

Toward an Epidemiology of Work Disability

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MUCH OF THE RECENT CONCERN ABOUT THE rising cost of illness focuses on expenditures for medical services. However, the indirect cost in the form of lost wages often exceeds the direct costs for health care. For example, Cooper and Rice (1976) estimated that the indirect costs of illness were almost two times as large as the direct ones.

Attempts to control the total cost of illness must therefore also include strategies to reduce the effects of disability due to illness, whether by preventing the loss of work, returning the disabled to the labor force, or changing entitlement criteria for disability compensation. Such efforts would be timely. Disability rates among workers more than doubled between 1966 and 1978 (Lando et al., 1979), and in doing so threaten the solvency of Social Security (Cowan, 1979).

This paper discusses some of the problems public policy must face in trying to prevent or at least reduce the prevalence of work disability. It asks the question, "What factors affect the probability that a worker will become disabled after the onset of an illness?" and suggests an additional framework for answering it by calculating a model of the causes of disability, a model derived from structured interviews conducted with persons who have been diagnosed by a physician as having rheumatoid arthritis, a common medical condition

and one frequently associated with work disability. The purpose of the paper, thus, is not to study the epidemiology of the illness, or to estimate the prevalence of work disability among a random, community-based sample of persons with this condition. Instead, its purpose is to study the causes of work disability after the onset of rheumatoid arthritis in a population of persons who were working pre-morbidly. The paper aims at understanding those aspects of an extant illness and its treatment, as well as of an individual's social and work environment, that affect his or her ability to continue to work. Although disability among persons at present outside of the labor force—housewives, students, retired persons—is itself an important social problem, this paper focuses solely on the causes of disability among working persons and on only one dimension of work disability, total cessation of employment.

The Context of the Study

The conventional wisdom concerning the causes of work disability has recently shifted from an almost total emphasis on medical factors to one in which such social factors as an individual's demographic background and income, education, and occupation take on increased importance.

As recently as twenty years ago, for example, the American Medical Association's (AMA) Committee on Medical Rating of Physical Impairments argued that, since disability was necessarily the direct result of an impairment caused by an illness or trauma, physicians should restrict their concern to medical categories when evaluating their patients' disability prospects. The committee stated that "competent evaluation of permanent impairment requires adequate and complete medical examination, accurate objective measure of function, and avoidance of subjective impressions and non-medical factors such as the patient's *age, sex, and occupation*" (emphasis added) (American Medical Association, 1958: preface, i).

Legal definitions of disability for the purpose of determining eligibility for program benefits written as much as ten years later parallel the committee's medical perspective. The 1967 Social Security Amendments state that "to be found disabled, an individual must have an impairment so severe that he is unable to engage in any kind of

substantial, gainful work that exists in the national economy" (Social Security Amendments, 1967:868).

Despite these assertions, however, weak correlations among the clinical attributes of impairments, functional limitations, and actual employment problems have frustrated attempts to use clinical impairment ratings to predict whether disability will result (Luft, 1978; Haber, 1971; Nagi, 1969a, 1976). Muscle atrophy due to stroke, for example, may or may not result in loss of mobility (functional limitation), and similar functional problems will manifest themselves differently in various patterns of daily activity (Luft, 1978:19–20). Thus, the effect of an impairment on social functioning generally can be predicted from clinical data only in the most extreme cases (Nagi, 1969a). As a result, researchers and policy analysts have shifted attention from the relation of disease entities to functional limitations, and have refocused on the psychosocial pathways by which impairments associated with illness become limitations on activity and by which these limitations evolve into the behavior patterns labeled "disability." In fact, Daitz (1965) and Haber (1971) argued that disability is a distinct entity, not necessarily related to the etiology or pathogenesis of the illness with which it is associated.

Berkowitz et al. (1976:3) note a "gradual recognition that some individuals are able to adapt to an impairment whereas others are not." This, in turn, reinforces the search for "variables other than the degree of impairment that affect changes in labor supply" (Berkowitz et al., 1976:65). They suggest that workers adjust simultaneously to their physical symptoms and to macroeconomic phenomena by deciding, together with other members of the family, which ones will work and for how many hours. These decisions are influenced by such individual social factors as age, sex, race, education, marital status, expected earnings and income sources, family structure, the will to work, and by such macro factors as regional unemployment rates. Such family adjustment strategies in the presence of a chronic illness are considered analogous to labor market response patterns when illness is not a factor. The Berkowitz model therefore predicts, and its findings demonstrate, that persons with employment liabilities due to nonmedical reasons are most likely to become disabled because of functional limitations (Berkowitz et al., 1976:73–81, 137).

Berkowitz and his colleagues advanced disability theory, then, by demonstrating that social factors are much more important than medi-

cal ones in determining whether individuals will become disabled, especially in the middle ranges of disease severity. They also pointed to the importance of the general labor market in determining the specific response of the impaired person.

Levitan and Taggart (1977:25–26) take the latter point one step further. They argue, and then demonstrate, that an impairment places a worker at the end of the labor queue and that workers with impairments can expect to maintain employment only when job opportunities are plentiful.

Luft (1978:106–109) tested each of the social characteristics noted by Berkowitz for its effect on work disability and found that occupation was the strongest predictor of work loss. He also demonstrated that the physical requirements of each occupation explained more of the variance in work disability than did the occupational title alone, indicating that the physical qualities of work (lifting, manual dexterity, etc.) account for a significant proportion of work disability.

Most of those who analyze disability policy focus on the social and medical characteristics of the individual with an impairment, to predict whether disability will result. A few, particularly Berkowitz et al. and Levitan and Taggart, also include the structure of the labor market in their analyses. Others cite the need for increased attention to the social characteristics of work, though their own data did not include variables to measure them. For example, Luft (1978:109) states:

For a number of specific [i.e., physical] on-the-job conditions, such as accidents, heavy labor, and dust-related disabilities, the specific working conditions associated with these disabilities tend not to be related or to be negatively related to the probability of their occurring. . . . Conditions more closely integrated in the work process and less obvious to the observer, such as stress and repetitive jobs, seem closely related to accidents and conditions due to heavy labor.

Nagi (1976:465) calls for studies of the effects of employer attitudes on the impaired, because his findings demonstrate the positive influence of job modifications on the probability of disability.

