

••• = revisions made in the electronic file to correspond to the mailed JCQ package  
1985-1993

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# Job Content Questionnaire and User's Guide

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March, 1985 - Revision 1.1\*

This Packet Contains:

1. Introductory comments, discussion of scales, sample size and statistical significance discussion.
2. Scale construction equations;
3. Occupation and industry category definitions, and our sample sizes.
4. Examples of national mean scores by occupation and industry groups; and subgroup sample sizes.
5. Questionnaire
6. An outline summary of Final N.I.O.S.H. report (Karasek, Schwartz, and Theorell- March 1, 1983) reviewing theory, methodology, and findings.
7. "Validation Report" discussing findings confirming the utility of the scales to predict heart disease and psychological strain - ) on request).

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•••\*revision of scale formula 6/86 - r.1.11



dropped:

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## I. INTRODUCTORY COMMENTS

1. This is a questionnaire-based instrument designed to measure the "content" of a respondent's work tasks - in a general manner which is applicable to all jobs and job holders in the U.S. The questionnaire scales have been used to predict job related stress and coronary heart disease in the U.S. and Sweden (see attached report: "Validation Study"). The best known scales are used to measure the high demand/low control model of job strain development, but over twenty other aspects of work and the individual are assessed. The scales are also relevant for studies of worker motivation, job satisfaction, absenteeism and labor turnover.

2. The questionnaire can be characterized as focusing on the psychological and social structure of the work situation - issues relevant to work demands, decision making opportunities, social interaction etc. Physical aspects of work are also measured - but in a very general manner. Several scales measuring psycho-social strain "outcomes" are also included. No personality scales or measures of non-job stressors are included; two areas in which the user may want to supplement our instrument.

3. Most of the scales are nationally standardizable, allowing users involved in small population or single plant studies to compare their findings to national averages on the scales (broken down by sex and occupation, industry). The nationally standardizability is due to the fact that a "core" of the questions replicates the U.S. Department of Labor's national Quality of Employment Survey of 1969, 1972, and 1977 (administered by the U. of Michigan, which we in turn have statistically adjusted to allow combining the three surveys: n=4,500 total for our reference base). Another advantage of the instrument is that its scales are also used in our data base linkage system (using job title) through which job content scores can be associated with health and productivity outcomes in national or company data bases already in existence (such as U.S. Census, Commerce, or NCHS data). This assures the continued validation of the instrument's scales in predicting a broad range of outcome variables.

4. Furthermore, we have designed this questionnaire as the the "Reference Base" of a two part "umbrella" strategy for collecting job data. The users are encouraged to develop the second part themselves: more situation -specific supplementary scales ("under the Job Content Scale umbrella") to measure the detailed problems that are important in the surveyed work site. These new scales can then be correlated to our nationally standardized scales.

5. Permission to use the Job Content Instrument (see section IV).

## II. FORMAT: THE INSTRUMENT COMES IN SEVERAL LENGTH FORMATS

1. The minimum "core" of questions represents the 27 questions that are presently being administered in a national follow-up study of the 4,000 offspring of the original Framingham study of U.S. National Heart Lung and Blood Institute. That instrument includes a 9 question scale on decision latitude, 9 questions on psychological work load, 5 questions on physical work load, and 4 questions on job insecurity (questions # 3-11, #19-36). Many of these questions go beyond the original Q.E.S. instrument and will allow us to extend our national standards to a more precise set of

scales in the future. •••(the 18 circled questions are from the original Q.E.S. survey).

## **2. RECOMMENDED FORMAT**

However, for almost all users we recommend that this "Framingham" version be supplemented by important scales omitted from that version of the instrument: social support - 11 questions (#48-58), decision latitude /organizational level - 8 questions (#12-18 - w/13B); two additional job insecurity questions (#37,38); and the skill level - required question (section IV -#5). This gives a 49 question total; and this is our recommended Standard Job Content Instrument.

3. Many users may wish to further supplement the 49 question version, with scales measuring psychological strain and job dissatisfaction (26 questions total: section II-#V1-V5, measuring job dissatisfaction, and section II-#R1-R8, measuring depression are most strongly recommended). To control for physical hazards at work that may also contribute to the outcome variables we recommend the 9 question physical hazard and exposure scales (#39-47).

