If time and opportunity were available
_____	1. Analyze and try to eliminate the cause of stress	1. _____
_____	2. Maintain a healthy diet and nutrition plan	2. _____
_____	3. Physical exercise	3. _____
_____	a. Aerobics	a. _____
_____	b. Jogging	b. _____
_____	c. Weight lifting	c. _____
_____	d. Sports	d. _____
_____	4. Mentally controlling stress levels	4. _____
_____	5. Learning not to worry	5. _____
_____	6. Talking with a friend or family member	6. _____
_____	7. Meditation	7. _____
_____	8. Quiet time alone	8. _____
_____	9. Prayer	9. _____
_____	10. Rest and relaxation	10. _____
_____	11. Use of time management techniques	11. _____
_____	12. Professional counseling	12. _____
_____	13. Physical aggression	13. _____
_____	14. Internalize the stress	14. _____
_____	a. Ulcers	a. _____
_____	b. Headaches	b. _____
_____	c. Severe muscle tension and knotting	c. _____
_____	15. Overeating	15. _____
_____	16. Tranquilizers	16. _____
_____	17. Alcohol	17. _____
_____	18. Smoking	18. _____
_____	19. Confronting the source of stress	19. _____
_____	20. Verbal aggression	20. _____
_____	21. Other _____	21. _____

APPENDIX B.