It is the hypothesis of this paper that the social qualities of workplaces also significantly affect the probability that an individual with an impairment will be able to continue working. Such qualities include how much tolerance the management exhibits to persons with impairments, what benefits it provides to sustain workers through

periods of flare-up in their illness (health and disability insurance), how much freedom it gives workers to control the pace of their work and their output, the time of their arrival and departure from work, and the degree of their autonomy on the job.

The data analysis that follows assesses the relative importance of the social and physical characteristics of workplaces and the social and medical characteristics of individuals in determining whether disability will result from a previously diagnosed illness. This analysis has important significance for policy because programs at present intervene at the level of the individual, by providing medical care or social services such as vocational rehabilitation or occupational therapy, or by encouraging changes in the physical structure of workplaces and the physical requirements of jobs.

Methods

The basic method of this research was to survey individuals in whom a physician had diagnosed rheumatoid arthritis, to determine their pre-morbid work situations, social backgrounds, and subsequent medical care history, and then by use of multiple regression to evaluate how these factors affected their work status during the study year.

The retrospective cohort design in which a group of individuals is brought forward to the present time, the use of multiple regression with this sort of design and especially in the presence of binary dependent variables, and the peculiarities of the disease analyzed—all pose important problems for the interpretation of the results. Some of these concerns are discussed in Appendix 1.

Twenty-five rheumatologists (arthritis specialists) from nineteen practice settings in the San Francisco and the Boston metropolitan areas assisted in our study by maintaining lists of all persons presenting with rheumatoid arthritis (RA) during an ensuing one-month period. We chose RA for study because it is a fairly common illness and a cause of disability that is also a discrete diagnosable entity. The rheumatologists who participated in the study were told to exclude persons with comorbidities and, because the study concerns the effect of RA on work, persons who were not of working ages, 21 to 65 years, at the onset of their condition. The practice settings included ten individual fee-for-service practices, two group fee-for-service practices, four public hospital clinics, two Veterans' Administration Hos-

pital clinics, two university out-patient facilities, and a large health maintenance organization. This procedure was designed to yield a survey population that included persons from a range of social and economic backgrounds. It did not necessarily provide a random distribution of disease severities, presumably because rheumatologists care for patients more severely afflicted on average, or because the less severely ill would be less likely to present during a one-month period. Though sampling among physicians precluded a truly random sample of the medical characteristics of persons with RA, community sampling of discrete clinical entities is impractical, both because of their low relative prevalence in the population at large (in this case 2 to 3 percent) (Friedman, 1974:121-129) and the inaccuracy of self-diagnosis by patients (Nagi, 1969b:27-36).

The rheumatologists recorded the names of the persons who presented to their offices with RA, as well as the stage of their illness, and informed them that they were to be contacted for the study. Eighty-nine percent of the persons contacted by the study team agreed to participate.

The 245 participants were interviewed over the telephone by a team trained by the authors, and were asked a series of questions intended to elicit information on the employment situation of the respondents in the year before the illness began and in the study year. The survey included questions relating to the respondents' occupations, the industries and the size of the firms in which they worked, the duties they performed on their jobs as well as the control they exercised over their own activities and those of others, their supervisory status, and whether or not they were self-employed. The activities required by the job and the occupational title were then translated, via the physical characteristics scale of the Dictionary of Occupational Titles, into a series of physical-characteristic-of-job variables in order to assess how the physical requirements affected later work. Questions designed to obtain more traditional social data were also asked for both the premorbid and the study years. These traditional items included individual and family incomes by source, extent of education, size of family and type of family structure, as well as racial background and marital status. A condensed version of the stressful life-events questionnaire was also used (Holmes and Rahe, 1967:213-218) to evaluate the extent to which individuals experienced other life changes that might account for their employment situation during the study year. Changes between the premorbid and

the study year in respondent's work status, in occupation, in workplace, or in hours worked each week were also recorded, as were any changes in the work status of family members. The persons with RA also provided data on each of the medical, surgical, and drug therapies utilized, on each health and social service professional visited for this condition, and on the length and characteristics of their illness. For data analysis, onset was defined as the year in which a physician diagnosed the condition, although respondents also reported the year in which they first noticed their symptoms. Response rates for questionnaire items averaged 95 percent, with a range of from about 85 to 100 percent.

Of the 245 respondents, 180 were actually employed and 9 were seeking employment in the premorbid year. The remaining 56, housewives and students, were not considered part of the labor force. Work adjustment patterns of the latter two groups will be explored in future papers. This paper concerns the effects of RA on the work situation of the 180 persons employed in the premorbid year. It tests the hypothesis that the social attributes of work are more important than the social or medical characteristics of the individual respondent, or than the physical characteristics of jobs, in determining whether disability (defined as total cessation of employment) will result after the condition is diagnosed. The hypothesis is tested by the technique of multiple regression. The dependent variable in this analysis is binary: whether or not an individual who was working premorbidly maintained employment. The scalings used in the independent variables are given in the notes to Tables 1 through 4. Because some of the variables measuring the social characteristics of work are uncommon in the health care literature, the evidence from the sociological literature for their external validity is presented, in Appendix 2. The appendix lists the questionnaire items themselves for a check of their face validity, and then presents a table of correlations among the items and other critical variables in this analysis for a check of their internal consistency.

Results

Tables 1 through 4 present data showing how the medical, demographic, personal resource (occupation, education, and income), and social characteristics of work variables, individually and in combina-

tions, affect the current employment situation of persons who were employed before they became ill. The data are arranged in this manner so that the explanatory power of equal numbers of medical and social variables can be compared. The tables report regression equations. A negative regression coefficient indicates that the presence of the condition measured by the variable decreases the likelihood of work disability with all other variables held constant; a positive regression coefficient, conversely, indicates an increased likelihood of disability.

This section also reports how the physical characteristics of jobs affect employment. The latter data and those on personal resources and social characteristics of work may be used to analyze three disability policy alternatives: to alter the physical characteristics of the work performed by persons with impairments, as well as the physical characteristics of workplaces; to develop the personal resources of persons with impairments; or to alter the social characteristics of jobs where such changes do not interfere with the production process.

Table 1 demonstrates that the best four medical variables (among the twenty-five therapies and professional services analyzed) explain 6.3 percent of the variance in the current employment situation of the sample group ($p < .05$). The surgical and stage (severity) (Steinbrocker et al., 1949) variables account for most of the explanatory power of the medical dimension; the regression that includes these two variables explains 5.8 percent of the overall variance. The length of time since RA was diagnosed and the presence or absence of comorbidities together contribute very little to the determination of disability.