4. A still more expansive form of the questionnaire includes new scales for human/computer interactions (section III - Technology - 17 questions - see Turner and Karasek , Ergonomics], June 1984); and new scales for work social identity (5 questions) and customer contact problems (7 questions).

5. In all cases basic demographic data (job title, age, sex, race, education, etc) must also be collected somewhere in your instrument. (such as our instrument's introductory questions in section I p.1 and section IV , see also the list in section III).

## **III. "UMBRELLA" SCALES AND THE TWO PART DATA COLLECTION STRATEGY**

Each user's survey location has detailed job circumstances which should be specifically measured in greater detail than the broadly worded question in our scales can distinguish. We encourage user's to supplement our instrument with more specific scales of their own construction. •••[italics] To build these scales we suggest beginning with unstructured interviews of a number of relevant individuals (labor, management) to determine the most salient issues at that site. Formulate these issues so that they can be measured by "expert observers", by monitoring technology, or as a small set of questions added to the instrument (perhaps three to ten questions per issue). These new measures become your new, "umbrella" scales which you test and administer along with our questions.

How can these new measures be utilized without national comparison standards (such as are available for our scales)? First, correlate these new scales with the Job Content Scales. This will help define the meaning of the new scales in terms of standard reference measures. Then, score each group in your survey on both your new "umbrella" scales and the Job Content Scales. In this manner both the national reference advantages of the Job Content Scales and the site-specific relevance of your own "umbrella" scales can be combined. For example:

You might be able to conclude that your new scale of "Skill Obsolence from Automated Data Entry" is correlated to the Job Insecurity and Skill Discretion Scales in the Job Content Instrument;  $r=.65$  and  $r=-.72$ , respectively. You might go on to demonstrate that your new scale illustrated a particularly salient problem in Department "A"; while another scale was the best measure of problems in Department "B". Furthermore, you could show that Department "A" and "B" also differ on their scores on the national JobContent Scales for Skill Discretion and Job Insecurity.

### III. STANDARD SCALES (See section VI and NIOSH report for detail)

<u>Job Content Scales and Demographic Variables</u>	<u>Computer Label*</u>
- Job Title/Occupation	(3digit Census Occup. Code)
- Industry	(4digit SIC code)
1. Skill discretion	DISC1
2. Created skills	DISC1A
3. Decision authority	NDISC2
4. Decision latitude ("control")	NDISC12
5. Skill utilization	SKLUTL
6. Psychological job demands ("demands")	DEM13
7. Job insecurity	JOBSEC
8. Hours worked	HRSWK
9. Total psych. stressors (z-scored addition #6 + #7)	DEMSEC
10. Supervisory responsibilities	SUPERV
11. Union membership	UNION
12. Coworker support	NCOWSUP
13. Supervisor support	NSUPSUP
14. Total social support	NSUPPOR
15. Physical exertion	PHYSDEM
16. Hazardous condition	PHYS4
17. Toxic exposures	PHYS5
18. Total physical hazards(z-scored addit. #16 + #17)	PHYSTOT
19. Total physical stressors(z-scored add. #15 + #18)	PHYPHY
20. Job dissatisfaction	HL8
21. Depression	HL7A
22. Composite psychological strain	PSYTOT
23. Sex	SEX
24. Age	AGE
25. Race	RACE
26. Income from job	SLFINC
27. Education	EDUC
28. Duncan social status	DUNCAN
29. Southern geographical location	SOUTH

30. Rural location  
31. Firm size

RURAL  
FIRMSZ

\*Prefix 'S' for  
std. deviation

## B. Sample size and Statistical Power of Comparisons

The sample size you will need to verify the statistical significance of a particular difference between your sample and the national scores depends on the statistical relationships discussed in Section V. In general we recommend you have a sample size of at least 100 per occupation group for which you would like to make comparisons. Using our larger, aggregated occupation (or industry) groups, a sample size of 50 should allow detection (two-tailed test,  $p > .01$ ) of a scale score difference of .5 standard deviations - roughly one fifth of the full range of variation between occupation groups on our scales (see "occupational map" NIOSH report, p. 47). A .75 standard deviation difference could be detected with a smaller sample (making possible comparisons to our detailed occupations (or industries)), but a .25 standard deviation difference would require a much larger sample.