OVERALL SATISFACTION STATISTICS

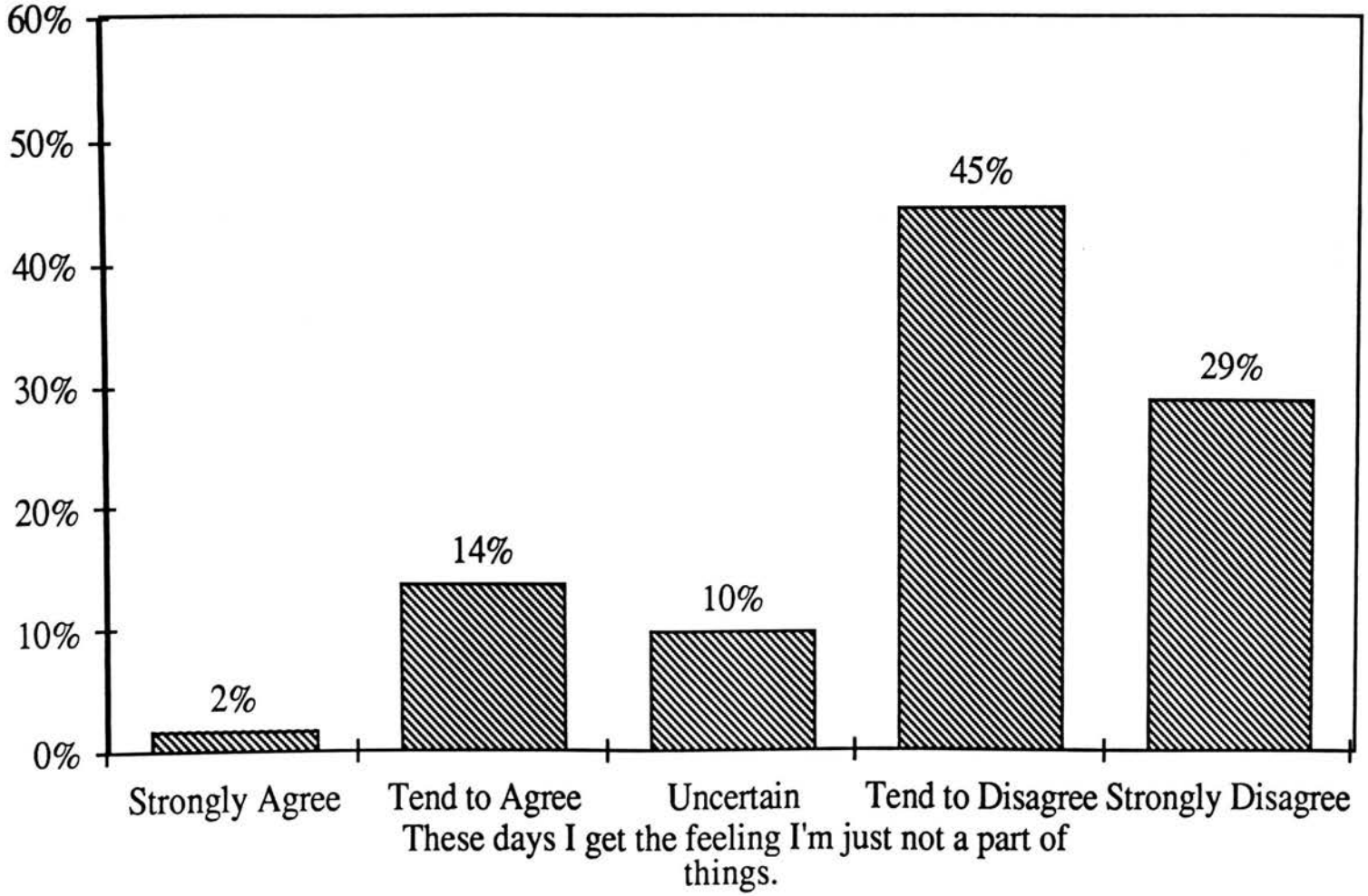

Figure 14. Overall Satisfaction Instrument #1: Anomie

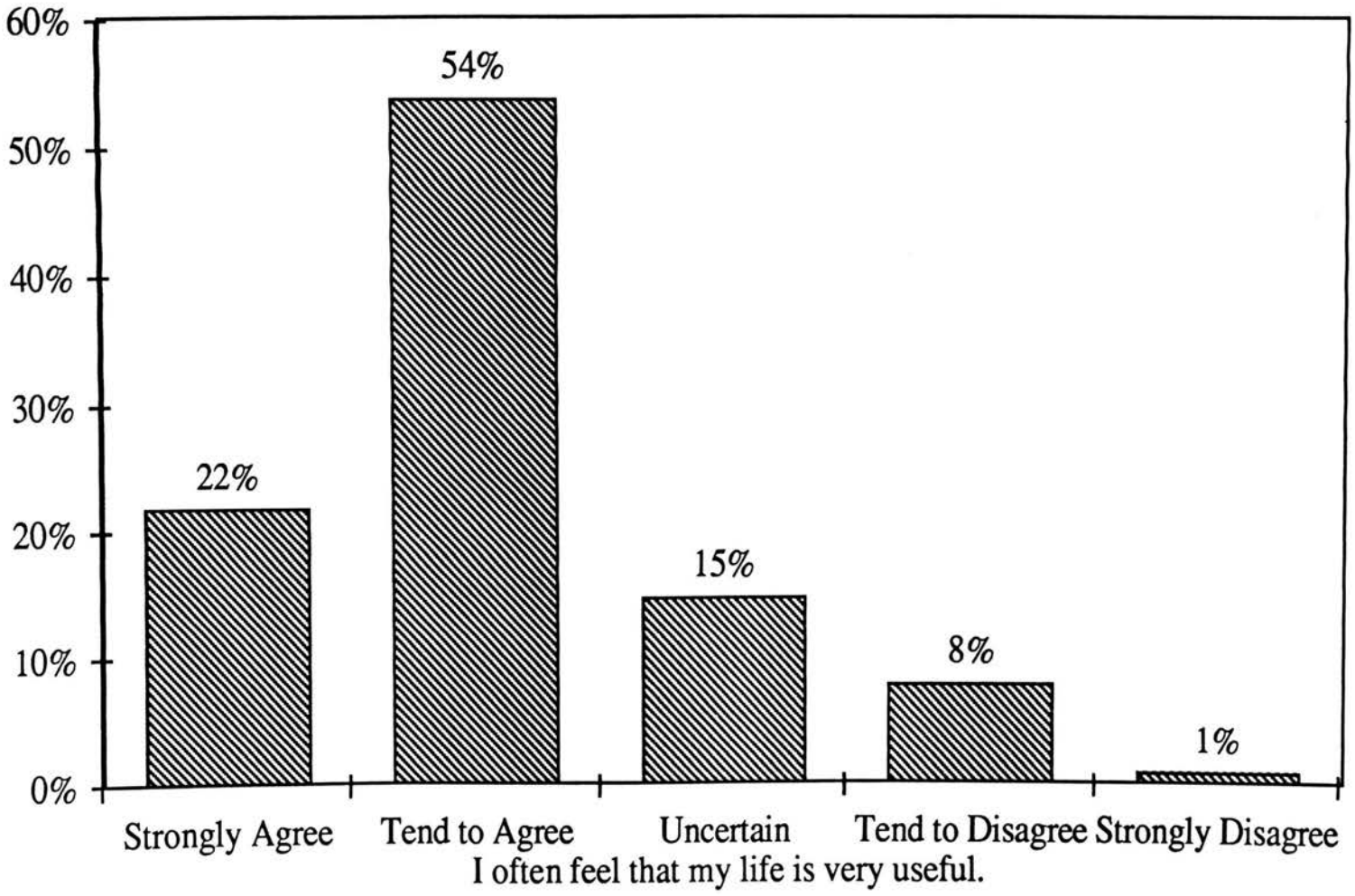

Figure 15. Overall Satisfaction Instrument #2: Self-Esteem

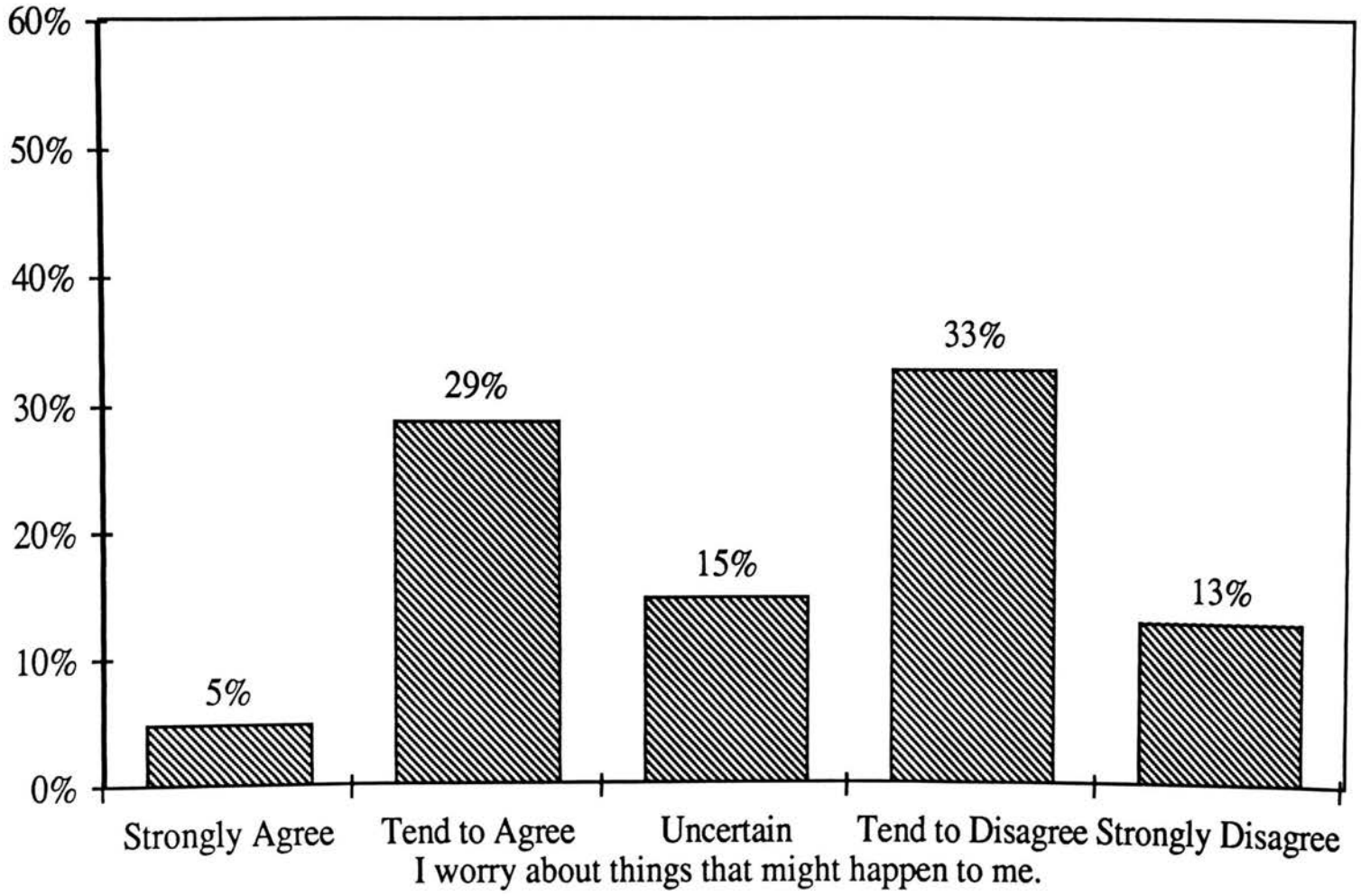

Figure 16. Overall Satisfaction Instrument #3: Anxiety