The finding that comorbidity did not influence employability among respondents to the survey is expected, because those with serious comorbidities were eliminated from the sample before the interview. Physicians may be surprised to note, however, that the duration of the illness does not affect employability. The medical literature argues that the damage from rheumatoid arthritis increases with the passage of time (Cobb, 1971:31-36). It is apparent, however, that employment effects are as likely to occur early in the course of RA as later. Still, those whose illness is more severe, as measured by anatomic stage, are, as expected, significantly more likely to cease working.

Perhaps the most striking finding from the medical data is that those respondents who had received a surgical procedure for their condition were less likely to continue working ($p < .01$). In fact, this finding was

TABLE 1
Effect of Medical Variables on Current Employment among Persons Previously Employed (N = 165)

Variables in the Regression	Regression Coefficients and Standard Errors for Variables				Percent of Variance Explained
	(1) Surgery*	(2) Severity of Illness†	(3) Comorbidities Present*	(4) Years after Diagnosis†	
1-4	.16 ¹ (.08)	.06 (.04)	.08 (.09)	0 (0)	.063 ⁴
1-3	.16 ¹ (.08)	.07 (.05)	.08 (.09)	—	.062 ⁴
1-2	.17 ² (.08)	.07 (.04)	—	—	.058 ³
1	.22 ¹ (.07)	—	—	—	.043 ³

* Dichotomous variable.

† Continuous variable.

¹ Regression coefficient significant at $p \leq .01$.

² Regression coefficient significant at $p \leq .05$.

³ Relation significant at $p \leq .01$.

⁴ Relation significant at $p \leq .05$.

replicated, although to a lesser degree, for each therapy and drug regimen commonly prescribed for persons with arthritis. That is, persons who had taken aspirin (the most common treatment) or steroids, received physical therapy, or used any other regimen were less likely to be working by the study year than those who did not, even when the stage of the illness was held constant. Several hypotheses to explain the phenomenon come to mind and could be investigated. The presence or absence of therapy might be a much more sensitive index of disease severity than the physiological and anatomical ones physicians traditionally use. Perhaps receipt of the therapy legitimates the expression of pain and hence the withdrawal from employment. Perhaps, instead, some of the therapies are inherently debilitating with respect to employment, even though they arrest or control the progress of the disease and provide relief from pain. At any rate, the negative association between each therapy and the ability to maintain employment demands further inquiry.

Table 2 shows the effect of demographic variables, individually and in combination, on the current employment situation of the persons in the sample. The five best demographic variables (two for marital statuses, and race, age, sex) explain 5.2 percent of the variance in disability, though not quite at the $p < .05$ level. The four best demographic variables explain 5 percent of the variance, which is only slightly less than the 6.3 percent explained by the four best medical variables. Most of the explanatory power of the demographic variables derives from the marital status of the respondents. When marital effects are taken into account, age, sex, and race contribute very little additional to the percent of variance explained, though nonwhites and women were slightly more prone to disability. The regression coefficients for the two categories of marital status analyzed in Table 2 are strongly positive, indicating that persons now married or previously married are more likely than those never married to experience loss of employment. A separate regression was run that included the category "never married" in the analysis, but this run is not reported in Table 2. The regression coefficient for persons never married was $-.33$, indicating that such persons were likely to remain employed, with all other variables held constant. Together, these findings suggest that those now married or previously married may choose to withdraw from employment because they have a greater diversity of sources of financial support on which to rely. For example, the widowed may

TABLE 2
Effect of Demographic Variables on Current Employment among Persons Previously Employed (N = 165)

Variables in the Regression	Regression Coefficients and Standard Errors for Variables					Percent of Variance Explained
	Marital Status*		(3) Race†	(4) Year of Birth‡	(5) Sex§	
	(1) Married	(2) Widowed, Separated, Divorced				
1-5	.27 ¹ (.12)	.32 ¹ (.13)	.11 (.10)	0 (0)	.05 (.08)	.052
1-4	.25 ¹ (.12)	.33 ¹ (.13)	.11 (.10)	0 (0)	—	.050
1-3	.27 ¹ (.12)	.34 ¹ (.13)	.09 (.09)	—	—	.046
1-2	.26 ¹ (.12)	.34 ¹ (.13)	—	—	—	.041 ²

* Marital status was expressed as two dummy variables for purposes of regression analysis; the excluded category, "never married."

† Race was divided into white and nonwhite categories; the latter were more likely to become disabled.

‡ Continuous variable.

§ Males received the code, 1; females, 2. The latter were more likely to become disabled.

¹ Regression coefficient significant at $p \leq .01$.

² Relation significant at $p \leq .05$.

have an estate, and the divorced may receive alimony. Persons who have never been married, on the other hand, can count only on welfare, disability payments, or small interhousehold transfers to compensate for lost income.

Given the current fiscal problems of the Social Security Disability Fund, and the finding that persons who have no one else in the family on whom to rely for support are likelier to retain employment, policy makers might want to consider changing the eligibility criteria for receipt of disability compensation. At present, the work history of the person facing disablement is the sole criterion for eligibility. If the economic status of the family were also included as a criterion, then persons other than the major wage earner in a household of high income would not receive payments. In turn, such persons then might choose to remain on their jobs. Of course, before these changes are made in entitlement criteria, additional data are necessary to substantiate the claim that persons currently or previously married are choosing to stop work. The higher disability rates among those married may be due to the reluctance of employers to lay off wage earners who have no one else on whom to rely for support.

In another analysis, the current employment situation of the respondents was regressed on individual and combinations of physical characteristics required by jobs, as derived from the Dictionary of Occupational Titles (U.S. Employment Service, 1966). The physical characteristics included requirements for lifting or carrying, climbing and balancing, reaching and handling, talking and hearing, visual acuity, and the degree to which the jobs exposed the worker to extremes of cold or heat, humidity, noises and vibrations, hazards, and fumes. We hypothesized that lifting, climbing, reaching, and extremes in temperature and humidity affected the employment prospects of persons with rheumatoid arthritis. However, no one physical characteristic of a job correlated significantly with current employment, even when the severity of the medical condition was held constant. Only when the current employment situation was regressed simultaneously on lifting, climbing, reaching, and humidity was there a slight, though significant ($p < .05$) effect on employment. This suggests that one requirement alone may not bring about work disability, but that several together might. Note also that Luft (1978) found a different result—a significant impact of the physical requirements of jobs. In his sample the specific physical impairment was known (e.g., to the hand)

and he was able to observe an interaction between the specific impairment and the requirement that would affect it (in the case of the hand, for example, lifting or reaching).