#### IV. PERMISSION AND DATA RESPONSE REQUIREMENTS (JOB DATA ONLY)

Permission is granted to all researchers to use and duplicate this instrument for studies involving samples of up to 75 people. The only requirement is that a short summary of the project be mailed back to us before you begin, briefly noting the parts of the instrument that you intend to use.

However, our permission to use the instrument on larger studies is contingent on users providing a copy of basic statistics and the job data file based on our questions (see specifics below). This requirement will allow us to update the national scores in the future, and to make certain the instrument's scales have a long-term future. For users who will present their findings in statistical form and intend to use our national scores as a comparison standard (presumably all users), these requirements represent no more analytic work than would already be necessary. Indeed the requirements below might be viewed as a "basic statistical analysis plan".

Once we receive the materials below we will then forward to the user the complete national mean scores and standard deviations for detailed occupation or industry groups, or for aggregated occupation or industry groups-for men,for women, or for men and women combined (see sample scores enclosed, and Appendix I/VI for group descriptions and sample sizes):

##### A. Descriptive Materials

1. A paragraph summarizing population, industry,job type,sample strategy,etc. A second paragraph summarizing the main goals of the study, other data collected (brief categories), and any salient issues or problems that arose.

2. A copy of your version of the instrument only if you have added new, specific scales related to the Job Content Scales(the"umbrella" scales). Other parts of your questionnaire need not be included (although some brief listings of such data would be desirable).

##### B. Statistical Summary

1. For Men, Women ( where  $n > 25$ ); and (Men + Women):

a. Means and standard deviations for all Job Content Scales, demographics, and "umbrella" scales for the three groups above.

b. Means and std. deviat. for all Job Content Scales, demographics, and "umbrella" scales for the three groups above, simultaneously broken down by 1970 U.S.3-digit Census Occupation Codes (this coding will be needed for your comparison to our scores. Occupations maybe coded from job titles using standard U.S. government occupationalcoding materials (see reference enclosed)).

2. For Men or (Men + Women):

a. Correlation matrix of all Job Content Scales , demographic variables and "umbrella" scales.

b. Correlation matrix (and covariance matrix if possible) for all ofthe individual questions included from our Job Content Scales, your"umbrella" scales, and the demographic variables.

C. Raw Data File - Job Scores and Demographics Only (not all your data)

1. Each individual in your survey should be a record (but no ID variable). Each Job Content Scale score and each "umbrella " scale score (not each question), along with all the demographic information (listed in section III above), should be placed in the record for each individual. Use the variable order in the section III list above and the following Fortran format:

a. F7.3 for each variable, including your new "umbrella" scales, except income and firm size which are F7.2.

b. List variables in the above order, 10 variables per "card image", adding your new variables at the end of the list.

c. Use the label names in section III for our variables. For your variables any 8 letter/number combination may be used. (Please give us a list defining the content of each new variable thus labeled.)

d. Skip seven columns (the "7X" Fortran convention) for each variable on the section III list that is missing or not measured.

e. Missing data should be represented as 99 (99999 for income, firm size).

2. The data should be placed on a standard IBM 5 1/4" floppy disk under MS-DOS (or other IBM standard label and standard operating system formatted media if the floppy disk format is not possible).

## V. SAMPLE SIZE AND STATISTICAL SIGNIFICANCE COMPUTATIONS

The sample size needed by the user is very sensitive to the magnitude of scale difference to be detected between the user's population and the national standard. As an example, a sample size of 50 should be sufficient to confirm a significant difference (using our aggregated occupations or industry scores) of .5 standard deviations - roughly one fifth of the full scale variation that we find between occupations and industries on our scales. Confirming a .75 standard deviation difference can be done with a significantly smaller sample size, and therefore may allow our detailed occupation or industry scores to be utilized. However, to confirm a .25 standard deviation difference will require a substantially larger sample than 50, and would have to be based on the aggregated codes at best. (See discussion and Table 1 below).

We have the full set of Job Content Scale scores for the following sets of national comparison groups, with sub-group sample sizes as follows:

a. Total population (n=4500), Men (n=2950), Women (n=1550)

b. Aggregated occupations-85 groups, and aggregated industry-65 groups. Scores are available simultaneously broken down as Men, Women or Men plus Women (n ≥ 25 for almost all groups).

c. Detailed 3-digit 1970 U.S. Census Occupation codes (slightly aggregated to n ≥ 3), and 3-digit (sometimes 4-digit) U.S. Standard Industry codes - both roughly 250 groups each. For occupation codes are available simultaneously broken down as Men, Women, or Men plus Women (average n = 14, but many "n's" as low as 3).