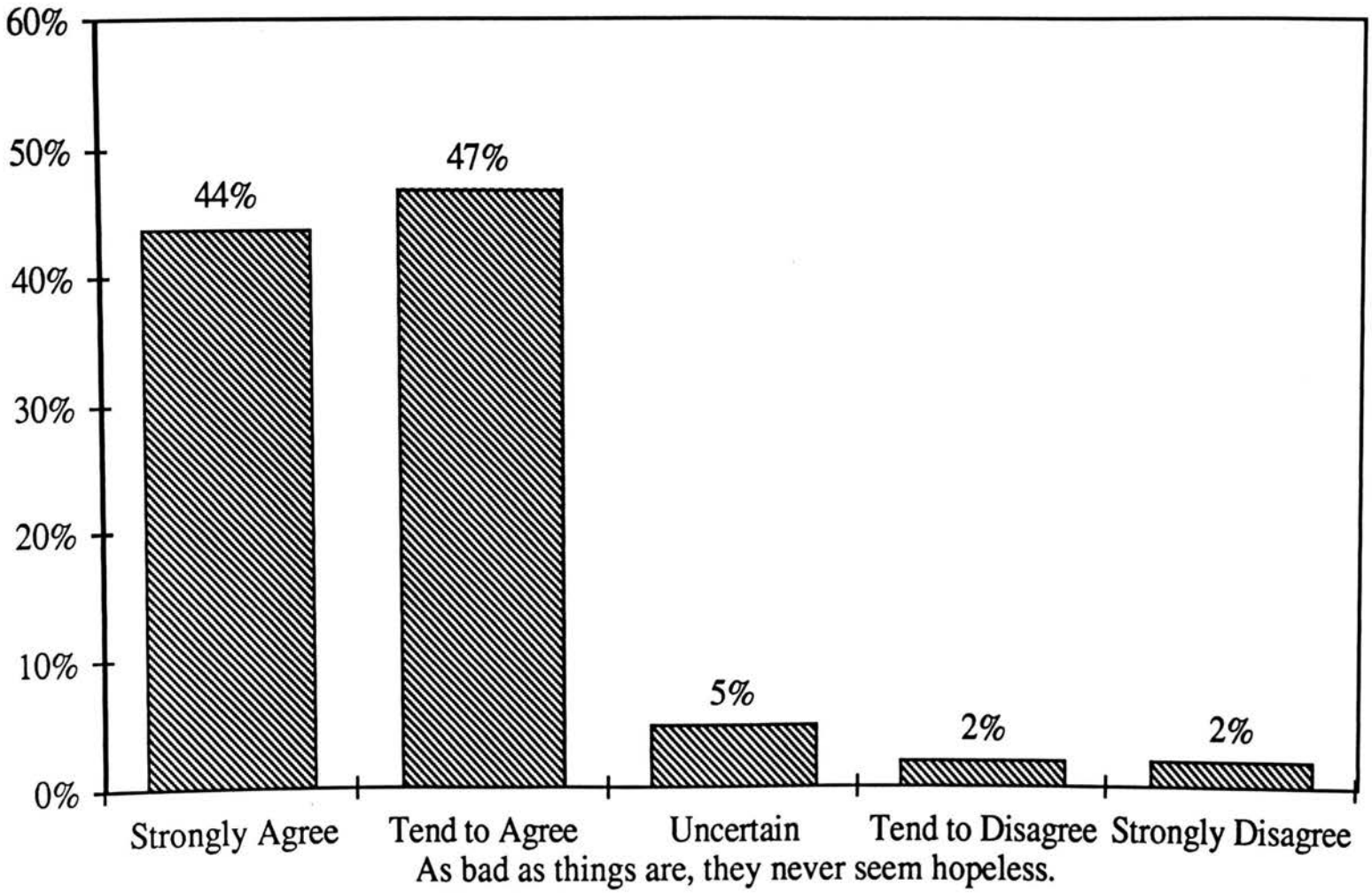

Figure 17. Overall Satisfaction Instrument #4: Depression

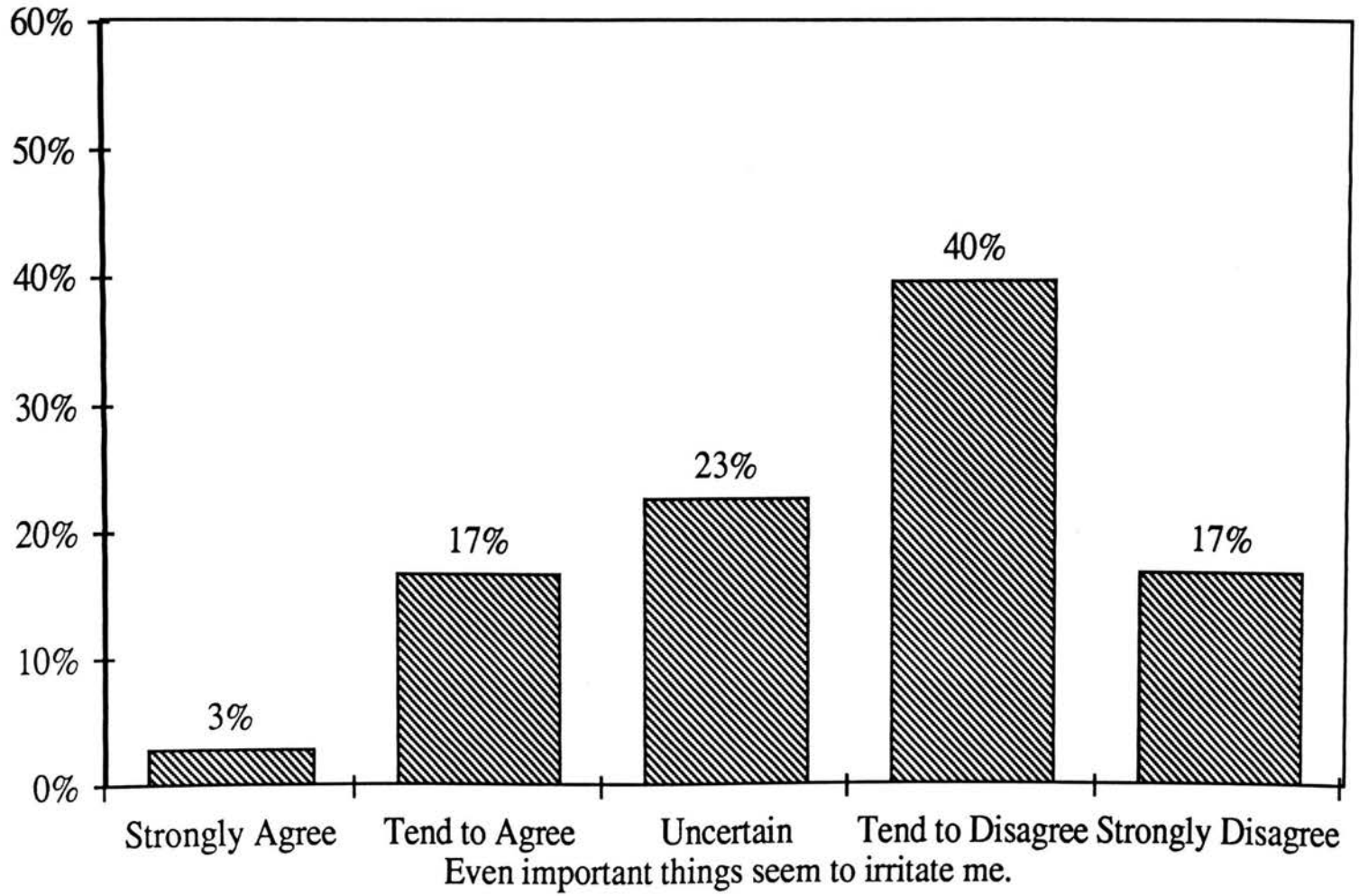

Figure 18. Overall Satisfaction Instrument #5: Irritation

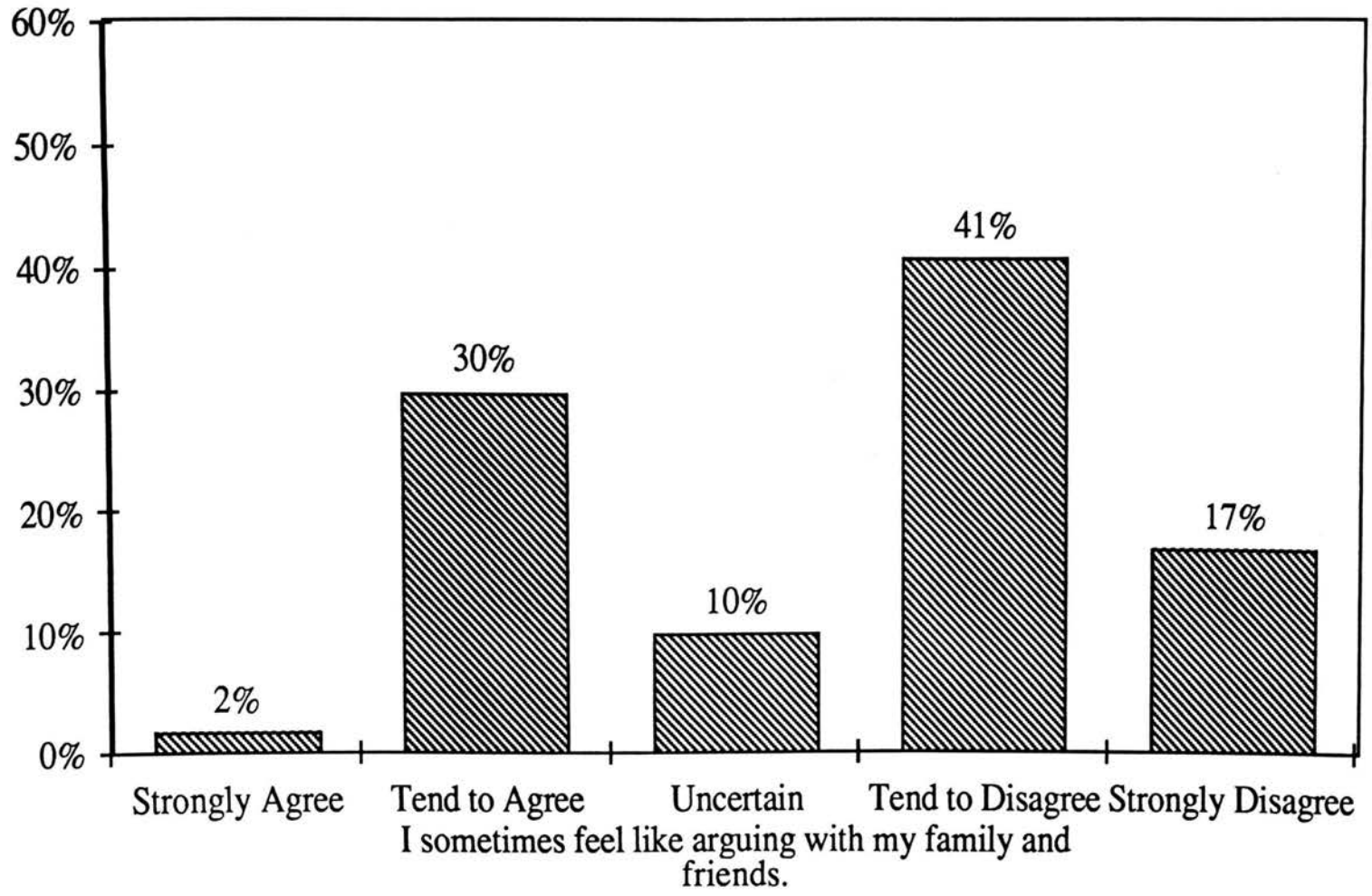

Figure 19. Overall Satisfaction Instrument #6: Aggression