Table 3 shows how the variables that measure individual resources (income, education, occupation), singly and in combinations, affect the current employment situation of the sample group. The five best personal-resource measures explain 4.3 percent of the variance in current employment, though not at a statistically significant level. The five best include three categories of occupation, the absolute amount of family income, and the respondent's education. The four best personal resource variables explain 4.2 percent of the variance in disability, which is less than the explanatory power of an equal number of medical and demographic variables.

To determine which income variables contribute most to the determination of disability, separate regressions were run with income measured absolutely at the family and individual level, and relatively at the individual level. Family income adds much more explanatory power than either the absolute amount of individual income, or individual income as a percent of the national median in the respondent's occupation. Occupation, education, and family income explain 4.3 percent of the variance in the maintenance of employment; occupation, education, and absolute amount of individual income, 3.2 percent; occupation, education, and relative individual income, 2.9 percent. These findings suggest that decisions regarding employment are more likely to be made on the basis of the household's financial status than on that of the individual wage earner.

Most of the explanatory power from the personal resource variables derives from the respondent's occupation. Professionals and managers were least likely to stop work; clerical and sales workers also tended to retain their jobs after onset of RA. Service workers, however, were very likely to become disabled. The term "occupation" subsumes the physical aspects of the work, the prestige accorded to crucial tasks performed (Duncan, 1961; Davis and Moore, 1945), and the special package of resources and skills that individuals use on the job. Which aspect of occupation accounts for disability? The data presented earlier demonstrate only equivocal evidence for an effect by the physical characteristics of jobs, and the data presented in Table 3 show only weak effects from education and income, the other personal resource measures. In a separate analysis, the Duncan (1961) occupational

TABLE 3
The Effect of Personal Resource Variables on Current Employment among Persons Previously Employed (N = 165)

Variables in the Regression	Regression Coefficients and Standard Errors for Variables						Percent of Variance Explained	
	(1)	(2)	(3)	(4)	(5)	(6)		(7)
		Occupation*						
		Professionals, Managers	Clericals, Sales	Services Workers	Family Income†	Individual Income†	Individual Percent of National Median†	Years of Education†
1-4, 7	-.17 (.13)	-.07 (.10)	.07 (.11)	.01 ¹ (0)	—	—	—	.01 (.01)
1-3, 5, 7	-.16 (.13)	-.08 (.10)	.08 (.11)	—	0 (0)	—	—	0 (.01)
1-3, 6-7	-.17 (.13)	-.08 (.10)	.09 (.11)	—	—	.01 (.03)	—	0 (.02)
1-4	-.15 (.11)	-.06 (.09)	.07 (.11)	.01 ¹ (0)	—	—	—	—
1-3	-.17 (.11)	-.07 (.09)	.09 (.11)	—	—	—	—	—

* Occupation was made into dummy variables for purposes of regression analysis; the excluded category was "manual labor."

† Continuous variable.

¹ Regression coefficient significant at $p \leq .05$.

prestige score was not found to be associated with employment status in the study year, suggesting that occupational prestige also does not affect the probability of disability. It is important for policy purposes to discover the origin of the occupational effect, however, since current policy efforts include programs to shift workers with impairments to less physical work, and to develop their human capital through vocational rehabilitation so that they can approach the labor market with a better package of skills and resources.

Using the data from the present study, we ran a separate regression with occupation excluded to measure the explanatory power of education and family income, the next two best predictors among the traditional social class variables. Together, education and family income explained only 2.5 percent of the variance in the current employment situation of the respondents.

Overall, the data presented in Table 3 suggest that the resources individuals bring to the labor markets influence their disability situation only slightly. More specifically, a good education will not and a white-collar occupation may not prevent disability. In order to evaluate programs designed to alter the employability of persons with impairments after the onset of disease, we analyzed the effects of changing occupations and of utilizing vocational rehabilitation and occupational therapy. Neither changing one's occupation nor utilizing these services was significantly associated with employment status in the study year.

Table 4 shows how the variables measuring the social characteristics of work, individually and in combinations, affect the current employment situation of the sample group. Earlier we argued that the social characteristics of work would influence disability more strongly than the resources individuals bring to the workplace. The data displayed in Table 4 substantiate this point for the population under study. Control over the pace of work (measured as three dummy variables for the purposes of the regression analysis), self-employment status, and occupation (also measured as three dummy variables) explain 12.9 percent of the variance in the current employment situation of the sample group ($p < .01$). Since occupation may be defined either in the workplace or by the resources individuals bring to the labor market, a regression was run with occupation excluded in order to gauge the effect of factors defined unambiguously in the workplace. Control over the pace of work and self-employment alone explained 11.2

TABLE 4
 The Effect of Variables Measuring the Social Characteristics of Work on Current Employment among Persons Previously Employed (N = 165)

Variables in the Regression	Regression Coefficients and Standard Errors for Variables							Percent of Variance Explained
	Control over Pace of Work*			Occupation†				
	(1) By Worker Alone	(2) By Worker and Superiors	(3) By Superiors Alone	(4) Self-Employment‡	(5) Professionals, Managers	(6) Clericals, Sales	(7) Services Workers	
1-7	-.13 ² (.07)	-.06 (.13)	.18 ² (.10)	-.26 ¹ (.13)	-.14 ² (.08)	.08 (.09)	.05 (.10)	.129 ³
1-4	-.12 (.08)	-.05 (.13)	.21 ² (.11)	-.25 ¹ (.13)	—	—	—	.112 ³
1-3	-.17 (.08)	-.03 (.13)	.22 ² (.11)	—	—	—	—	.092 ³

* Control over the pace of work was made into dummy variables for the purpose of regression analysis; the excluded category was "by workers and colleagues."

† The self-employed received the code, 1; others, 2. The latter were more likely to become disabled.

‡ Occupation was made into dummy variables, with the category "manual labor" excluded.

¹ Regression coefficient significant at $p \leq .01$.

² Regression coefficient significant at $p \leq .05$.

³ Relation significant at $p \leq .01$.

percent of the variance in disability, also at the .01 level of significance.

