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A MEASURE OF FUNCTIONAL CAPACITY

Sandy Duchnok

Division of Disability Studies

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## A Measure of Functional Capacity\*

A long-term disability reflects the interaction between a continued physical or mental impairment which limits functioning and restrictions and requirements of the social environment. It is a pattern of behavior that represents the "gap between the actual and expected fulfillment of social roles." <sup>1/</sup> A disability is a behavioral response to a functional impairment which is affected by many non-medical factors, and it cannot be equated with the underlying physical or mental impairment. Impairments and functional limitations are, however, central to any disability and the Social Security Administration is constructing measures to assess the impact these factors have on the development of disability.

In particular, the SSA is interested in work disability or loss or reduction in the ability to work. How can we study the dynamic interaction between the different medical, personal, and environmental factors that contribute to the emergence of a work disability? The functional capacity index presented in this paper was developed for that purpose. Based on a model prevalent in the literature, the index is an attempt to represent the underlying medically-related aspects of disability in contrast to other factors such as the person's age, educational level, or work history. Nagi has expressed the model as: active pathology

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\*By Sandy Duchnok, Division of Disability Studies

<sup>1/</sup> Koshel, Jeffrey J. and Carl V. Granger, "Rehabilitation Terminology: Who is Severely Disabled?," Rehabilitation Literature, Vol. 39, No. 4, April 1978, p. 102.

(diagnosis) → impairment → functional limitations → disability <sup>2/</sup> where active pathology is the nature of the disease process or injury and impairment is the anatomical loss or physiologic or mental disruption resulting from the pathology. Functional limitations refer to inability to perform tasks or requirements necessitated by usual roles and normal daily activities and include the capacity for self-care and mobility.

The data used in construction of the index are from a 1972 survey, and a 1974 follow-up <sup>3/</sup>, sponsored by the Social Security Administration, of 18,000 disabled and nondisabled adults aged 20-64. While the data available cannot exactly duplicate the elements of the model, an approximation is achieved.

Related to the unanticipated growth in the social security disability insurance program, we would like to be able to identify subgroups in

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<sup>2/</sup> For a general discussion of this conceptualization, see Nagi, S.Z., "Some Conceptual Issues in Disability and Rehabilitation", in M. B. Sussman (editor) Sociology and Rehabilitation, (Washington, D. C., American Sociological Association, 1965); pp. 100-103. Also see Nagi, Saad Z., "An Epidemiology of Disability Among Adults in the United States", Health and Society, Milbank Memorial Fund Quarterly, Vol. 54, No. 4, Fall 1976, pp. 39-46.

<sup>3/</sup> See Allan, Kathryn H., "First Findings of the 1972 Survey of the Disabled: General Characteristics", Social Security Bulletin, October 1976, and Krute, Aaron and Mordechai Lando, "Initial Results from the 1974 Survey of Health and Work Characteristics", forthcoming in 1978 proceedings of the American Statistical Association for more detailed information about these surveys.

the population that are a high risk for the program so that future needs/demand might be anticipated. The definition of disability now used in the periodic SSA surveys does not allow us to do this because it is not an independent, quantitative measure of health. Rather, severity of disability is based on the individual's opinion of the extent to which his health limits his ability to work. 4/ It is a self-assessment, not an objective measure of the effect of health on overall work performance. As a global assessment, it cannot be used to isolate the effects of separate aspects of health on work. This lack of specificity precludes any elements of standardization since it is impossible to tell what different individuals have in mind when they are considering their health in general.

Several other problems exist with this type of definition of severity of disability. By its very nature, it is tautologic with the work variables we are trying to predict. That is, one would expect to find a systematic association between severity of disability and actual work participation, because this relationship is assumed from the start. Several research reports from this survey series 5/ reveal precisely this type of pattern.

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4/ Persons who reported that their health prevented them from working regularly or at all were considered to be severely disabled. The occupationally disabled included those whose health limited them to part-time but regular work or to a different kind of job. Persons with a secondary disability could work regularly and full-time but with some limitation in the way or amount of work that was done. Nondisabled persons reported no restrictions in their work due to health. See the Technical Note at the end of this report for the specific questionnaire items used to determine disability status.

5/ See, for example, Steinberg, Edward, "Work Experience of the Disabled, 1966 and 1969: A Follow-Up Study," Report No. 2, January 1976.

Most recently, data from the 1972 survey of the disabled, indicates that participation in the labor force varies directly with the extent of disability. 6/

One further issue is that of reliability. As yet, there is no evidence that substantiates the reliability of answers to this type of survey item. There is some testimony to the contrary. Nearly one-third of some 1,500 persons who reported no disability in the 1970 Census, apparently changed their minds about this during the next year. A screener sent to these "nondisabled" persons in 1971, found 500 people who claimed that they had in fact been disabled since before 1970.

It seems that a multitude of factors might influence the outcome to a question about health. Individuals exhibit different levels of knowledge about their condition or may be sensitive to implications of the question being asked. On the other hand, it is possible that having previously been interviewed influences the way a person answers the same question at a later date, especially after he has had some time to think about it and to consult a doctor.

While one may also question the reliability of answers to items that make up the functional capacity index, these items are more specific and direct and are not confused with the additional assessment of possible effect

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6/ Schechter, Evan S., "Employment and Work Adjustments of the Disabled: 1972 Survey of Disabled and Nondisabled Adults," Social Security Bulletin, July 1977.

on work. It is not likely that someone would change his mind about whether or not he has emphysema. More likely, he would change his mind about the effect his condition had on his ability to work full-time, regularly, or at all.

The index of functional capacity is proposed as an alternative measure of work ability. The idea of the index is that everyone in the sample population is assigned a numerical value which represents his level of impairment for work based on his medical conditions and physical and self-care limitations. <sup>7/</sup> The index is a quantitative tool that incorporates more than one item, none of which has been linked a priori to actual work behavior. It offers more precision in measurement than the current definition of severity, and greater objectivity. By allowing score comparisons with known disabled social security beneficiaries, the scale should add to our understanding of the function level of the general population. It can also be used to plot changes in function level over time, both on the individual and population level. Most importantly, the scale could be used to make projections of applications for benefits and growth in the social security disability program. ✓

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<sup>7/</sup> Several studies demonstrate validity for these kinds of items in the form of doctors' corroboration of patients' reports. See Saad Z. Nagi, "Congruency in Medical and Self-Assessment of Disability", Industrial Medicine and Surgery, Vol. 38, No. 3, March 1969, pp. 27-36.

### Validity Requirements

From the foregoing discussion, it is clear that the major thrust of this effort is to operationally define functional capacity as a fundamental component of work disability. It will then be a useful foundation for a more complete index of severity of disability. The definition of the variable determines the appropriate criteria of validity. Very generally, validity implies that an instrument measures what it purports to measure. The three most commonly considered types of validity are content, criterion, and construct validity. <sup>8/</sup> Content validity depends on whether the domain being measured is adequately represented. Here, it will depend on the relevance of the index components to the medical aspects of the concept of work disability. Criterion-oriented validity will include discrimination between known disabled beneficiaries and other population samples and projection of subsequent death, institutionalization, or disability allowance using information available from a follow-up study conducted in 1974. To establish construct validity, we must accurately predict theoretical propositions. Mostly, this will be based on predictions of work status at two points in time and on positive associations with other factors known to be associated with disability such as age and self-perception of disability.

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<sup>8/</sup> See Kaplan, Robert M. et al., "Health Status: Types of validity and the Index of Well-Being," Health Services Research, Winter 1976, pp. 478-507.



### Development of Index

Most studies of functional limitations reported in the literature commonly include four types of daily activities: (1) social role activities such as work or housework; (2) self-care activities such as bathing, dressing, and feeding oneself; (3) physical activities such as walking, stooping or lifting; and (4) mobility, the ability to travel from one place to another. 9/ The conceptualization of function status presented here differs in two major respects--work activity is not included since this is what we are trying to predict, and health conditions are included because, logically, the nature of the disease process involves an interruption in normal functioning. For certain groups of diseases, this disruption is potentially more burdensome and long-lasting than for other types. 10/

The earlier work of Haber 11/ provides the most useful foundation for this index mostly because of the comparability of data items across surveys. 12/

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9/ See Haber, Lawrence D., "The Epidemiology of Disability: II. The Measurement of Functional Capacity Limitations", Social Security Survey of the Disabled: 1966, Social Security Administration Report No. 10, July 1970. Also see Reynolds, Jeff W. et.al., "The Validation of a Functional Status Index", Journal of Health and Social Behavior, No. 15, December 1974, pp. 271-288 and Patrick, Donald L. et.al., "Toward an Operational Definition of Health", Journal of Health and Social Behavior, No. 14, March 1973, pp. 6-23.

10/ The Rehabilitation Act of 1973 specifies certain diseases from which a functional disability may result that could severely handicap a person. See Koshel, J. et.al., op.cit.

11/ Haber, op.cit.

12/ The Social Security Administration has sponsored periodic surveys of the disabled since 1966. Pertinent items included in the 1966 survey questionnaire were very similar to those used in subsequent studies and analyses of these earlier data has provided useful background information on which to build.

Basically, the earlier index is composed of two parts. One part consists of a 9-point physical limitations scale which ranges from "no loss" to "severe loss" in capacities considered important for work and independence in daily living. Limitations in walking are weighted most heavily. Difficulty reaching or using hands results in "moderate" loss but combined with restrictions in walking is ascertained to be "severely" limiting. <sup>13/</sup> Limitations in lifting, stooping, or using stairs are thought to have a "minor" effect on functioning. Another category for "functional dependence" is added to the physical activity scale. Persons who are confined to the home or who usually need assistance with personal care are classified as dependent. So are those who report needing help from others to go outside, get around outside, or to use public transportation. Dependency is the most serious limitation one can have in this scheme.