The following formula gives that exact relationships between statistical power, sample size, confidence interval, and our sets of occupation and industry scores, but it requires the standard deviation of each detailed occupation (or industry) group:

$$t = \frac{(\bar{X}_{\text{National}} - \bar{X}_{\text{You}})}{\sqrt{\frac{((n_{\text{Nat}}-1) \text{std.dev}^2_{\text{Nat}} + (n_{\text{You}}-1) \text{std.dev}^2_{\text{You}}) \left(\frac{1}{n_{\text{Nat}}} + \frac{1}{n_{\text{You}}}\right)}{(n_{\text{Nat}} + n_{\text{You}} - 2)}}$$

The formula will give approximately correct results for study design purposes, if the national total population standard deviations are substituted with a correction factor (which is between .65 and .95 depending on the scale (1.0 - Betw.occ. var.); for this and other scale statistics, see NIOSH report ). If we further assume that both the "n" of our occupation and the "n" of your sample are ≥ 25, and that your group's scale standard deviations are similar to ours (likely unless your occupations are very narrowly defined), then the formula reduces to the following approximation used to calculate Table 1.

$$\frac{1}{n_{\text{National}}} + \frac{1}{n_{\text{You}}} = \frac{\text{Diff. in Means}^2 \text{ (% of std. dev. units)}}{t^2 \text{ (Corection Factor)}}$$

Table 1 shows the "typical" sample size you need; at a given scale difference, at a given level of statistical significance, given our sample size for the occupation you wish to compare with (the "n's" for each occupation and industry group are included in Appendix 1. [ NOTE: "n" for PHYSDM,HL7A, HL8, PSYTOT is only 2/3 the "n" listed in our sample

size tables]). The computations also depend on the scale used. We have based our calculations on the Decision Latitude scale; its high between-occupation variance diminishes the needed sample size somewhat. The calculations are also based on a two-tailed test for significance (direction of the difference in the means is not known a priori). A one-tailed test can reduce the sample needed significantly. Because of these approximations we suggest the user *add 50%* to the "n" so calculated.

TABLE1: USER SAMPLE SIZE ("n"Y<sub>ou</sub>), GIVEN NAT. SAMP. GROUP SIZE ("n"Nat)

Confid.	.75 std. dev.		.50 std. dev.		.25 std. dev.	
	"n"Nat	"n"Y <sub>ou</sub>	"n"Nat	"n"Y <sub>ou</sub>	"n"Nat	"n"Y <sub>ou</sub>
p ≤ .10	6	9	6	not.pos	6	not.pos
	11	5	11	25	11	not.pos
	20	5	20	12	20	not.pos
	40	4	40	9	40	95
	80	4	80	8	80	44
	160	4	160	8	160	35
p ≤ .05	6	40	6	not.pos	6	not.pos
	11	9	11	>1000	11	not.pos
	20	7	20	20	20	not.pos
	40	6	40	14	40	>1000
	80	6	80	12	80	80
	160	5	160	11	160	53
p ≤ .01	6	not.pos	6	not.pos	6	not.pos
	11	33	11	not.pos	11	not.pos
	20	13	20	120	20	not.pos
	40	10	40	30	40	not.pos
	80	9	80	22	80	500
	160	8	160	19	160	121

## VI. FORMULAE FOR JOB CONTENT INSTRUMENT SCALE CONSTRUCTION

Skill Discretion =  $[Q3 + Q5 + Q7 + Q9 + Q11 + (5 - Q4)] \times 2$  \*rev.6/86\*

Created Skill =  $[Q3 + Q5 + Q11]$

Decision Authority =  $[Q6 + Q10 + (5 - Q8)] \times 2$  \*XX\*[x4]\*

Decision Latitude = Skill Discretion + Decision Authority

Skill Utilization = IV.5 - Education <both coded in years>

Psychol. Job Demands =  $[(Q19 + Q20) \times 3 + (15 - (Q22 + Q23 + Q26)) \times 2]$

Job Insecurity =  $[Q33 + Q36 + (5 - Q34)]$

Hours Worked = IV.1 <hours>

Total Psyc. Stressors = Z-scored addition of Psyc. Job Dem + Job Insec.