Control and self-employment, together comprising the four best variables measuring the social characteristics of work, have an explanatory power 1.8 times as large as the four best medical, 2.2 times as large as the four best demographic, and 2.7 times as large as the four best personal resource variables. Highly negative and slightly negative regression coefficients for control by workers alone, and by workers and their superiors ($-.12$ and $-.05$, respectively), indicate that the workers' involvement in setting the pace of work reduces the probability that they will stop work. On the other hand, when superiors alone set the pace of work, the probability that a worker will become disabled significantly increases (the regression coefficient is $+.21$). Self-employment independently and significantly increases the chance that an individual impaired because of rheumatoid arthritis will continue working. Not all the social characteristics of work affected the probability of work loss. For example, none of the measures of control over others' work activities did, nor did such controls over one's own work activities as being able to decide when to take a break in the middle of a work day. Still, some dimensions of control over one's own work, such as being able to leave within the work day to receive medical care, or to decide when to take a day off without requesting a superior's permission, also increased the likelihood of staying employed.

Up to this point, each set of variables that influences disability has been discussed in isolation from the other sets. Table 5 presents five regression equations that simultaneously use the best medical, demographic, personal resource, and social characteristics of work variables to explain the current employment situation of the respondents. The equations also include a variable derived from the question, "Did any changes in the activities of your premorbid job occur?" because such modifications significantly reduced the likelihood of disability (Nagi, 1976:455). Finally, three of the runs include unemployment rates, measured in the premorbid year for the local region and for the entire nation, because high unemployment increases the chance that an individual will experience disability (Levitan and Taggart, 1977:25-26). The first two regressions in Table 5 include 165 cases (15 respondents failed to answer every item used in the regressions). Since data on the unemployment rate in the metropolitan area before 1965 were

TABLE 5
A Model to Explain Current Employment Status

Vari- ables in the Regres- sion	Regression Coefficients and Standard Errors of Variables														R ²	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)		
			Marital Status*		Occupation†		Control over the Pace of Work‡									
1-12	165	.05 (.04)	.14 ¹ (.07)	.30 ¹ (.11)	.35 ¹ (.12)	-.12 (.10)	.01 (.09)	.07 (.10)	-.15 ² (.08)	-.11 (.13)	.11 (.13)	-.27 ¹ (.13)	-.19 ¹ (.07)	—	—	.239 ³
1-12, 14	165	.04 (.09)	.13 ¹ (.07)	.30 ¹ (.11)	.33 ¹ (.12)	-.11 (.10)	.04 (.09)	.06 (.10)	-.15 ² (.08)	-.10 (.13)	.10 (.13)	-.26 ¹ (.13)	-.21 ¹ (.07)	—	.03 ¹ (.01)	.256 ³
1-12	143	.06 (.04)	.18 ¹ (.08)	.29 ¹ (.12)	.36 ¹ (.14)	-.15 ² (.11)	.05 (.10)	.03 (.11)	-.13 ² (.08)	-.13 (.13)	.11 (.14)	-.26 ¹ (.14)	-.20 ¹ (.08)	—	—	.266 ³
1-12, 14	143	.05 (.04)	.16 ¹ (.08)	.27 ¹ (.12)	.33 ¹ (.14)	-.15 ² (.11)	.06 (.10)	.02 (.11)	-.10 ² (.08)	-.09 (.14)	.13 (.11)	-.26 ¹ (.14)	-.21 ¹ (.08)	—	.04 ² (.03)	.277 ³
1-13	143	.03 (.04)	.15 ¹ (.04)	.23 ¹ (.12)	.31 ¹ (.13)	-.17 ¹ (.11)	.07 (.09)	.03 (.11)	-.08 (.08)	-.06 (.14)	.14 ² (.10)	-.24 ¹ (.13)	-.21 ¹ (.07)	.04 ¹ (.02)	—	.293 ³

Key to Variables in Table 5: (1) Severity of illness (stage). (2) Surgery performed. Marital status: (3) Married. (4) Widowed, separated, divorced. Occupation: (5) Professionals, managers. (6) Clerical, sales. (7) Service work. Control over pace of work: (8) By worker alone. (9) By worker and superior. (10) By superior alone. (11) Self-employment. (12) Changes in activities of pre-morbid job. (13) Unemployment rate in metropolitan area at diagnosis. (14) National unemployment rate at diagnosis. R²: The percent of variance explained.

* The category "never married" was excluded from the regression.

† The category "manual labor" was excluded.

‡ The category "by workers and colleagues" was excluded.

1 Regression coefficient significant at p ≤ .01.

2 Regression coefficient significant at p ≤ .05.

3 Relation significant at p ≤ .01.

unavailable for Boston, because of changes in the definition of the Standard Metropolitan Statistical Area (SMSA), the last three equations include only 143 cases. The third and the fourth equations, respectively, include the same independent variables as do the first and the second, but their explanatory power is greater because, with fewer cases, there is less variance to explain in the data. These equations are included so that when *metropolitan rate* replaces *national rate* in the fifth equation, the explanatory power of the independent variables can be compared across an equal number of cases. In all five equations, the independent variables explain the variance in the employment situation of the respondents at the $p < .01$ significance level.

The first equation in Table 5 that excludes the unemployment rate explains 23.9 percent of the variance in the current employment situation. The third, identical to the first except that it includes fewer cases, explains 26.6 percent. In the first equation, surgery, control over the pace of work by the worker alone, self-employment, and changes in the activities of the pre morbid job significantly affect the likelihood of disability; the latter two variables exert a particularly strong influence on work patterns. In the third equation, professional and managerial occupations also significantly reduce the likelihood of disability. In both the first and third equations, persons currently or formerly married stand a significantly and greatly increased chance of disability. When, in the second and fourth regression runs, the national unemployment rate at diagnosis is added to the other independent variables, the percent of variance explained increases from 23.9 to 26.6 (with 165 cases analyzed) and from 25.6 to 27.7 (with 143 cases analyzed). In the fifth equation, when the unemployment rate in the metropolitan area at diagnosis replaces the national unemployment rate in the same year, the percent of variance explained increases still further to 29.3 (again with 143 cases analyzed). Unemployment contributes significantly, though slightly, to the determination of work disability. And, apparently, the unemployment rate in the immediate region of persons who face the prospect of disability poses a more concrete obstacle to their continued employability than does the national unemployment rate. To corroborate the regression findings from the last equation in Table 5, a discriminant analysis was also run. The independent variables in that equation correctly classify 75 percent of the cases into categories of employed and unemployed.