Items were selected for the new index to cover a range of disturbances in function. Function is defined in terms of the degree to which an individual is free of medically related limitations that would restrict his ability to work. In other words, we want to establish that an individual does or does not have a medical impairment (or combination of impairments) that significantly limits his capacity to perform basic work related functions. The major components of this concept identified from the literature on disability determinations include: (1) underlying chronic health conditions, (2) clinically related signs, symptoms, and laboratory findings and (3) capacities essential to the performance of most jobs

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<sup>13/</sup> See the Technical Appendix at the end of this report for the rules for construction of the physical limitations scale.

such as walking, lifting, seeing and hearing. <sup>14/</sup> Based on the data available, as many of these features as possible were incorporated into three scales entitled, Health Conditions, Physical Activity Limitations, and Mobility and Self-Care Limitations. These three scales cover the range of activities and capacities included in the earlier functional limitations index, plus the Health Conditions Scale which is an independent measure of illness severity. This last measure was added in an attempt to account for the large number of persons who considered themselves severely disabled although they were classified as having no limitations on the earlier scale. For many people, health considerations alone may be the dominant factor in a decision to drop out of the labor market.

The Health Conditions Scale forms the starting classification for the new limitations index. <sup>15/</sup> The emphasis here was on the disabling potential of specific diseases which was seen as a composite of the seriousness of

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<sup>14/</sup> See "Program Policy Directive: Disability--Finding an Individual Not Disabled on Medical Consideration Alone," extracted from Laws and Regulations, 404.1502(c) and 416.902(c), Disability Insurance State Manual 321B, Disability Insurance Letter (DIL) III-1, DIL III-13, DIL-II-37, Exhibit 2, and DIL II-47 for a description of determination of disability on basis of medical impairment. Also see Guides to the Evaluation of Permanent Impairment, American Medical Association, Committee on Rating of Mental and Physical Impairment, 1971 for a discussion of the concept of permanent impairment.

<sup>15/</sup> A study which examines the extent of doctor-patient agreement on kind of underlying medical conditions found that physician assessments corroborated impaired persons' statements about their own conditions in 94 percent of the cases. See Warren, M. D., "Interview Surveys of Handicapped People: The Accuracy of Statements About the Underlying Medical Condition", Rheumatology and Rehabilitation, 1976, Vol. 15, No. 4, pp. 295-302.

the disorder and its probable future course. 16/ A serious condition was one which was progressive in nature, one which was likely to result in a gradual loss of function despite available treatment. Multiple sclerosis or emphysema are examples of conditions that were expected to have a relapsing or deteriorating course. Conditions such as cancer, blindness, and mental retardation also ranked as serious because chances for improvement are often minimal and these types of disorders often result in severe restrictions in daily living. 17/

Several confounding factors made it difficult to assess the possible consequences of specific chronic diseases. For example, the terminology used in the list of conditions shown to respondents was very imprecise and there was no information about the stage of the disease, levels of access to medical care or quality of care received. Despite the fact that no precise statement of prognosis would be made for specific disorders, a value was assigned based on the likelihood that someone with a certain combination of chronic diseases would be allowed disability benefits under the social security program. 18/

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16/ For an evaluation of disabling potential of different categories of diseases, see Aaron Krute and Mary E. Burdette, "1972 Survey of Disabled and Nondisabled Adults". "Chronic Diseases, Injury and Work Disability", Social Security Bulletin, April 1978.

17/ Although it can be argued that these conditions often do not result in restrictions in living or that they are not likely to get worse, 25, 36, and 71 percent of all persons with visual impairments, cancer, and mental retardation, respectively, cited this condition as the main reason they were limited in their ability to work. See the Technical Appendix for a complete description of the methodology used in construction of the Health Conditions Scale.

18/ Unpublished data for primary and secondary diagnoses most prevalent among disabled workers allowed benefits under Social Security for Disability Applicant Statistics, 1972.

The Physical Activity Scale was added to the Health Conditions Scale to give more exact information about the person's functioning. Limitations in walking, handling, and reaching have diffuse consequences for daily independence aside from being a handicap for working. Use of public transportation and access to buildings are problematic for mostly anyone who has difficulty walking and hence affects their ability to work.

The Physical Activity Scale focuses on the wide-ranging importance of limitations in walking and handling. Other combinations of activities, more specific to job requirements, were included in the scale but were given less weight. Job distributions of the employed population were compared with respondent reports of job requirements for different occupations to determine combinations of activities that would result in restricted capacity to work. Certain types of limitations--for example, difficulties with both reaching and light lifting--were considered to be associated and given less weight than limitations involving both sets of extremities. 19/

The Self-care and Mobility Scale was added to the Physical Activity Scale as an independent indicator of the effects of impairment and chronic conditions. Disorders such as blindness or mental retardation may affect mobility but not physical activity. Mentally ill persons may be able to carry out physical exercises but experience difficulties in

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19/ The Technical Appendix at the end of this report gives a full explanation of the Physical Activity Scale and of the method used to combine the three scales into an overall index of functional capacity.

accomplishing minimal activities for daily living. Personal care and mobility measure basic functioning in the sense that limitations in these activities are a handicap to effective role performance in general. These items provide extra detail about functioning needed to complete the index.

### Validity

The index was designed as a measure of work-related capacity and, if it is valid, it should discriminate strongly between working and nonemployed persons. Since it is based on medical and job considerations, it should also differentiate between disabled worker beneficiaries and other population subgroups; also, death should occur more frequently among those who had substantial functional limitations. In addition, other associations are expected. If the measure is valid, then persons with a high score should perceive their health situation as more severe than persons with a low score. The scale should also correlate well with age <sup>20/</sup> and be higher for men than for women (i.e., men have a stronger attachment to the labor force and are more likely to become disabled worker beneficiaries). Finally, these relationships should not change much over time. Follow-up data on work and disability status allow us to test the change in these associations over the 2-year period from 1972-1974.

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<sup>20/</sup> See, for example, Lawrence D. Haber, "Age and Capacity Devaluation", Journal of Health and Social Behavior, September 1970, for a discussion of the association between age and work capacity.

Analyses of the relationships between the functional capacity scale and other variables were performed to test validity hypotheses. While the "best" test of validity would be to have occupational therapists rate individuals' capacity for work, this was not part of the survey design. The tests presented here include an examination of the distribution of scale scores across relevant variables and a summary statistic for each distribution in the form of a Kendall's tau correlation. Comparisons of primary results will be made with the functional capacity scale developed earlier by Haber.

The scale devised by Haber has provided extensive information about the relationships between physical, self-care and mobility limitations and other variables of interest. The new scale builds upon this earlier effort aiming at improvement and refinement of measurement. Three basic improvements were sought after--(1) reducing the proportion of disabled worker beneficiaries at the low end of the scale (i.e., persons having no functional limitations), (2) reducing the relatively high proportion of respondents with no measured limitations who considered themselves severely disabled, and (3) reducing the high proportion of persons with substantial functional limitations who were working either full- or part-time.

### Work status criteria

The functional capacity index discriminated well between workers and nonworkers in the general population (Table 1). <sup>21/</sup> Nearly all workers, full or part-time, scored on the lower end of the scale meaning they had fewer measured functional limitations. The earlier scale (Table 2) made the same discrimination but there were some internal differences between the two indexes. The new scale showed a more consistent association between functional capacity and work status--the proportion of persons working decreased in a more regular fashion as functional capacity decreased on the scale. At the high end of the scale there was a dramatic drop in the percent of persons who were working; only 8 percent of those who had severe limitations (scores of 9 and 10) worked either full- or part-time. In contrast, the earlier scale showed 20 to 45 percent of those with high scores as working.

Despite these internal differences, the two scales correlated nearly equally with work status. For unweighted data, <sup>22/</sup> the newer index correlated .3571 with work status vs. a correlation of .3358 with the earlier index. The correlation presented is a Kendall's tau for ordinal variables with an

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<sup>21/</sup> One-hundred and eight individuals, out of a sample size of 17,997, were eliminated from the analysis because they could not be assigned an index score. See the Technical Appendix for an explanation. Another 91 individuals were excluded because their data records could not be matched across survey years. All figures in the tables are weighted to represent the U. S. adult population under consideration.

<sup>22/</sup> Population size of 16,605 persons aged 20-64 in 1972.



unequal number of categories. 23/ All correlations presented in this paper were significant at the .00001 level.

An examination of the data by sex revealed a stronger association for males than females (Table 3). Fewer women work than men and this fact was consistently retained in the present data. Thus, 5 to 10 percent of the men with few functional limitations were out of work compared to about 45 percent of the women who were most able to work. Few men or women with severe limitations were working, although again, a larger proportion of women with such limitations were out of work (96 percent compared to about 85 percent of the men). Overall, males showed a correlation of .4167 between work and functional capacity as distinguished from .2865 for females. The results lend some support for the new scale as a measure of work-related capacity.

#### Disability status criteria

It is evident from social security program specifications that disability depends upon a number of factors relating to the individual and the environment in which he functions. The Social Security Act regarding disability encompasses vocational factors as well as medical impairment. 24/ Special consideration is given to impaired individuals who are older, less well educated, and who have work histories limited to

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23/ In this instance, work status was ranked in the following order: no work, part-time work, full-time work. See Norman H. Nie et.al., Statistical Package for the Social Sciences, 2nd edition, Section 16 on subprogram CROSSTABS for a description of the formula used to calculate the "tau".

24/ See Disability Insurance State Manual, Disability Evaluation Standards, 321E for a discussion.

unskilled labor. Because of this policy, we would not expect that all disabled beneficiaries would have high scores on the functional limitations scale. It is reasonable to assume that a wider range of capacities would be exhibited among persons who have been considered disabled. On the other hand, it is not expected that disabled workers will have very low scores either, since this would indicate that they are not functionally limited.

The functional capacity scale exhibited precisely this type of pattern (Table 4). Less than 2 percent of disabled beneficiaries reported a high level (scores of 0 through 3) of functioning whereas 76 percent manifested low (scores of 6 through 10) functioning. With the older scale, 79 percent of disabled individuals also had high scores; however, 15 percent scored on the very low end of the scale (Table 5). The new scale seems to be more sensitive to disability status which is an improvement that was desired.