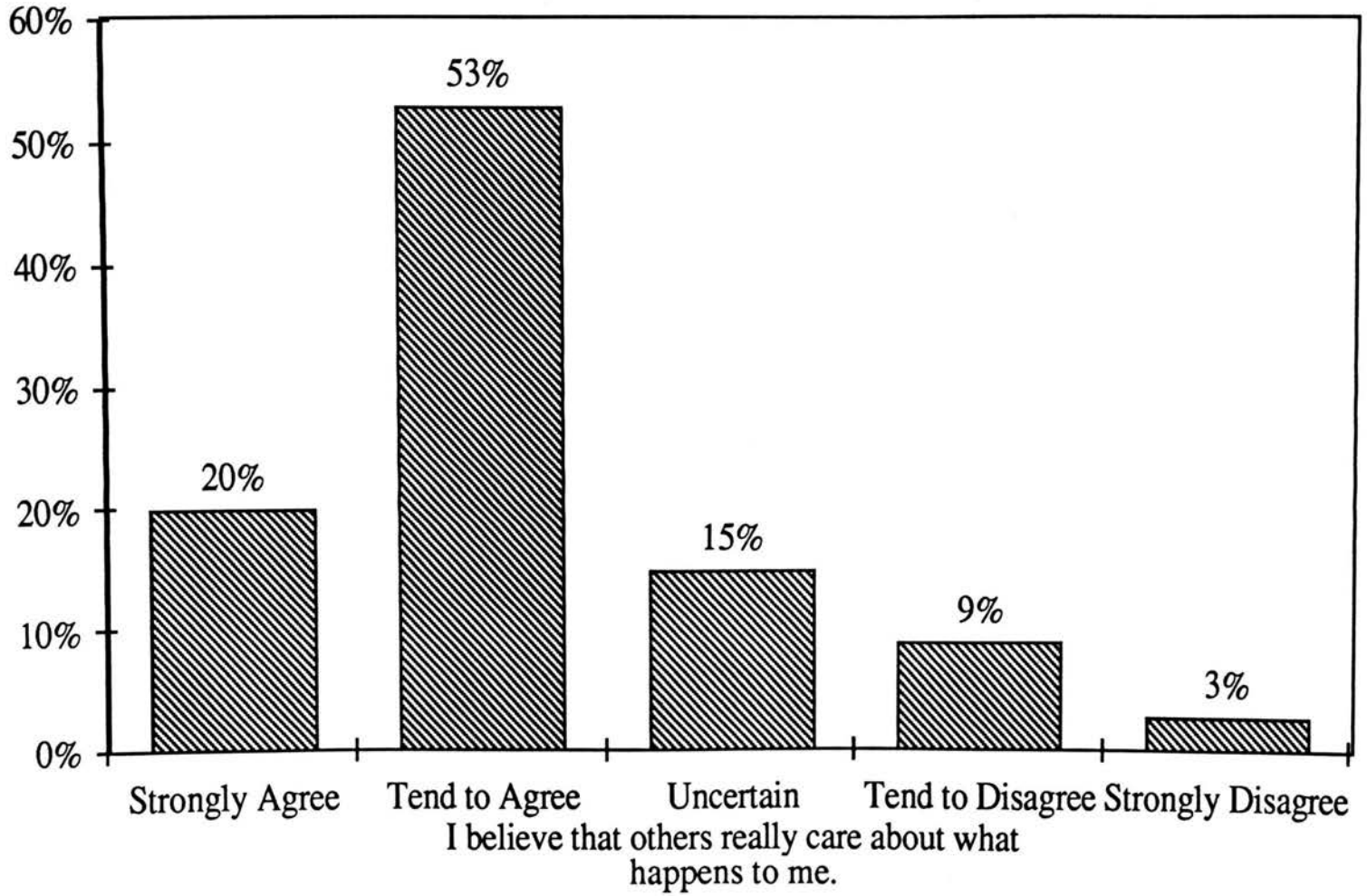

Figure 20. Overall Satisfaction Instrument #7: Social Support

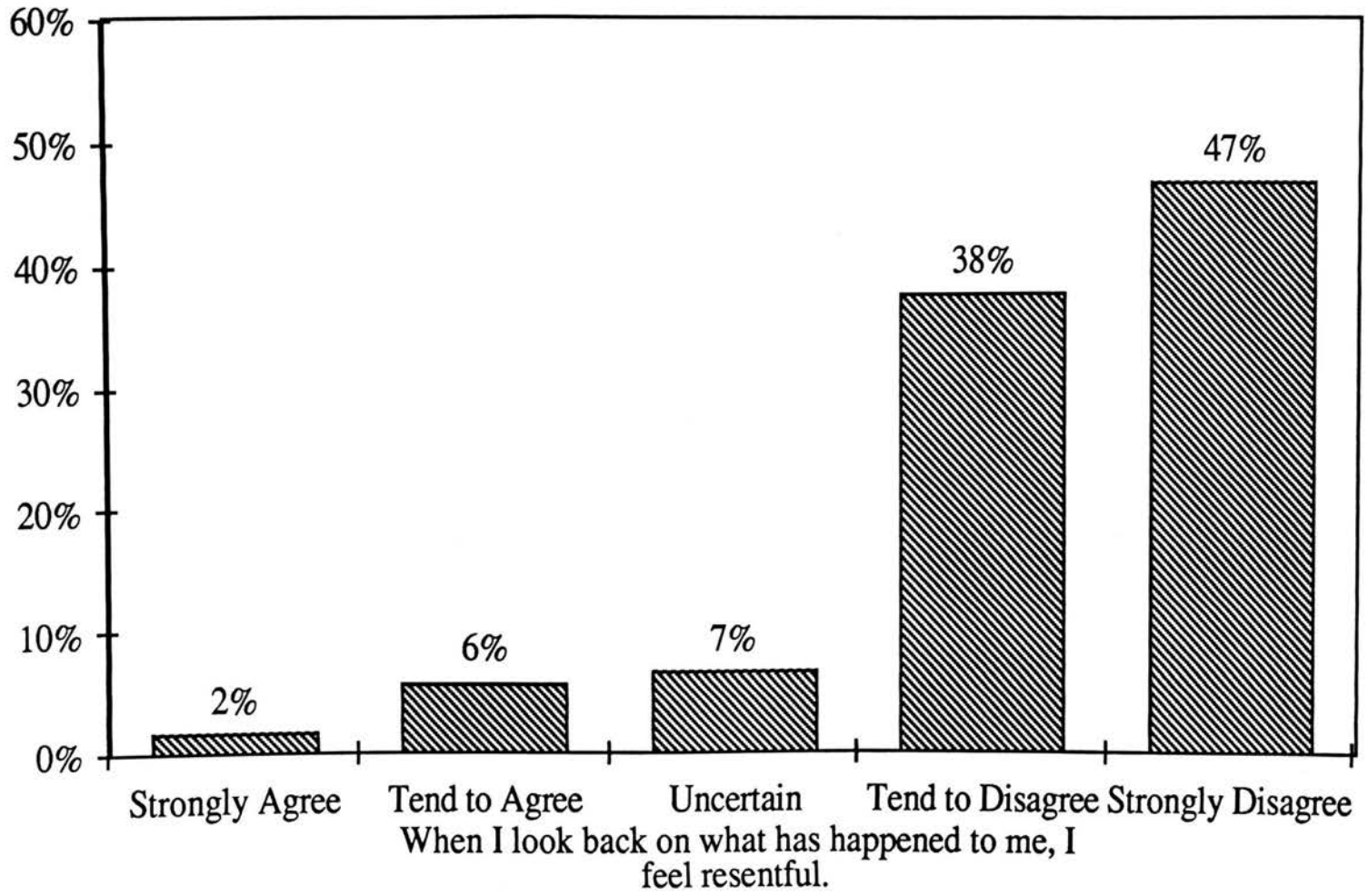

Figure 21. Overall Satisfaction Instrument #8: Resentment

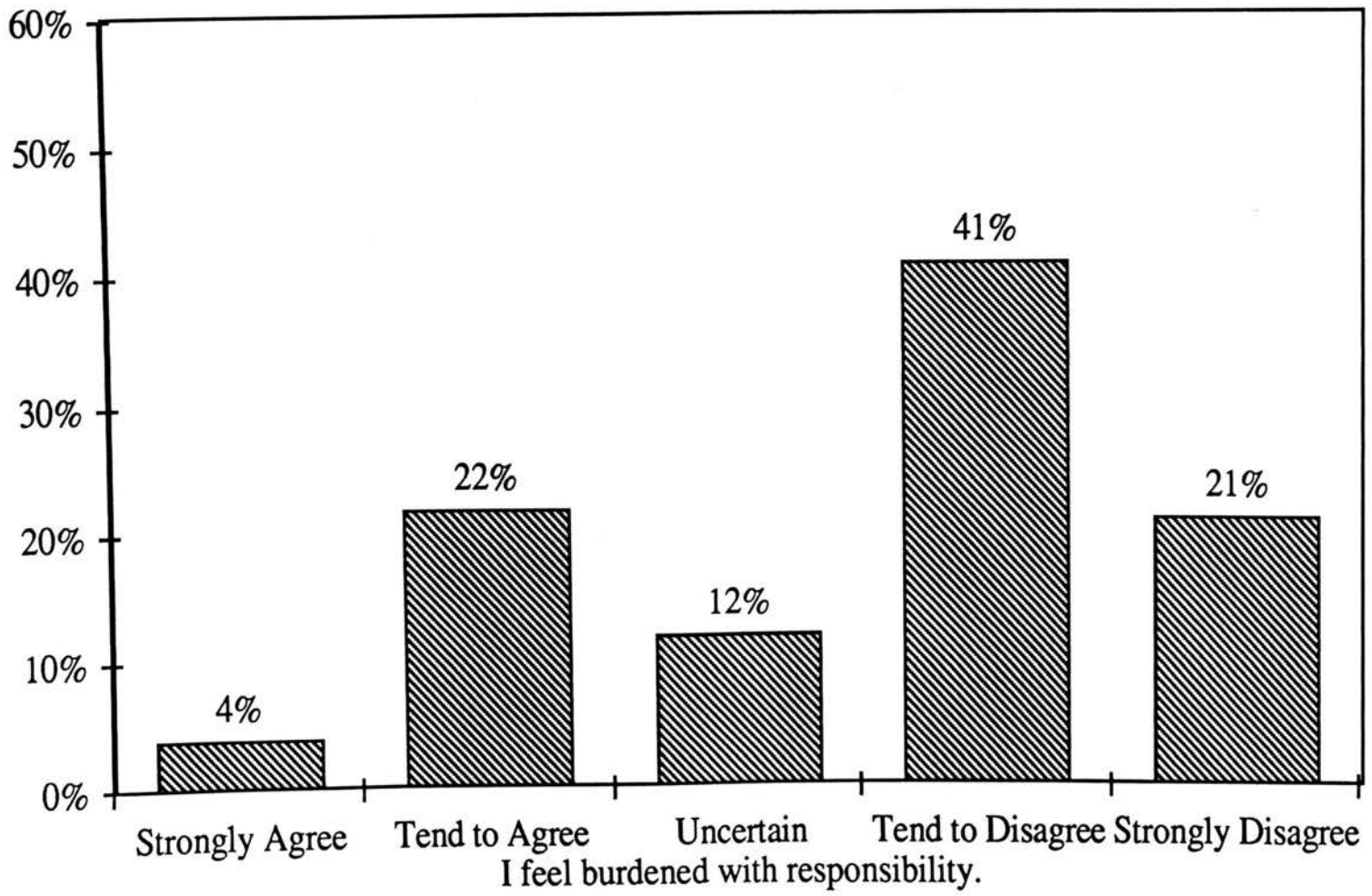

Figure 22. Overall Satisfaction Instrument #9: Responsibility

APPENDIX C.

STATISTICAL ANALYSIS SYSTEM

STATISTICAL ANALYSIS SYSTEM

Statistical Analysis System (SAS) is the computer system which was used to determine the statistics in this paper. The following is a summary of the individual SAS programs utilized throughout the preparation of this thesis.

The SAS program PROC FREQ calculates frequency, cumulative frequence, percent, and cumulative percent for any given variable. These figures are displayed in tabular form to three decimal places (six significant figures). PROC FREQ is also able to separate data by specific variables, i.e. SAS has the capability to separate responses by male/female.

Within the PROC FREQ program, cross tabulation tables of two or more variables may be derived determining frequency, percent, row frequency, row percent, column frequency, column percent, and totals. In this thesis, cross tabulations were calculated using PROC FREQ to compare an individual's response from one question to the response from the same individual to another question.

The program PROC MEANS calculates the number of values, mean, standard deviation, number of missing values, minimum and maximum values (range), and standard error of the mean for any given variable. This program was applied to years of experience, number of dependents, and number of subordinates.