Discussion

The findings presented here retrace the trajectory of the disability literature by demonstrating that social factors, including demographic background, personal resources, and the physical characteristics of work, are significantly more important than purely medical factors in determining the probability of work disability in a population of persons with rheumatoid arthritis. The findings then demonstrate that in addition to the social factors previously analyzed, the social characteristics of work are also important determinants of work disability.

Public policy toward disability currently emphasizes interventions at the level of the individual rather than at the level of the workplace. Sizable efforts are certainly being made now to encourage work organizations to hire the handicapped or to alter facilities so as to remove the physical obstacles to their employment, but the bulk of our efforts are expended on medical interventions on the individual or on social service interventions at the level of the individual, such as vocational rehabilitation or occupational therapy.

We would not argue against these social service programs, whose purpose is to augment the skills with which individuals with impairments confront the labor market. Nor, for that matter, would we argue against medical interventions. The literature on vocational rehabilitation, for example, provides ample evidence of the benefits that accrue to select populations of recipients (Kisner, 1973:383-396). Moreover, service interventions provide benefits beyond maintaining employment. Several respondents, for example, reported that counselors had helped alleviate tensions within the family caused by the emotional and financial burden of caring for someone with a serious chronic condition. And several others stated that, although medical care had not been successful in keeping them in the labor force, the relief of pain they experienced justified their great expenditure for medical services.

However, we do feel that the strength of the findings from the present study, Nagi's findings that modifications within work activities reduce the chance of disability, and Luft's findings that such "hidden" job characteristics as repetition of tasks also affect the employability of the impaired person, warrant giving greater attention to the social characteristics of the workplace as an arena for policy concern, at the

very least to test their observed importance for other disease entities. Our finding that the social characteristics of work exert the strongest influence over disability may be due primarily to the nature of rheumatoid arthritis. RA is a periodic illness of flares and remissions lasting weeks, months, or even years, and even of variations in the experience of symptoms within a single day. Morning stiffness that precludes an early start on work activities, for example, is a common problem among rheumatoid arthritics. Because of these fluctuations in the symptoms, the ability to fit the work schedule around the illness through control over the pace and time of work and activities of the job is crucial to the continued employment of persons with RA. Musculoskeletal problems constitute 30 percent of all total work disability and 40 percent of all partial work disability in the U.S. (U.S. Department of Health, Education, and Welfare, 1977), and rheumatoid arthritis is reported to be one of the two single most important clinical entities causing work loss in the United Kingdom (Nichols, 1978). Thus, even if the findings from the present study can not be generalized to other diseases, they could significantly reduce the prevalence of work disability. However, many of the time-control issues that are important to persons with arthritis would be relevant to those with other chronic conditions. Diabetes, cancers, and mental illness, like arthritis, are subject to periods of flare-up and remission requiring time off or lessening of the normal work pace. And persons with cardiovascular disease share the arthritic's need to take short rest periods within the work day, even during a period of remission: such persons become tired and need to slow down for a few minutes or so.

If investigations of other clinical entities do substantiate the findings of this study, technical and political issues emerge. The technical issue concerns the proportion of jobs in the economy for which structured work time is an inherent component of the production process. Clearly, the automobile assembly plant could not operate under the sort of flexible time arrangements that would benefit the arthritic. However, as Hirshhorn (1979) points out, in the growth sectors of the economy, particularly among the services, the division between work and other activities is frequently ambiguous, and structured work time may, in fact, be counterproductive. In other situations, the nine-to-five routine may be modified. At any rate, it seems possible to determine in a technical sense the jobs for which existing work rules are not strictly necessary for the production process and, because structured

work time may foster disability, to change work rules when appropriate. Persons with impairments might then be transferred to jobs with freer work schedules.

The political issue of finding a way to encourage workplaces to reform their work rules is a far more difficult problem. With high unemployment among both technical and nontechnical workers (U.S. Department of Labor, 1975), firms can easily find skilled workers to replace impaired workers who are laid off. Thus, there appear to be few incentives for management to reorganize work around the problems of the disabled.

One other point seems worthy of discussion. Many researchers who study disability feel that an important—perhaps the most important—element in determining whether an individual becomes disabled after the onset of an illness is the will to work. Although the data do not bear on this issue directly, it is interesting to speculate as to whether those who control the pace of work, or have flexible schedules of work, are more satisfied with their jobs and are therefore more willing to push on to continue working, whereas those who lack control on the job are more willing to take the disability route. Whether for the technical reason that persons who control the pace of their work can fit their schedules around episodes of illness, or for the psychosocial reason that they enjoy work more, the social characteristics of work clearly play a significant role in determining disability among persons with previously diagnosed rheumatoid arthritis. Pending replication of these results for other clinical entities, and the use of larger and more random sampling frames, altering the social characteristics of work should be considered alongside programs to retrain individuals with impairments and to alter the physical characteristics of workplaces as policies to reduce the prevalence of disability, one of the largest components of the cost of illness.

Appendix 1

In a retrospective cohort analysis such as the one used in this paper, the only formal controls available are statistical ones. It is therefore entirely possible that effects apparently due to the variables available for analysis are in reality the result of some other factors that were correlated with the variables analyzed and for which data were not

collected. In the data analysis for this paper, the retrospective cohort design poses two discrete problems. First, there is much evidence that persons who undergo stressful life changes experience higher incidence rates of a broad range of illnesses (Syme and Berkman, 1976:1-6). Although the evidence is at best ambiguous with respect to rheumatoid arthritis, several researchers argue that persons who experience stressful life events, and those who possess certain personality types, are likelier to have RA (Cobb, 1971:56-62). It is conceivable that such stressful events may be correlated with the social characteristic of work variables and may therefore account for the observed differences in disability rates. However, we applied direct statistical control for other stressful events that occurred after disease onset. We found that marital dissolution or death of spouse had significant effects on disability status (data reported in the paper), as did changing the activities of work (data also reported). These changes were not correlated with the social characteristics of work, nor did they reduce the effect of the variables of interest in a multivariate framework. We found no effect from changes in family and household structure, residential location or type, leisure activities, individual or family income or source of income, or in health and disability insurance coverage; no effect from changes in work status (employed or unemployed) from the premorbid to the study year (implying that the remittent nature of employment had no effect); no effect from changes in place of work, total amount of time worked each week, or in the work patterns of family members.