Not only did disabled beneficiaries tend to have higher scores on the new scale, but the higher the score, the larger the proportion of individuals who were disabled. <sup>25/</sup> That is, the new scale demonstrated a consistently positive relationship between work disability and functional capacity. With the old scale, the relationship was not this consistent.

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<sup>25/</sup> Table population is all persons under age 65 who were insured for disability under Social Security. Typically, this means that these persons worked 20 quarters covered under social security in the 10 years preceding the onset of their disability. As of age 65, all persons receiving disability benefits are converted to old age benefits instead.

The expected rise across scores in the percent of persons who were disabled was not found with any regularity.

Again, however, the differences between the two scales did not have any significant effect on the correlations. Overall, the newer scale correlated .3805 with disability status as opposed to .3543 for the older scale.

According to 1972 survey information, the median age for social security disabled beneficiaries was 57 years. Generally, disabled beneficiaries were more likely to be older reflecting the toll of degenerative diseases that develop over many years and devalued work capacities. Did the functional capacity index discriminate age-related differences in the prediction of disability? Was there a stronger association between functional capacity and disability among the older groups?

Distributions across groups over age 34 revealed the more negative effect of declining functional capacity with age (Table 6). Functional capacity correlated .2233 with disability in the 35-44 age group; .3861 in the 45-54 age group; and .5489 for those aged 55-64. The pattern of correlations emphasized the expected combined effect of deteriorating capacity and age on work participation. On the old index, the correlations were .2059, .3739, and .5113 for the three age groups respectively.

Some discrepancy in the new scale structure was apparent in the two older groups, where fewer beneficiaries were found among the most functionally limited than among those who had a lower score (of 9). The relatively small number of persons in this scoring category may account for this inflation of proportion of disabled persons.

### Self-report criteria

Respondents were asked whether their health condition limited their ability to work. Based on their answers, they were defined as "severely disabled", if their health prevented them from working regularly or at all; or "partially disabled", if they could work regularly, but not the same kind or amount of work; and "not disabled", if their health did not limit their work. To the extent that self-perceptions are accurate, a positive association between level of functioning and self-report is to be expected. The results confirmed this expectation.

Severely disabled persons were more likely to be functionally limited--to have higher scores on the new scale--than persons who thought they were less disabled (Table 7). Almost no persons who said they were not disabled had a score above 4 on the scale. The percent who considered themselves severely disabled decreased in a consistent fashion as functional capacity increased, from 97 percent of those who had a score of 10 on the scale to only one percent of those with the lowest score. Conversely, people with lower scores tended to agree that their health did not affect their ability to work.

The earlier scale showed some incongruencies between what people said about their health in general and specific information that they reported. For example, 14.5 percent of those who thought they had a severe health problem, had no measured limitations on the scale (Table 8). Also, the agreement accomplished in the new scale is not found here. A somewhat large proportion of persons with low scores considered themselves severely disabled and many of those with high scores felt that their health

condition was not much of a problem.

These variations between the two scales were summarized in the correlations--the new scale agreed .6077 with self-perception, reduced to .5273 on the old scale.

### Age

There is ample evidence that age is associated with declining physical capacity and increased chronic disease. The distribution of age on the new functional capacity scale reflects this relationship. More young persons scored low on the scale than those aged 45 and over (Table 9). Only 30 percent of those with no limitations were in the older brackets compared to 85 percent of those who were most limited. Generally speaking, the percent of older persons rose as functional capacity decreased on the scale.

Age distributed similarly on the older scale except that a higher proportion, about one-third, of those with substantial functional limitations were in the younger age groups (Table 10). Apparently, this feature was different enough to cause some variation in the correlations. The newer index showed a higher correlation with age (.3322) than the older index (.2526).

### Death, Institutionalization, or Disablement After 1972

Although the functional capacity index was designed to measure current level of functioning, probable future functioning was weighed in the score assignments. Serious medical conditions with accompanying physical restrictions or dependency were assumed to have a high probability of continuance and were given higher rank on the scale. This property of the scale should be evident in follow-up data on which and disability status. That is, if these assumptions are correct, and because of the association that has been shown between functional capacity and work participation, persons who had severe limitations and were out of work in 1972 should be just as likely to be out of work in 1974. Assuming that their condition would not improve substantially, there should be an even greater likelihood of their disablement or death after 1972. These assumptions about continuance were not made for persons who had lesser functional limitations. Thus, the degree of predictability expected for higher scale scores is not as likely at the lower end of the scale.

The 1974 follow-up survey provided the opportunity to collect longitudinal information on the sample. In testing for prediction of disablement <sup>26/</sup> in the period covered by the longitudinal data--that is, from 1972 to 1974--the analysis was restricted to persons who were disability insured under social security in 1972 but who were not receiving benefits at that time. The question to be answered is what was the probability of having become disabled over the next two years given a certain level of functional capacity in 1972?

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<sup>26/</sup> "Disablement" here and in the following pages means that the person was allowed benefits for disability under Social Security.

A comparison of the old and new indexes (tables 11 and 12) reveals a stronger association between 1972 function level and subsequent disablement with the new scale. The probability of having become disabled ranges from less than .01 among those who had no limitations to .53 among those who had many limitations. Probability of disablement varied across the older scale reaching a much lower .19 among the most limited.

The association found on the newer scale was even more definitive in that it was stronger for men than for women. As hypothesized earlier, men are more likely to become disabled because they tend to work more hours, and at jobs that require manual or heavy labor. The older scale also made a distinction between the sexes, however. Correlations on the two indexes showed only a slight difference for the men--.0922 and .0780 on the new and old indexes, respectively. For the women, the correlations were close to .065 for both indexes.

Further evidence of validity of the new scale can be adduced from the percentages of persons who died <sup>27/</sup> sometime between 1972 and 1974 (table 13). For all adults aged 20-66, the likelihood of death was increased by lowered functional capacity. This can also be concluded from the older index (table 14) but with slightly lowered probabilities of occurrence. Correlations were .0696 with the new scale and .0603 with the older one.

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<sup>27/</sup> Persons who were institutionalized were included in the death category. They made up 0.2 percent of the population aged 20-66 in 1972.

To summarize this information about the predictive capacity of the new index, table 15 gives the percentages of persons who were insured for disability in 1972 and who subsequently became disabled, died, or were institutionalized. The data show that as much as 63 percent of the most functionally limited would fall into one of these categories two years later. Among men and women with much reduced functioning, the men were significantly more likely to have had these adverse events happen.

#### Work Status in 1974

Was change in work participation over time related to underlying function level? Did the data confirm the assumptions about functional capacity and its probable impact on work behavior? The data are not conclusive. Except among the most functionally limited, work stoppage seemed to be dependent on functional capacity (table 16). Those with lowered capacity were generally more likely to have stopped work than those with fewer limitations. The severely limited, however, seemed to concentrate in part-time work despite their disabled status. <sup>28/</sup> The relatively small number of persons in this category (i.e., those with substantial limitations who were working in 1972) may be a reason for the unpredictability of the figures.

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<sup>28/</sup> Unpublished 1974 data indicate that 59 percent of the men who had scores of 10 in 1972 on the new scale and who became disabled beneficiaries between surveys continued to work part-time. This proportion of beneficiaries who were working was the highest for any scale score. In general, only about 10 percent of all persons who became beneficiaries between 1972 and 1974 were working either full- or part-time in 1974.



The old index showed a more logical relationship between capacity and behavior although the correlations did not attest to the difference (table 17). Work correlated .1242 with functional level on the new index and .0934 on the old one.

A final indication of the association between functioning and work participation is provided by the proportions of nonworkers in 1972 who later went to work. Here the figures are more definite. Those with more limitations on the new index were not as likely to have started work (table 18). The old index shows the same outcome (table 19).

### Conclusions

The results reported here are favorable for use of the functional capacity indicator as a component of work disability. As stated earlier, the scale represents one attempt to improve the precision of the earlier scale. As such, both the methodology used and the final measure developed are under discussion.

As a disability outcome measure, the resulting score distributions had sufficient variability to detect differences in functioning in the population subgroups. This was in contrast to the earlier measure which was essentially bimodal, tapping either no limitations or severe limitations. The additional items included in the newer scale and the methodology used to combine them produced a scale that detected a wider range of limitations.

In addition, the newer scale exhibited high internal consistency with evidence of predictive capacity over time. Hypothesized associations were observed and tended to be strong, supporting the validity of the scale. Finally, the new scale had the improvements that were desired with respect to reducing the proportion of disabled beneficiaries and severely disabled persons at the less limited end of the scale. Thus, it had incremental validity because it contributed information that was not available with the older measure.

On the negative side, the newer scale does not appear to be a much better overall predictor of disability, death, work behavior, or other variables studied.

All in all, the new scale is a valuable tool for identifying high risk groups and for studying the relationship between functional capacity, age, work history, education and other disability factors. In general, groups with high scores can be considered to be at risk for disability.

TABLE 1.--Extent of work in 1972: Number and percentage distributions of adult population aged 20-64 by new functional capacity score, 1972\*

	Percentage distribution by functional capacity score										
	0	1	2	3	4	5	6	7	8	9	10
Total	50,456	13,631	9,310	2,499	16,106	4,436	2,155	1,862	1,460	363	876
Total number (in thousands).....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total percent.....	24.9	32.6	23.9	31.0	29.1	52.1	53.2	64.0	72.1	92.9	91.5
Nonworkers.....	75.1	67.3	76.1	69.0	70.9	47.9	46.7	36.0	27.9	7.1	8.5
Workers.....	62.2	54.1	61.4	52.7	55.9	36.5	35.3	22.4	21.2	5.1	6.0
Full-time.....	12.9	13.2	14.7	16.3	15.0	11.4	11.4	13.6	6.7	2.0	2.5
Part-time.....											