Supervisory Responsibility = Q15 <1 = none, 5 = yes>

Union Membership = Q16 <1 = no, 5 = yes>

Coworker Support =  $[Q53 + Q54 + Q56 + Q58]$

Supervisor Support =  $[Q48 + Q49 + Q51 + Q52]$

Social Support = Coworker Support + Supervisor Support

Physical Exertion = Q21

Hazardous Conditions =  $[Q41 + Q42 + Q44 + Q45 + Q47]$

Toxic Exposures =  $[Q39 + Q40 + Q43]$

Total Physical Hazards = z-scored addition of Hazard Cond + Tox Expos.

Total Physical Stressors = z-scored addit. of Phys Exer + Tot Phys Haz

Job Dissatisfaction =  $[(V3 + V5 - V2 - V4) \times 3 - (V1 \times 4) + 40] / 60$

Depression (Life Dissatis) =  $[R2 + R3 + R4 + R5 + R6 + R7 + R8 - R1] / 48$

Physic/Psychosom Strain =  $[(4 - V6)^2 + (4 - V11)^2 + (4 - V12)^2 + (4 - V13)^2] / 36$

Sleeping Problems =  $[(4 - V14)^2 + (4 - V15)^2] / 18$

Compos. Psych. Strain = z-scored add.of Job Diss+Depr+Physic/Psyc+Sleep

THE FOLLOWING MUST BE GATHERED SOMEWHERE IN *YOUR* INSTRUMENT:

Sex <1 = male, 2 = female>

Age <years>

Race <1 = white, 0 = non-white>

Education <years>

Income from Job (IV.3) < 000's dollars/year>

Southern Location <1 = yes, 0 = no>

Rural Location <1 = yes, 0 = no>

Firm Size <number of employees at your location>

Job Title <3-digit US Census Occupation code. This determines Duncan SES>

Industry <3-digit SIC codes are desirable, but broad industry is sufficient>

## ADDITIONAL SCALES

These new scales have not yet been validated on a national sample, but are currently being used by researchers, and we expect validation information to accumulate soon. We suggest the following formats for initial scale construction attempts.

Decision Latitude - Group = [Q13A + Q13B] (=missing value if Q12 = 1)

Decision Latitude - Formal = [Q14 + Q15]

Decision Latitude - Union = [Q17 + Q18] (=missing value if Q16 = 1)

Decision Latitude Macro =  $\frac{[\text{Dec.Lat.}-\text{Group} + \text{D.L.}-\text{Formal} + \text{D.L.}-\text{Union}]}{3}$   
\*( /2 if Q12 or Q16 =1; /1 if Q12 and Q16 = 1)

•••Job insecurity 2 = [Q33 - Q34 + Q35 + Q36 - Q37 - Q38]

•••Extensions of original scales for Framingham version of Instrument:

•••Physical Exertion (FR) = [Q21 + Q24 + Q25]

•••Physical Isometric Loads = [Q30 + Q31]

•••Psyc. Job Dem. (FR) = [Q19 + Q20 - Q22 - Q23 - Q26 + Q27 + Q28 + Q29 + Q32]

•••Job Insecurity (FR) = [Q33 - Q34 + Q35 + Q36]

## •••ADDED SCALES

Customer Relationships = [Q59 + Q60 + Q61 + Q62 + Q63 - Q64]

Self-Identity Through Work = [Q65 + Q66 + Q67 + Q68 + Q69 + Q70]

Muscle Aches = [V7 + V8]

Suspect Heart Disease = [V9 + V10 + V16]

## NEW TECHNOLOGY SCALES (Section III of questionnaire)

Value of New Skills = [III.2 - III.3 + III.15]

Control over Equipment = [III.4 - III.5 - III.7]

Addition Work Load = [III.12 + III.14 + III.18]

Capacity of Equipment = [III.10 + III.11 + III.13 - III.8]

Type of Technology = III.9, III.16, III.17 - no scale intended

## OTHER QUESTIONS

Shift Work = IV.2, •••Work schedule flexibility = IV.4 - no scale intended

••• work Group Size = Q12

Substance Abuse = V17(tranquillizers), V18(smoking) - no scale intended

Additional Supervisor Support Question = Q69

Additional Coworker Support Question = Q71

71. I get information/feedback from my co-workers about how well I do my job.

18. The computer or automated equipment I use keeps me constantly busy, with little chance for pauses.