We did not measure premorbid stress directly, but we did perform an indirect analysis of respondents' premorbid situation in an attempt to reduce the risk that premorbid stress led to the illness as well as to the work sequelae we analyzed. A higher percentage of respondents were married than a matched age-sex group also from Boston and San Francisco. A higher percentage of the survey respondents who considered themselves in the labor force (the 180 analyzed in this paper and 9 others who were actively seeking employment in the premorbid year) were employed premorbidly than were an age-matched group of other Bostonians and San Franciscans. Survey respondents had incomes that averaged 220 percent of the median income of an American group matched in sex and age, and 120 percent of the median income of an American group matched in occupation as well as sex and age. Thus it is reasonable to infer that lack of income was not a

problem to most of them and that the majority continued to work steadily. Finally, the respondents reflected their communities in mean educational level, racial composition, their mix of occupations and industries, and in the hours worked each week.

The present study does not afford either a direct or an indirect test of the controversial theory concerning the role of personality types in RA. However, even if the social characteristics of work were correlated with personality types, intervention through the workplace makes greater sense, because modifying the social or physical characteristics of jobs is inherently easier than modifying personality types. Moreover, a personality type may not express itself in a structure of work that is less constraining with respect to pace and activities. However, it is quite possible that any individual, regardless of personality type or socioeconomic status, would have difficulty maintaining a job when the remittent nature of the disease interacts with requirements for punctuality and for invariable productivity.

The second potential problem that arises from the research design used is that in a regression model there may be interaction effects among independent variables and the dependent one. To test for the presence of the most likely interaction effects, two-way contingency tables were used to compare the two-way relationships between a dependent and an independent variable for each value of a second independent variable. No strong interaction effects were detected, except for the tautological one between those persons who were self-employed and who therefore claimed to control the pace of their work. When the data were analyzed without these 18 individuals, significant relations remained between the pace of work and disability status. Because regression analysis generally assumes a linear relationship between independent and dependent variables, which may not hold when categorical variables are used, an analysis of covariance was also performed with each variable set and for the entire model. The relationships found with the multiple regression analysis were replicated with the analysis of covariance.

Appendix 2

The literature on stratification within work has grown dramatically over the last few years. Most sociologists traditionally believed that

stratification had primarily a functional origin: strata derived from the value of the contribution made in work or to the economy as a whole (Parsons, 1960; Davis and Moore, 1945). In turn, social stratification in work could be summarized by an index of occupations and/or occupational prestige (Duncan, 1961). Recently, however, it has been argued that stratification is more complex, deriving from ownership of the firm (Wright, 1977) and authority and control within work (the degree to which one is supervised and supervises others) (Dahrendorf, 1959; Braverman, 1974; Edwards, 1979), as well as from functional criteria. These new theories have been tested by several investigators, principally for their ability to explain income distribution. More specifically, Robinson and Kelley (1979) used National Opinion Research Center data, asking respondents whether they had a supervisor; whether their supervisor had one; whether the respondents supervised anyone; and whether their subordinates supervised others. Robinson and Kelley found that these variables improved by 50 percent upon the power of an occupational index alone to explain income distribution. Wright and Perrone (1977) used data from the University of Michigan's Survey of Working Conditions, asking respondents if they worked for themselves or someone else; if self-employed, did they have someone working for them; and if they were supervisors. Wright and Perrone found that their measures were as powerful in determining income as occupation and education. Finally, Wolf and Fligstein (1979) used data from a Wisconsin study of social factors in achievement, asking respondents if they had the authority to hire and fire others, influence the rate of pay of others, and supervise the work of others. The authors utilized these variables to demonstrate that although women and men are distributed evenly among occupations, women have less authority and control within the workplace, the occupation being held constant.

The current study was designed to demonstrate how the medical, demographic, and occupational factors, as well as the social characteristics of work, affected the probability of disability. It expanded on some of the concepts developed in the studies just cited by asking questions that covered a greater range of activities of supervision and subordination, but the questionnaire also included items used in these studies and in the traditional stratification literature. The specific items measuring dimensions of ownership and authority, the social characteristics of work, included the following:

Were you self-employed or did you work for someone else?

Did you supervise the work of others or tell other employees what work to do? What were your responsibilities as a supervisor? Did you have any say in the following decisions concerning your subordinates at work: The pace at which they performed work? The tools and work procedures used? What they actually produced? When they could take a break? When they received a raise or promotion? When they were fired or laid off?

Which of the following could you do without permission of your superior, by informing your superior, by asking permission of your superior, or could not do (choices read with every item): Take a break from work? Leave the place of work to go for medical care? Take a day off from work? Take a week off from work? Decide what time to come to work?

Which of the following best described your job: The pace of work was decided by your superiors? The pace of work was decided jointly by you and your superiors? The pace of work was decided jointly by you and your colleagues? You decided the pace of your work?

Table 6 is a matrix of significant correlations among the items measuring activities of supervision (whether the respondent was a supervisor, the supervisors' control over work pace, tools, products, work breaks, pay raises, firings), those measuring activities of subordinate status (whether respondent could take a work break, go for medical care, take a day or week off, decide what time to come to work), and self-employment, occupation, and, the dependent variable in the analysis, current employment situation. The table reports only correlations that are significant at $p < .05$. Correlations that are not significant are indicated by blank cells in the matrix.

Each of the items measuring supervisory status correlates significantly with every other item in this dimension. The range of the correlation coefficients among the supervisory items is .4 to .83, with most falling within the .5 to .6 range. Similar activities, such as control over firings and raises, have a correlation coefficient as high as .83; dissimilar activities, such as firings and control over work tools, have a correlation coefficient of .45. Likewise, each of the items measuring dimensions of subordination correlates significantly with every other item of this dimension. The range of correlation coefficients among the subordinate items is .38 to .82, with most of the correlations falling between .55 and .65. Such similar activities as having the right

TABLE 6
Significant Correlations ($p \leq .05$) among Questionnaire Items Measuring the Social Characteristics of Work

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
X	-.38	.45	.48	-.55	-.37	-.22	.17	.14					-.23		.34	
	X	.63	.62	.58	.40	.22	-.28	.17			.13	.17		-.13	-.55	
		X	.82	.64	.33	.22	.28	.15	.17	.24	.17	.21		-.13	-.62	
			X	.68	.41	.22	.25	.18	.14	.17	.14	.17	.13		-.54	
				X	.55	.29	.32	.18	.22	.22	.32	.28	.16		-.42	
					X	.34	.31	.18	.19	.19	.28	.27			-.24	
						X	.83	.54	.41	.49	.65	.65	-.14		-.18	
							X	.55	.45	.56	.67	.65	-.15		-.27	
								X	.59	.52	.57	.58	-.14		-.18	
									X	.58	.55	.53			(10)	
										X	.56	.61			(11)	
											X	.74			(12)	
												X			(13)	
													X		(14)	
														X	(15)	
															X	(16)