  

	Percentage distribution by work status										
	0	1	2	3	4	5	6	7	8	9	10
Total	48.9	13.2	9.0	2.4	15.6	4.3	2.1	1.8	1.4	.4	.8
Total number (in thousands)	103,153										
Total percent	100.0										
Nonworkers	39.9	14.1	7.0	2.5	14.8	7.3	3.6	3.8	3.3	1.1	2.5
Workers	52.9	12.8	9.9	2.4	16.0	3.0	1.4	.9	.6	1/	.1
Full-time	54.1	12.7	9.9	2.3	15.5	2.8	1.3	0.7	0.5	0.0	0.1
Part-time	47.7	13.2	10.1	3.0	17.7	3.7	1.8	1.9	0.7	0.1	0.2

1/ Less than .05 percent

\* Functional capacity decreases as scores increase on the scale. That is, low scores represent greater capacity and vice versa.

TABLE 2.--Extent of work in 1972: Number and percentage distributions of adult population aged 20-64 by old functional capacity score, 1972.\*

Percentage distribution by functional capacity score										
Total	1	2	3	4	5	6	7	8	9	10
Total number (in thousands) .....	85,218	946	6,599	1,126	25	125	3,500	2,235	851	2,529
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonworkers.....	26.2	48.1	37.8	57.9	64.8	76.2	47.0	68.7	54.4	73.2
Workers.....	73.8	52.0	62.1	42.1	35.2	23.8	53.0	31.3	45.5	26.8
Full-time.....	60.5	38.7	45.8	27.6	35.2	11.8	39.3	24.2	35.5	18.3
Part-time.....	13.3	13.3	16.3	14.5	--	12.0	13.7	7.1	10.0	8.5

Percentage distribution by work status										
Total number (in thousands)	Total Percent	1	2	3	4	5	6	7	8	10
Total.....	100.0	82.6	.9	6.4	1.1	1/1	.1	3.4	2.2	.8
Nonworkers.....	31,542	70.8	1.4	7.9	2.1	.1	.3	5.2	4.9	1.5
Workers.....	71,610	87.8	.7	5.7	.7	1/1	1/1	2.6	1.0	.5
Full-time.....	57,968	88.9	.6	5.2	.5	1/1	1/1	2.4	.9	.8
Part-time.....	13,642	83.0	.9	7.9	1.2	--	.1	3.5	1.2	.6

1/ Less than .05 percent

\* Functional capacity decreases as scores increase on the scale. That is, low scores represent greater capacity and vice versa.

TABLE 3.--Extent of work in 1972: Percentage distribution of males and females aged 20-64 by new functional capacity score, 1972

Work status	Functional capacity										
	0	1	2	3	4	5	6	7	8	9	10
<u>Male</u>											
Number (in thousands).....	25,417	5,113	4,870	980	7,654	1,883	1,026	786	698	123	351
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonworkers.....	9.7	5.1	7.2	10.4	9.4	27.6	37.6	43.9	55.8	86.9	82.2
Workers.....	90.3	94.9	92.9	89.6	90.6	72.4	62.4	56.1	44.2	13.1	17.8
Full-time.....	79.7	86.3	81.2	73.2	80.2	60.5	51.8	39.8	35.4	10.9	14.0
Part-time.....	10.6	8.6	11.7	16.4	10.4	11.9	10.6	16.3	8.8	2.2	3.8
<u>Female</u>											
Number (in thousands).....	25,039	8,517	4,440	1,519	8,452	2,553	1,129	1,076	762	240	524
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonworkers.....	49.4	49.2	42.1	44.2	46.9	70.2	67.4	78.6	87.0	95.9	97.8
Workers.....	50.6	50.8	57.9	55.8	53.1	29.8	32.5	21.4	13.0	4.0	2.3
Full-time.....	35.0	34.8	39.8	39.5	34.0	18.8	20.3	9.7	8.1	2.1	.6
Part-time.....	15.6	16.0	18.1	16.3	19.1	11.0	12.2	11.7	4.9	1.9	1.7



TABLE 5.--Disabled beneficiaries: Number and percentage distributions of adult population aged 20-64 who were insured for disability under the social security program by old functional capacity score, 1972

Disability allowance and percentage distribution by functional capacity score										
	1	2	3	4	5	6	7	8	9	10
Total	54,967	53.1	3,810	576	22	49	1,988	1,025	517	1,120
Total number (in thousands).....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total percent.....	99.8	97.4	97.6	86.7	90.3	51.7	89.1	66.1	85.2	61.5
Nonbeneficiaries.....	.2	2.6	2.4	13.3	9.7	48.3	10.9	33.9	14.8	38.5
Disabled beneficiaries....										
Percentage distribution by disability allowance										
Total	85.1	.8	5.9	.9	1/	.1	3.1	1.6	.8	1.7
Total number (in thousands)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total percent	86.8	.8	5.9	.8	1/	1/	2.8	1.1	.7	1.1
Nonbeneficiaries.....	7.8	1.0	6.7	5.5	.2	1.7	15.6	25.0	5.5	31.0
Beneficiaries.....										

1/ Less than .05 percent.

TABLE 6.--Disabled beneficiaries by age: Percentage distribution of adults aged 20-64 who were insured for disability under the social security program by disability allowance, age and new functional capacity score, 1972

Disability allowance	Functional capacity score										
	0	1	2	3	4	5	6	7	8	9	10
<u>Age 35-44</u>											
Total number (in thousands).....	7,096	1,469	1,595	213	1,524	399	70	72	57	12	38
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	99.0	99.8	99.9	99.4	99.1	96.3	85.0	77.0	67.8	22.9	15.2
Beneficiaries.....	1.0	.2	.1	.6	.9	3.7	15.0	23.0	32.2	77.1	84.8
<u>Age 45-54</u>											
Total (in thousands)..	5,853	1,318	1,354	408	3,320	612	359	243	234	40	118
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	97.3	100.0	99.7	99.5	99.1	94.3	82.9	71.1	66.4	37.5	43.4
Beneficiaries.....	2.7	--	.3	.5	.9	5.7	17.1	28.9	33.6	62.5	56.6
<u>Age 55-64</u>											
Total (in thousands)..	3,507	832	986	302	3,024	732	489	425	405	53	254
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	92.6	99.9	99.8	99.1	97.6	86.6	73.3	69.8	58.4	20.4	35.4
Beneficiaries.....	7.4	.1	.2	.9	2.4	13.4	26.7	30.2	41.6	79.6	64.6



TABLE 7.--Self-report of disability: Number and percentage distributions of adult population aged 20-66 reporting different levels of disability by new functional capacity score, 1972

	Percentage distribution by functional capacity score										
	0	1	2	3	4	5	6	7	8	9	10
Total	51,373	13,828	9,511	2,575	17,002	4,894	2,366	2,076	1,626	387	967
Total number (in thousands)	106,607										
Total percent...	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Severe disability.....	.2	1.1	2.0	3.9	7.1	33.4	46.0	61.7	72.8	85.5	96.8
Partial disability.....	.6	4.7	10.3	12.5	16.1	30.4	28.4	19.5	15.4	13.5	3.1
Not disabled.....	99.3	94.2	87.7	83.6	76.8	36.2	25.6	18.9	11.7	1.0	.2

  

	Percentage distribution by self-report of disability												
	Total number (in thousands)	Total Percent	0	1	2	3	4	5	6	7	8	9	10
Total	106,607	100.0	48.2	13.0	8.9	2.4	15.9	4.6	2.2	1.9	1.5	.4	.9
Severe disability.....	8,194	100.0	1.0	1.9	2.3	1.2	14.7	19.9	13.3	15.6	14.4	4.0	11.4
Partial disability.....	7,877	100.0	3.7	8.2	12.4	4.1	34.7	18.9	8.5	5.1	3.2	.7	.4
Not disabled.....	90,536	100.0	56.3	14.4	9.2	2.4	14.4	2.0	.7	.4	.2	1/	1/

1/ Less than .05 percent.

TABLE 8.--Self-report of disability: Number and percentage distributions of adult population aged 20-66 reporting different levels of disability by old functional capacity score, 1972

Percentage distribution by functional capacity score										
Total	1	2	3	4	5	6	7	8	9	10
Total number (in thousands).....	87,213	999	6,981	1,211	41	160	3,879	2,464	959	2,698
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Severe disability.....	1.4	17.4	12.6	46.5	34.6	65.2	35.9	64.6	46.8	68.0
Partial disability.....	4.2	20.2	23.3	28.5	17.4	14.5	26.7	23.5	16.8	10.9
Not disabled.....	94.5	62.3	64.1	25.0	48.0	20.3	37.3	11.9	36.4	21.1

  

Percentage distribution by self-report of disability											
Total number (in thousands)	Total Percent	1	2	3	4	5	6	7	8	9	10
Total.....	106,607	81.8	.9	6.5	1.1	1/	.2	3.6	2.3	.9	2.5
Severe disability.....	8,194	14.5	2.1	10.7	6.9	.2	1.3	17.0	19.4	5.5	22.4
Partial disability.....	7,877	45.7	2.6	20.7	4.4	.1	.3	13.2	7.3	2.0	3.7
Not disabled.....	90,535	91.0	.7	4.9	.3	1/	1/	1.6	.3	.4	.6

1/ Less than .05 percent.

TABLE 9.--Age and functional capacity: Number and percentage distributions of age groups 20-66 years old by new functional capacity score, 1972

Percentage distribution by functional capacity score											
	0	1	2	3	4	5	6	7	8	9	10
Total	51,374	13,828	9,511	2,575	17,002	4,894	2,366	2,076	1,626	387	967
Total number (in thousands).....	106,608										
Total percent....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Under age 35.....	48.2	50.2	34.9	34.8	18.3	17.8	13.2	11.8	4.6	8.9	6.6
35-44 years.....	21.8	20.9	26.8	14.7	17.4	18.4	10.1	9.3	9.9	11.6	8.1
45-54 years.....	17.3	17.8	21.9	27.7	31.3	26.2	29.8	29.1	28.9	27.3	25.8
55-66 years.....	12.6	11.0	16.4	22.7	33.0	37.6	46.8	49.9	56.6	52.2	59.4

  

Percentage distribution by age groups											
	0	1	2	3	4	5	6	7	8	9	10
Total	48.2	13.0	8.9	2.4	15.9	4.6	2.2	1.9	1.5	.4	.9
Total number (in thousands)	106,608										
Total percent	100.0										
Under age 35.....	60.9	17.1	8.2	2.2	7.7	2.1	.8	.6	.2	.1	.2
35-44 years.....	51.9	13.4	11.8	1.8	13.7	4.2	1.1	.9	.7	.2	.4
45-54 years.....	38.9	10.8	9.1	3.1	23.2	5.6	3.1	2.6	2.0	.5	1.1
55-66 years.....	30.2	7.1	7.3	2.7	26.2	8.6	5.2	4.8	4.3	.9	2.7

TABLE 10.--Age and functional capacity: Number and percentage distributions of age groups 20-66 years old by functional capacity score, 1972

		Percentage distribution by functional capacity score									
Total		1	2	3	4	5	6	7	8	9	10
Total number (in thousands).....	106,608	87,215	999	6,981	1,211	41	160	3,879	2,464	959	2,698
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Under age 35.....	38.1	42.7	25.3	20.3	14.6	16.2	6.9	16.1	6.1	19.6	20.3
35-44 years.....	20.3	21.3	17.9	19.7	12.5	4.8	19.6	14.3	7.9	13.9	14.0
45-54 years.....	21.5	20.0	28.1	29.3	32.0	20.3	12.1	26.6	32.8	26.7	23.1
55-66 years.....	20.1	15.9	28.7	30.7	41.0	58.7	61.4	43.0	53.3	39.8	42.6

  

		Percentage distribution by age groups									
Total number (in thousands)	Total Percent	1	2	3	4	5	6	7	8	9	10
Total.....	106,608	81.8	.9	6.5	1.1	1/	.2	3.6	2.3	.9	2.5
Under age 35.....	40,650	91.7	.6	3.5	.4	1/	1/	1.5	.4	.5	1.3
35-44 years.....	21,610	86.1	.8	6.4	.7	1/	.1	2.6	.9	.6	1.7
45-54 years.....	22,899	76.2	1.2	8.9	1.7	1/	.1	4.5	3.5	1.1	2.7
55-64 years.....	21,448	64.7	1.3	10.0	2.3	1/	.5	7.8	6.1	1.8	5.4

1/ Less than .05 percent.

TABLE 11.--Social security disability allowance after 1972: Percentage distribution of 1972 disability insured nonbeneficiaries aged 20-62 by disablement between 1972-1974, sex, and new 1972 functional capacity score

Beneficiary status in 1974	Functional capacity score											
	Total	0	1	2	3	4	5	6	7	8	9	10
Total (in thousands) .....	61,201	32,769	7,702	6,154	1,562	9,227	1,903	863	495	394	31	100
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	98.9	99.8	99.7	99.5	99.7	90.0	90.2	93.0	87.4	81.6	60.7	47.0
Disabled beneficiaries..	1.1	.2	.3	.5	.3	1.0	9.8	7.0	12.6	18.4	39.3	53.0
<u>Males</u>												
Total.....	38,188	20,908	3,957	4,146	726	5,830	1,276	629	361	269	22	67
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	98.7	99.7	99.8	99.8	98.3	98.8	89.7	91.3	86.9	74.9	52.4	42.5
Disabled beneficiaries..	1.3	.3	.2	.2	.7	1.2	10.3	8.7	13.1	25.1	47.6	57.5
<u>Females</u>												
Total.....	23,013	11,861	3,746	2,009	836	3,397	628	235	134	125	10	33
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	99.2	99.8	99.5	98.8	100.0	99.3	91.3	97.7	88.6	96.1	79.3	56.0
Disabled beneficiaries..	.8	.2	.5	1.2	--	.7	8.7	2.3	11.4	3.9	20.7	44.0

TABLE 12.--Social security disability allowance after 1972: Percentage distribution of 1972 disability insured nonbeneficiaries aged 20-62 by disablement between 1972-1974, sex, and old 1972 functional capacity score

Beneficiary status in 1974	Functional capacity score									
	1	2	3	4	5	6	7	8	9	10
Total	53,569	478	3,534	443	16	21	1,564	568	407	602
Total (in thousands)	61,201									
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	98.9	93.6	96.7	90.9	100.0	84.5	95.4	85.3	94.8	80.7
Disabled beneficiaries..	1.1	6.4	3.3	9.1	--	15.5	4.6	14.7	5.2	19.3
<u>Males</u>										
Total (in thousands)	38,188	292	1,919	242	9	4	1,191	402	321	344
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	98.7	90.6	95.1	94.1	100.0	71.8	94.6	81.2	96.2	71.9
Disabled beneficiaries..	1.3	9.4	4.9	5.9	--	28.2	5.4	18.8	3.8	28.1
<u>Females</u>										
Total (in thousands)	23,013	185	1,615	201	7	18	373	165	86	258
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonbeneficiaries.....	99.2	98.3	98.5	87.0	100.0	87.2	97.9	95.3	89.6	92.5
Disabled beneficiaries..	.8	1.7	1.5	13.0	--	12.8	2.1	4.7	10.4	7.5

TABLE 13.--Death or institutionalization by 1974: Percentage distribution of adults aged 20-66 who died or were institutionalized after 1972 by new 1972 functional capacity score

Death or institutional status in 1974	Functional capacity score										
	0	1	2	3	4	5	6	7	8	9	10
Total	51,064	14,059	9,693	2,641	17,143	4,910	2,376	2,062	1,638	366	968
Total (in thousands)	106,920	14,059	9,693	2,641	17,143	4,910	2,376	2,062	1,638	366	968
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Alive.....	98.3	99.1	98.9	98.0	97.2	96.3	95.7	96.3	92.1	91.1	86.1
Dead or institutionalized.....	1.7	.9	1.1	1.9	2.8	3.7	4.3	3.7	8.0	8.9	14.0

TABLE 14.--Death or institutionalization by 1974: Percentage distribution of adults aged 20-66 who died or were institutionalized after 1972 by old 1972 functional capacity score

Death or institutional status in 1974	Functional capacity score									
	1	2	3	4	5	6	7	8	9	10
Total	87,332	1,027	7,170	1,181	38	172	3,885	2,438	977	2,701
Total (in thousands)	106,920									
Total percent....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Alive.....	98.9	94.9	97.3	98.6	100.0	96.8	95.7	93.4	96.3	91.6
Dead or institutionalized.....	1.7	5.1	2.6	1.4	--	3.2	4.3	6.6	3.8	8.4



TABLE 15.--Disabled, dead or institutionalized after 1972: Percentage distribution of 1972 disability insured nonbeneficiaries aged 20-62 by death or disablement between 1972-74, sex, and new 1972 functional capacity score

1974 Status	Functional capacity score										
	0	1	2	3	4	5	6	7	8	9	10
<u>Total</u>											
Total (in thousands).....	33,051	7,754	6,189	1,565	9,487	1,965	916	511	451	35	123
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Alive (nonbeneficiary).....	98.9	99.0	98.9	99.5	96.3	87.4	87.7	84.7	71.3	55.0	38.0
Disabled beneficiary....	.2	.3	.5	.3	1.0	9.5	6.6	12.2	16.1	35.5	42.8
Dead or institutionalized.....	1.4	.9	.6	.2	2.7	3.1	5.8	3.1	12.6	9.5	19.2
<u>Male</u>											
Total (in thousands).....	21,119	4,006	4,180	727	6,024	1,310	649	369	325	25	89
Total percent.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Alive (nonbeneficiary).....	98.7	98.6	99.0	99.2	95.6	87.4	88.5	85.1	62.0	45.5	32.0
Disabled beneficiary....	.3	.2	.2	.7	1.2	10.0	8.4	12.8	20.8	41.3	43.2
Dead or institutionalized.....	1.6	1.2	.8	.1	3.2	2.6	3.1	2.1	17.2	13.2	24.8

TABLE 15.--Disabled, dead or institutionalized after 1972: Percentage distribution of 1972 disability insured nonbeneficiaries aged 20-62 by death or disablement between 1972-74, sex, and new 1972 functional capacity score--Continued

1974 Status	Functional capacity score										
	0	1	2	3	4	5	6	7	8	9	10
Total	11,932	3,749	2,009	838	3,463	655	267	143	126	10	35
Total (in thousands)	11.932	3.749	2.009	0.838	3.463	0.655	0.267	0.143	0.126	0.010	0.035
Total percent....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Female											
Alive (nonbeneficiary).....	98.3	99.5	98.7	99.7	97.4	87.5	85.7	83.5	95.5	79.3	53.1
Disabled beneficiary...	.8	.5	1.2	--	.6	8.3	2.1	10.7	3.9	20.7	41.7
Dead or institutionalized.....	.9	.1	--	.3	1.9	4.2	12.3	5.7	.6	--	5.1

TABLE 16.--Extent of work in 1974: Percentage distribution of adults aged 22-64 who were employed in 1972 by new 1972 functional capacity score and sex

Work in 1974	Functional capacity score										
	0	1	2	3	4	5	6	7	8	9	10
Total	36,853	9,200	7,062	1,674	10,874	1,999	955	583	346	24	56
Total (in thousands)	69.627	9.200	7.062	1.674	10.874	1.999	955	583	346	24	56
Total percent....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonworker.....	9.4	10.5	12.2	8.7	10.7	17.8	21.3	21.3	25.8	41.5	17.9
Workers.....	90.7	89.5	87.8	91.3	89.3	82.2	78.7	78.7	74.3	58.5	82.1
Full-time.....	74.6	69.1	73.7	76.4	72.2	63.3	55.3	57.0	53.0	31.5	25.0
Part-time.....	16.1	20.4	14.1	14.9	17.1	18.9	23.4	21.7	21.3	27.0	57.1





TABLE 19.--Extent of work in 1974: Percentage distribution of adults aged 22-64 who were employed in 1972 by old 1972 functional capacity score and sex

Work in 1974	Functional capacity score										
	1	2	3	4	5	6	7	8	9	10	
Total	21,230	376	2,348	570	12	92	1,357	1,349	374	1,468	
Total (in thousands)	29,176	21,230	376	2,348	570	12	92	1,357	1,349	374	1,468
Total percent..	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nonworkers.....	74.5	82.0	82.3	85.0	82.3	87.1	85.6	93.0	86.2	91.4	
Workers.....	25.6	18.0	17.7	15.0	17.7	12.9	14.3	7.0	13.9	8.6	
Full-time.....	14.9	3.5	6.9	11.1	10.4	.6	6.4	2.0	8.8	4.5	
Part-time.....	10.7	14.5	10.8	3.9	7.3	12.3	7.9	5.0	5.1	4.1	

## TECHNICAL APPENDIX

The method of scaling used in this research effort involves a grouping and evaluation of different data items based on patterns that were directly observable in the data for disabled and nondisabled subpopulations sampled in the 1972 Social Security Survey of Disabled and Non-disabled Adults. An effort was made to assimilate ideas from the health status, functional capacity, and disability measurement literature. Initially, each respondent was assigned a value on a 6-point scale for health conditions, a 5-point scale for physical limitations, and a 3-point scale for dependency on others. Combinations of steps for these three variables yielded 90 (=  $6 \times 5 \times 3$ ) theoretical levels of functioning, which were further reduced and ranked on a scale of 1 to 10. A description of the items, criteria for assessment, and rules for weighting are elucidated here.