Key to Questionnaire Items: Subordinate status, respondent's control over own activities; (1) Pace of work. (2) Deciding what time to come to work. (3) Taking a week off. (4) Taking a day off. (5) Leaving work for health care. (6) Work breaks. Supervisory status, respondent's control over work of others. (7) Firings, layoffs. (8) Raises, promotions. (9) Work breaks. (10) Product. (11) Tools. (12) Face. (13) Respondent a supervisor. Employment: (14) Current employment situation. (15) Occupation. (16) Respondent self-employed.

to take a day or week off have a correlation coefficient as high as .82; the weakest correlation is between deciding on one's own work breaks (the most frequently occurring privilege) and deciding when to take a week off (the least frequent).

None of the supervisory items correlates significantly with the current employment situation, the dependent variable in this analysis, indicating that it is not the ability to control other's activities that influences one's disability prospects. On the other hand, among the subordinate dimensions, being able to leave the place of work to receive health care, to take a day off, and to control the pace of work correlate significantly, though not strongly, with current employment. This indicates that although these factors may alter the probability of disability, they alone do not determine it.

References

- American Medical Association, Committee on Medical Rating of Physical Impairment. 1958. A Guide to the Evaluation of Permanent Impairment of the Extremities and Back. *Journal of the American Medical Association* 166:3-109.
- Braverman, H. 1974. *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*. New York: Monthly Review Press.
- Berkowitz, M., Johnson, W., and Murphy, E. 1976. *Public Policy Toward Disability*. New York: Praeger.
- Cobb, S. 1971. *The Frequency of the Rheumatic Diseases*. Cambridge, Mass.: Harvard University Press.
- Cooper, B., and Rice, D. 1976. The Economic Cost of Illness Revisited. *Social Security Bulletin* 39:21-35.
- Cowan, E. 1979. Disability Program Is in Need of Reform, Too. *New York Times*, February 25.
- Dahrendorf, R. 1959. *Class and Class Conflict in Industrial Society*. Stanford: Stanford University Press.
- Daitz, B. 1965. The Challenge of Disability. *American Journal of Public Health* 55:528-534.
- Davis, K., and Moore, W. 1945. Some Principles of Stratification. *American Sociological Review* 10(2):242-249.
- Duncan, O. 1961. A Socioeconomic Index for All Occupations. In Reiss, A., ed., *Occupations and Social Status*. Glencoe, Ill.: Free Press.

- Edwards, R. 1979. *Contested Terrain: The Transformation of the Workplace in the Twentieth Century*. New York: Basic Books.
- Friedman, G. 1974. *Primer of Epidemiology*. New York: McGraw-Hill.
- Haber, L. 1971. Disabling Effects of Chronic Disease and Impairments. *Journal of Chronic Disease* 24(7):469-487.
- Hirshhorn, L. 1979. The Theory of Social Services in Disaccumulationist Capitalism. *International Journal of Health Services* 9(2):295-311.
- Holmes, T., and Rahe, R. 1967. The Social Readjustment Scale. *Journal of Psychosomatic Research* 11:213-218.
- Kisner, L. 1973. A Review of Benefit/Cost Analysis in Vocational Rehabilitation. *Supplemental Studies for the National Commission on State Workmen's Compensation Laws*, vol. 2:383-396. Washington, D.C.: Government Printing Office.
- Lando, M., Coate, M., and Kraus, R. 1979. Disability Benefit Applications and the Economy. *Social Security Bulletin* 42(10):3-10.
- Levitan, S., and Taggart, R. 1977. *Jobs for the Disabled*. Baltimore: Johns Hopkins Press.
- Luft, H.S. 1978. *The Economic Causes and Consequences of Health Problems*. Cambridge, Mass.: Ballinger Press.
- Nagi, S. 1969a. *Disability and Rehabilitation*. Columbus: Ohio State University Press.
- . 1969b. Congruency in Medical and Self-Assessment of Disability. *Industrial Medicine and Surgery* 38(3):27-36.
- . 1976. An Epidemiology of Disability among Adults in the United States. *Milbank Memorial Fund Quarterly/Health and Society* 54(Fall):439-468.
- Nichols, P. 1978. Rehabilitation and Resettlement of the Working Adult in the U.K. Paper presented at *Advances in Medicine Symposium*, London, England, July 27.
- Parsons, T. 1960. *Structure and Process in Modern Societies*. Glencoe, Ill.: Free Press.
- Robinson, R., and Kelley, J. 1979. Class as Conceived by Marx and Dahrendorf: Effects on Income Equality in the United States and Great Britain. *American Sociological Review* 44(1):38-58.
- Social Security Amendments. 1967. PL-90-248, Title 1, Part 4, Section 158.
- Steinbrocker, O., Traeger, C., and Butterman, R. 1949. Therapeutic Criteria in Rheumatoid Arthritis. *Journal of the American Medical Association* 140:659-662.
- Syme, L., and Berkman, L. 1976. Social Class, Susceptibility, and Sickness. *American Journal of Epidemiology* 104(1):1-6.

- U.S. Department of Health, Education, and Welfare. 1977. *Work Disability in the United States. A Chartbook*. HEW Pub. No. (SSA) 77-11978. Washington, D.C.: Government Printing Office.
- U.S. Department of Labor. 1975. *Handbook of Labor Statistics*. Table 65, Unemployment Rates by Occupation, U.S., 1958-1974, 157. Washington, D.C.: Government Printing Office.
- U.S. Employment Service. 1966. *Dictionary of Occupational Titles*, third edition, *Supplement: Selected Characteristics of Occupations (Physical Demands, Working Conditions, Training Time)*. Washington, D.C.: Government Printing Office.
- Wolf, W., and Fligstein, N. 1979. Sex and Authority in the Workplace: The Causes of Sexual Inequality. *American Sociological Review* 44(2):235-252.
- Wright, E. 1977. Class Structure and Occupation: A Research Note. University of Wisconsin, Madison: Institute for Research on Poverty Discussion Paper No. 415-77.
- Wright, E., and Perrone, L. 1977. Marxist Class Categories and Income Equality. *American Sociological Review* 42(1):32-55.

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