### Health Conditions Scale

Respondents for the 1972 SSA survey were shown a list of 38 conditions and asked to identify those which they had. Although up to five conditions were tabulated in the data, the weighting and classifying scheme developed here used only the two most serious conditions reported. Use of two conditions was considered to be a manageable prospect and reflected the multiple impairments typically reported by severely ill persons.

The question asked was:

SHOW FLASHCARD NO. 3

31a. Do you have any of these conditions or impairments?

31a.

064  No - SKIP to 32

z  Yes - Which one(s)? 7

Condition No. Description

065	_____	_____
066	_____	_____
067	_____	_____
068	_____	_____
069	_____	_____

# FLASHCARD NO. 3

- 1. Asthma
- 2. Tuberculosis
- 3. Chronic bronchitis
- 4. Emphysema
- 5. Any other chronic lung trouble
- 6. Allergies affecting breathing
- 7. Any other allergy
- 8. Rheumatic fever
- 9. Hardening of the arteries
- 10. High blood pressure (hypertension)
- 11. Heart attacks (coronary)
- 12. Heart trouble
- 13. Stroke
- 14. Trouble with varicose veins
- 15. Hemorrhoids or piles
- 16. Tumor, cyst or growth
- 17. Cancer
- 18. Chronic gallbladder or liver trouble
- 19. Stomach ulcer
- 20. Other chronic stomach trouble
- 21. Kidney stones or chronic kidney trouble
- 22. Arthritis or rheumatism
- 23. Mental illness
- 24. Mental retardation
- 25. Diabetes
- 26. Thyroid trouble or goiter
- 27. Epilepsy or seizures
- 28. Multiple sclerosis
- 29. Alcohol or drug problems
- 30. Chronic nervous trouble
- 31. Hernia or rupture
- 32. Deafness or serious trouble with hearing
- 33. Blindness or serious trouble with seeing, even when wearing glasses
- 34. Missing legs or feet
- 35. Missing arms or hands
- 36. Chronic stiffness or any deformity of the foot, leg, arm or hand
- 37. Repeated trouble with back or spine
- 38. Chronic stiffness or deformity of the back or spine



The seriousness of a disorder depended on several factors. These were the likelihood that the disorder:

- was degenerative in nature and would not improve with treatment 1/
- had a high frequency of occurrence among SSA disabled beneficiaries indicating its disabling potential 2/
- was complicated by persistent pain or other residuals such as paralysis that would restrict one's daily functioning
- was reported more often by persons who considered themselves severely disabled 3/, and
- was not prevalent among the nondisabled

With these guidelines in mind, and allowing for the lack of discriminating information about the stage of the disease or treatment, conditions were placed in four lists ranging from most serious to least serious as follows:

---

1/ See, for example, Disability Evaluation under Social Security; a Handbook for Physicians, 1973 or Guides to the Evaluation of Permanent Impairment, AMA, 1971.

2/ Unpublished data for disabled worker allowances from Disability Applicant Statistics, 1972. Also, unpublished report by Krute and Sayetta (ibid.) giving primary and secondary diagnoses most prevalent among disabled beneficiaries. Obviously, high occurrence among beneficiaries could be a function of high occurrence in general.

3/ Report by Krute and Burdette entitled, "1972 Survey of Disabled and Nondisabled Adults: Chronic Disease, Injury, and Work Disability", Social Security Bulletin, April 1978. This factor is not entirely independent of the second factor since nearly all disabled beneficiaries considered themselves to be severely disabled. However, only 18 percent of the severely disabled were beneficiaries.

Most serious

Heart attacks  
Heart trouble  
Multiple sclerosis  
Cancer  
Blindness

Second list 4/

Arthritis  
Missing legs/feet  
Rheumatic fever  
Hardening of arteries  
High blood pressure  
Stroke  
Emphysema  
Mental illness  
Mental retardation  
Alcohol or drug problem  
Diabetes  
Deafness  
Gall bladder/liver trouble  
Other nervous system disorders

Third list

Trouble with back or spine  
Chronic stiffness or deformity of  
foot, leg, or hand  
Tuberculosis  
Chronic bronchitis  
Asthma  
Stomach ulcer  
Chronic nervous trouble  
Epilepsy  
Kidney stones/trouble  
Missing arm/hand  
Varicose veins  
Hernia  
Other musculo-skeletal disorders  
Other circulatory disorders

Fourth list (least serious) 5/

Other chronic lung trouble  
Allergies (respiratory)  
Other chronic stomach trouble  
Other digestive disorders  
Other urogenital conditions  
**Other endocrine disorders**  
Tumor, cyst, or growth  
Other neoplasms  
Allergies (non-respiratory)  
Other complications

---

4/ A similar list of conditions considered to potentially result in disability is set forth in the Rehabilitation Act of 1973. See Koshel, et. al., op. cit.

5/ Very few respondents had conditions which fell into these categories. Non-respiratory allergies were most prevalent with 7.2 percent of the population suffering from these.

Respondents were ranked on a scale of 1 to 6 for health conditions. To simplify description, labels were used for the scale steps such as "very serious conditions", "controllable conditions", to "no health conditions". The rules for combination follow:

Score

- 6 Very serious conditions--at least one condition from group 1 or two conditions from group 2
- 5 Serious conditions--at least one condition from group 2
- 4 Controllable conditions--two conditions from group 3
- 3 Not too serious conditions--at least one condition from group 3
- 2 Slight health problems--conditions from group 4 only
- 1 No health conditions--no reported conditions

According to this scheme, a person who had high blood pressure and stroke would receive a score of 6, someone who had a missing arm would receive a score of 3, and someone who had chronic bronchitis and chronic nervous trouble would be assigned a score of 4.

Physical Activity Scale

The Physical Activity Scale was designed for three purposes--(1) to provide additional information about the severity of physical disorders, (2) to estimate capacity to work based on ability to perform combinations of physical activities that are required on most jobs, and (3) to assess the amount of difficulty that someone with certain physical limitations would have in getting around and taking care of his daily needs by himself.

Respondents were asked what physical activities (such as walking, standing for long periods, or reaching) they had difficulty doing and whether they could do these at all. The list of activities appraised roughly corresponds to the Dictionary of Occupational Titles' classification of physical job requirements. <sup>6/</sup> Employed persons were also asked to describe which of these activities were necessary on their jobs. By determining what proportion of the population worked at different occupations and therefore what physical activities were likely to be required most often and by more people, it was possible to rank the six activities in terms of importance for working.

The specific questions asked were:

<p>SHOW FLASHCARD NO. ①</p> <p>27. Do you have any difficulty performing any of the activities on this card?</p>	<p>27.</p>	<p>④7 1 <input type="checkbox"/> No - SKIP to 28, page 6</p> <p>2 <input type="checkbox"/> Yes - Which ones? - Mark each activity mentioned and for each one marked ask -</p> <p style="text-align: right;">Can you . . . at all?</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">Yes</th> <th style="width: 10%; text-align: center;">No</th> </tr> </thead> <tbody> <tr> <td>④8 1 <input type="checkbox"/> Walking . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>④9 1 <input type="checkbox"/> Using stairs or inclines . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>⑤0 1 <input type="checkbox"/> Standing for long periods . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>⑤1 1 <input type="checkbox"/> Sitting for long periods . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>⑤2 1 <input type="checkbox"/> Stooping, crouching or kneeling . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>⑤3 1 <input type="checkbox"/> Lifting or carrying weights up to 10 pounds . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>⑤4 1 <input type="checkbox"/> Lifting or carrying weights over 10 pounds . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>⑤5 1 <input type="checkbox"/> Reaching . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> <tr> <td>⑤6 1 <input type="checkbox"/> Handling and fingering . . . . .</td> <td style="text-align: center;">2 <input type="checkbox"/></td> <td style="text-align: center;">3 <input type="checkbox"/></td> </tr> </tbody> </table>		Yes	No	④8 1 <input type="checkbox"/> Walking . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	④9 1 <input type="checkbox"/> Using stairs or inclines . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	⑤0 1 <input type="checkbox"/> Standing for long periods . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	⑤1 1 <input type="checkbox"/> Sitting for long periods . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	⑤2 1 <input type="checkbox"/> Stooping, crouching or kneeling . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	⑤3 1 <input type="checkbox"/> Lifting or carrying weights up to 10 pounds . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	⑤4 1 <input type="checkbox"/> Lifting or carrying weights over 10 pounds . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	⑤5 1 <input type="checkbox"/> Reaching . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>	⑤6 1 <input type="checkbox"/> Handling and fingering . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	Yes	No																														
④8 1 <input type="checkbox"/> Walking . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>																														
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⑤5 1 <input type="checkbox"/> Reaching . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>																														
⑤6 1 <input type="checkbox"/> Handling and fingering . . . . .	2 <input type="checkbox"/>	3 <input type="checkbox"/>																														

<sup>6/</sup> See Dictionary of Occupation Titles, Third Edition, 1975, Volume II, Occupational Classification, Appendix B, pp. 654-655 for an explanation of physical demands of work situations. Light lifting (up to 10 pounds) was included in this scale instead of heavy lifting (10 pounds or over) because it is more restrictive. Anyone who had difficulty with the former would also have problems lifting heavier objects. Climbing stairs was not included because of the conceptual overlap with the activity of walking.

SHOW FLASHCARD NO. ①

18a. Which of these things do you do on your job?

(Mark all that apply)

- 18a. ① 1  Walking  
② 2  Using stairs or inclines  
③ 3  Standing for long periods  
④ 4  Sitting for long periods  
⑤ 5  Stooping, crouching or kneeling  
⑥ 6  Lifting or carrying weights up to 10 pounds  
⑦ 7  Lifting or carrying weights over 10 pounds  
⑧ 8  Reaching  
⑨ 9  Handling and fingering

For example, the data showed that walking was a job requirement for at least 80 percent of the males employed as professionals, managers, salesmen, craftsmen, laborers, and farmers and farm managers. These occupations retained 63 percent of employed males. More women (63 percent), on the other hand, were employed in clerical, operative, and service fields where handling and using fingers was required approximately 80 percent of the time. Use of hands was also reported as a job activity by most men and women professionals, managers, and craftsmen who represented about 40 percent of the work force.

Reaching was also frequently required in job situations. Regardless of occupation, about 50 percent of all workers said that they had to reach on their job. However, for every occupation where reaching and also walking or handling were indicated, reaching was reported by fewer workers than the other two physical activities.

Similarly, light lifting, standing, and stooping were concentrated in occupations that employed less of the work force. Whenever these activities were reported by workers in the high employment occupations (professional, operatives, and craftsmen), walking, handling, or reaching were reported by more people in these jobs.

Another factor taken into account in rating activities was how necessary the activity was for daily functioning and mobility. For nonworking women, in particular, it was determined that walking, handling, reaching, and standing for long periods were regularly required in the course of their daily routine. Thus, walking, handling, and reaching were essential to most of the population. These activities were regularly performed around the home, in getting to work, and on the job. Generally, it was felt that limitations in lifting and stooping were less restrictive, since they were peculiar to particular jobs, and that adaptations could be effected more easily.

Finally, limitations involving both sets of extremities were considered more serious than the effect of restricted arm or leg movements by themselves.

Using these criteria, and taking the degree of difficulty into account, scale scores were assigned for limitations in different sets of activities. The rules for combination follow: (1) Walk and handle have equal weight in this scheme; reach and light lifting are weighted second and third in importance; and stand and stoop are both weighted fourth.

(2) "No" means no difficulty, "Diff " means some difficulty, and "Cannot" means cannot do the activity at all.

	Walk	Handle	Reach	Light Lifting	Stand	Stoop
No limit	No	No	No	No	No	No
Minor limit	No	No	No	Diff	Diff in 1 of	
	No	No	No	No	Cannot in 1 of	
	No	No	No	No	Diff in 2 of	
Moderate limit	No	No	No	Cannot	Cannot in 1 of	
	No	No	No	Cannot	Diff in 2 of	
	No	No	No	Diff	Cannot in 2 of	
	No	No	Diff	Cannot	Diff in 1 of	
	No	No	Diff	Diff	Cannot in 1 of	
	No	No	Cannot	Cannot	No in both	
	No	Diff	No	No	Cannot in 1 of	
	No	Diff	No	No	Diff in 2 of	
	No	Diff	No	Diff	Diff in 1 of	
	No	Diff	Diff	Diff	No in both	
Moderate-severe limit	No	Diff	Diff	Diff	No in both	
	Diff	No	No	No	Diff in 2 of	
Moderate-severe limit	All combinations not specified in other categories (too numerous to list).					
Severe limit	Diff	Diff	Diff			
	Diff	Cannot				
	No	Cannot	Cannot			
	Cannot	No	Diff			
	Cannot	Diff				
	Diff	No	Diff	Diff	Diff	Diff in 2 of

(Category 5 is the only one where the least serious restrictions are specified: in all other categories, a more serious situation is not allowed. For example, someone who reported having difficulty with walking and reaching would receive a score of 4 not of 3; and someone

who could not reach, light lift or stand would also receive a score of 4. On the other hand, a person who could not walk or handle at all, would receive a score of 5).

Dependency Scale

This scale is the most straightforward and the rules for construction are as follows:

No help needed from others--needs occasional or no (rare or never) help in personal care (washing, bathing, and dressing) and needs no help in mobility (to go outside, get around outside, or with public transportation).

Partly dependent on others--needs occasional or no help in personal care and needs help to go out, get around outside, or with public transportation.

Major dependency on others--usually needs help with personal care, or is confined to the home, or needs help to go out and get around outside.

The specific questions asked were:

<p>35a. How often do you need help from others in looking after your personal needs - such as dressing, undressing, eating, or personal hygiene?</p>	<p>35a. (088) 1 <input type="checkbox"/> Usually or frequently          2 <input type="checkbox"/> Occasionally          3 <input type="checkbox"/> Rarely or never</p>
<p>32a. Are you usually able to go out of doors without help from another person?</p>	<p>32a. (073) 1 <input type="checkbox"/> Yes          2 <input type="checkbox"/> No</p>
<p>b. Are you usually able to get around outside your home without help from another person?</p>	<p>b. (074) 1 <input type="checkbox"/> Yes          2 <input type="checkbox"/> No</p>
<p>c. Are you able to use buses, trains, or other public transportation without help from others?</p>	<p>c. (075) 1 <input type="checkbox"/> Yes - SKIP to 34, page 8          2 <input type="checkbox"/> No</p>
<p>33. Do you have to stay in the house all or most of the time?</p>	<p>33. (076) 1 <input type="checkbox"/> Yes          2 <input type="checkbox"/> No</p>



### Index of Functional Capacity

The index of functional capacity is an estimate of overall performance capabilities allowing for the combined impact of the three variables just described. It is a measure of potential behavior, particularly work behavior, based on underlying etiology. In this respect, it differs from most other health status indicators which are usually defined in terms of actual behavior without incorporating etiology.

The basic framework used in scaling was to develop prototype case descriptions for each combination of subscale scores, and to then rate this "person's" capacity for work and for normal functioning in general. In essence, the author sat down with a randomized list of the 90 possible combinations of subscale scores, and assigned a value to each combination based on an overall perception of capacity to function. For example, a case description of someone who had a score of 6 for health conditions, a score of 4 for physical limitations, and a score of 2 for dependency might be the following: (1) has high blood pressure and stroke, (2) has much trouble lifting, reaching, and walking for long distances, (3) is somewhat dependent on others for personal needs. Based on this hypothetical situation, an estimation was made of the "person's" ability to work. Probable future capacity was also considered.

This approach was taken with several assumptions in mind. First, it was assumed that the physical limitations and/or dependency needs that a person reported were logically related to his underlying medical condition. Second, persons who had no physical limitations, but who had

a serious health condition and had to rely on others for daily needs, were assumed to be suffering from nervous mental disorders. Finally, persons who evidenced serious problems on all three subscales were assumed to have long-term disturbances with a high probability of continuance, and were therefore rated higher (for less capacity) on the total index.

It should be mentioned that several possible case descriptions were thought about before rating each combination of subscales scores on a scale of 0 to 10. In effect, the process of valuation undertaken here does not differ from the method of scaling by equal-appearing intervals that has been used in several recent studies of health. <sup>7/</sup>

A second, independent ranking was performed by another person who had had a thorough knowledge of the contents and score rankings of the original three subscales. The procedure followed was simpler and more systematic. Basically, a score of 10 was assigned for a combination of very serious health conditions, severe physical limitations, and much dependence on others; a score of 0 was reserved for the combination, no health conditions, no physical limitations, and no dependence on others. Two points were then subtracted (from a starting point of 10) for each drop in degree of dependency and one point was subtracted for a lessening of physical limitations or seriousness of health condition. As examples, the partial table below shows the score assignments for those who had severe and moderately-severe physical limitations for all types of health conditions and levels of dependency.

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<sup>7/</sup> Patrick, Donald L. et. al., "Toward an Operational Definition of Health", Journal of Health and Social Behavior, No. 14, March 1973, pp. 6-23.

Physical Limitations	Health conditions	Much dependency	Some dependency	No dependency
Severe	Very serious.....	10	8	6
	Serious/controllable...	10	8	6
	Not too serious/slight.	9	7	5
Moderately-severe	Very serious.....	10	8	6
	Serious/controllable...	9	7	5
	Not too serious/slight.	9	7	5

Scores were compared across raters to determine the extent of differences in ranking. On one-third of the 90 items, there was a difference of 1 to 2 points in score assignments. However, there was still a high level of agreement on relative position (low vs. high end of the scale, or scores of 0 - 4 vs. scores of 5 - 10) of items on the scale. The major difference between the raters, was that the "case description" rater tended to give more weight to the effect of severity of disease, resulting in higher scores for one-third of the 90 possible function levels.

The final index represents a compromise between the two sets of scores (generally in favor of a higher score) after a discussion of rationales. It is presented in total below.

Physical Limitations	Health conditions	Much dependency	Some dependency	No dependency
Severe	Very serious.....	10	9	8
	Serious/controllable...	10	9	7
	Not too serious/slight.	9	8	6/5 <u>1/</u>
	No conditions.....	*	*	*
Moderately severe	Very serious.....	10	8	7
	Serious/controllable...	9	8/7	6
	Not too serious/slight.	9/8	7	5/4
	No conditions.....	*	*	*
Moderate	Very serious.....	10	8	6
	Serious/controllable...	9/8	7	5
	Not too serious/slight.	8/7	6	4
	No conditions.....	*	4	3
Minor	Very serious.....	9	7	5
	Serious/controllable...	3/7	6	4
	Not too serious/slight.	7/6	5	3/2
	No conditions.....	*	3	1
None	Very serious.....	8	6	4
	Serious/controllable...	7	5	4/3
	Not too serious/slight.	6/5	4	2/1
	No conditions.....	*	3	0

\* Categories were not allowed because they did not seem to make sense. There were 180 cases out of a possible 17,997 who fell into these categories, and 8 percent of all disabled worker beneficiaries were included in these 180 cases. All 180 were dropped from the analysis.

1/ Split scores mean 6 was assigned to "Not too serious" and 5 was assigned to "Slight".

Physical Limitations Scale (earlier index) 1/

Extent of loss	Code	Walking	Reaching or using hands	Lifting weights up to 10 lbs., stooping, and using stairs
No loss	1	No	No	No
Minor loss	2	No	Diff	No
	3	No	No	Diff (if any)
	4	No	Diff	Diff (if any)
Moderate loss	5	No	Cannot	No
	6	No	Cannot	Diff (if any)
Moderate-severe loss	7	Diff	No	
Severe loss	8	Diff	Diff	
	9	Diff	Cannot	

1/. "No" means no difficulty with the specified activity; "Diff" means some difficulty; and "Cannot" means cannot do the activity at all. This scale uses answers from item 27 of the questionnaire given in the Physical Activity Scale section of this appendix.

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1974 FOLLOW-UP SURVEY OF THE DISABLED AND THE NONDISABLED:

TECHNICAL NOTE

The Social Security Administration is responsible for collecting and analyzing data on the disabled to provide information for use in administering the disability insurance program. In carrying out this responsibility, SSA conducted a survey in 1972, using the 5-percent sample from the 1970 Decennial Census to identify both disabled and nondisabled adults. The 1972 survey was designed primarily to update earlier estimates of the extent and severity of disability in the population derived from the earlier Social Security Survey of the Disabled in 1966.

With the 1972 survey providing baseline information on disability status, income and income sources, work adjustment and other social and economic characteristics of the population, follow-up interviews were conducted in 1974 to examine changes over the 2-year period. The changes in the disability and economic status of the working age population were examined and related to entitlement under the disability insurance program and supplemental security income (SSI) disability provisions.

The 1974 survey provides information on the following:

- changes in the prevalence and extent of disability in the working age population by demographic, social, economic, and occupational characteristics between 1972 and 1974;
- improvement in health status of the disabled;

- the nature of adaptation to recent impairment and disability, such as work adjustments, rehabilitation, dependency and changes in family relationships and participation;
- functional limitations and mental health ratings;
- use of medical care and rehabilitation services;
- knowledge of and extent of participation in all public income maintenance programs to determine patterns and interrelationships which reflect the policy and procedures of the SSA disability program provisions.

#### Study Design

The data were collected and processed by the Bureau of the Census. Survey estimates for 1972 are based on a sample of 18,000 interviewed persons selected from the 1970 5-percent Census sample. Of the 18,000 persons interviewed, 11,700 were disabled in April 1970; 5,000 were nondisabled but some had health impairments; and 1,300 were recently disabled persons interviewed in 1971. In addition to the above sample of interviewed persons, there were 2,850 noninterviews. Thus the rate of 'good responses' for the survey--based on 18,000 interviewed persons out of 20,850 eligible for interview--was 86 percent.

In 1974, data were collected in personal interviews from the 16,110 persons who were previously interviewed in 1972 and were still living in 1974. At the time of the 1974 Survey, about 7,600 persons identified themselves as disabled and 8,400 as nondisabled. The additional 1,890 persons were classified as noninterviews for the following reasons:

1972 Status	Total	Interview status in 1974					
		Inter-views	Non-interviews				
			Death	Institu-tionalized	Refused	Other	Total
Total...	17,997	16,030	598	96	700	573	1,967
Disabled....	8,633	7,591	470	77	264	231	1,042
Nondisabled.	9,364	8,439	128	19	436	342	925

The rate of 'good response' in the 1974 survey was 90 percent. In general, the 1972 sample was a stratified multi-stage cluster design comprised of 357 sampling areas including every county and some independent cities in the United States. The disabled persons were selected from all 357 strata, and the nondisabled and recently disabled groups were chosen from a special subset of 105 strata. The sample was designed to represent the noninstitutionalized civilian population of the United States aged 18-64 as of April 1970.

#### Match with Social Security Records

To enhance the usefulness of survey data in analyses focused on program issues, the information obtained by interviews was combined with selected data available from the master beneficiary record (MBR) and the earnings records maintained by the Social Security Administration. Data from both the interviews and records were used to establish beneficiary status for tabulation purposes.

### Imputation of Missing Information

In order to maximize the amount of useful information, missing income and medical cost items were imputed based on values obtained from respondents with similar economic, medical, and demographic characteristics. Examples of medical characteristics are days hospitalized and number of doctor visits; economic characteristics included income and other types of assets. An amount was assigned from another person, systematically chosen according to the order in which the records were processed, who gave a good response to the item in question.

### Definition of Disability

Disability is defined in this study as a limitation in the kind or amount of work (or housework) resulting from a chronic health condition or impairment lasting 3 months or longer. The disability classification is based on the extent of the individual's capacity for work, as reported by the respondent in the set of work-qualification questions given below.

<p>36. Now we would like to ask you how your health affects your work activities?</p> <p>a. Does your health or condition keep you from working <b>ALTOGETHER</b>?</p> <p>b. Does it limit the <b>KIND</b> or <b>AMOUNT</b> of work you can do?</p> <p>c. (Women only) Does it limit the amount or kind of <b>HOUSEWORK</b> you can do?</p>	<p>36.</p> <p>a. (094) 1 <input type="checkbox"/> No 2 <input type="checkbox"/> Yes - SKIP to Check Item C</p> <p>b. (095) 1 <input type="checkbox"/> No 2 <input type="checkbox"/> Yes - SKIP to Check Item C</p> <p>c. (096) 1 <input type="checkbox"/> No 2 <input type="checkbox"/> Yes - SKIP to Check Item C</p>
<p>41a. Are you now <b>ABLE</b> to do the same kind of work you did before your work limitation began?</p> <p>b. Are you now <b>ABLE</b> to work full time or can you work only part time?</p> <p>c. Are you now <b>ABLE</b> to work regularly or can you only work occasionally or irregularly?</p>	<p>41a. (109) 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Never worked before work limitation began</p> <p>b. (110) 1 <input type="checkbox"/> Full time 2 <input type="checkbox"/> Part time</p> <p>c. (111) 1 <input type="checkbox"/> Regularly 2 <input type="checkbox"/> Occasionally or irregularly</p>

The severity of disability was classified by the extent of work limitations into the following categories.

Severely disabled.--Unable to work altogether ("Yes" to Question 36a) or unable to work regularly ("Yes" to Question 36b or 36c and "2" coded in Question 41c).

Occupationally disabled.--Able to work regularly ("1" in Question 41c) but unable to do the same work as before the onset of disability ("Yes" to Question 36b or 36c and "2" in Question 41a) or unable to work full time ("Yes" to Question 36b or 36c and "2" in Question 41b).

Secondary work limitations.--Able to work full time, regularly, and at the same work but with limitations in the kind or amount of work they can perform ("Yes" to Question 36b or 36c and #2 in all of Questions 41a to 41c).

Persons who are occupationally disabled or who have secondary work limitations are considered to be partially disabled. Data on employment and on functional capacities--such as mobility, activities of daily living, personal care needs, and functional activity limitations--were also collected to evaluate further the nature and severity of disability.

#### Reliability of the Estimates

Because the estimates in this report are based on a sample, they may differ somewhat from the figures that would have been obtained if all

disabled and nondisabled adults in the United States had been surveyed with the same techniques used. As in any survey, the results are subject to error of response and of reporting as well as to the sampling variability. The standard error is a measure of sampling variability and indicates the amounts by which the sample estimates may vary from the values that would have been obtained if all persons in the universe had been studied.

For interval estimates, the standard error is used to construct an interval with a prescribed confidence that the interval includes the universe value of the average of all possible samples drawn from the same universe. In about 68 percent of the samples from a population, the population value would be included in the interval from one standard error below the sample estimate to one standard error above it--referred to as the 68-percent confidence or one-standard-error interval. In about 95 percent of the samples from a population, the population value would be included in the interval from two standard errors below the sample estimate to two standard errors above it--the 95-percent confidence or two-standard-error interval. The 99-percent confidence interval extends approximately  $2\frac{1}{2}$  standard errors above and below the sample estimate.

The standard error is also useful in testing the significance of the difference between two statistics--that is, the confidence one can have that the sample difference in means, percentages, or estimates is a real

difference and not merely due to chance. To test this assumption, standard error of the difference can be calculated from the square root of the sum of the squared standard errors of each sample estimate. If the observed difference is as large as one standard error of the difference, it is statistically significant at the 68-percent confidence level; if as large as two standard errors, it is significant at approximately the 95-percent level; and if as large as 2½ standard errors it is significant at about the 99-percent level. As a general practice in this analyses presented in this report, differences in estimates and percentages are considered statistically significant if the critical ratio equals or exceeds 1.96 standard errors, the level at which a predicted difference could be expected to occur by chance less than 5 out of 100 times, or the 0.05 level of significance.

Table I-A gives approximate standard errors for the total number of persons (disabled in 1972) estimated from the sample to have certain characteristics. Table I-B gives approximate standard errors for estimated percentages. Linear interpolation may be used to obtain values not specifically shown. In order to receive standard errors that are applicable to a variety of estimates, a number of assumptions and approximations were required. As a result, the tables of standard errors provide an indication of the order of magnitude rather than the precise standard error for any specific attribute.

TABLE I-A.--Standard errors of estimated numbers of persons with a disability in 1972

Size of estimate	Standard error
10,000.....	13,516
25,000.....	21,423
50,000.....	30,380
75,000.....	37,287
100,000.....	43,134
250,000.....	68,757
500,000.....	98,171
750,000.....	121,151
1,000,000.....	140,817
2,500,000.....	229,476
5,000,000.....	336,664
7,500,000.....	424,738
10,000,000.....	503,241
25,000,000.....	893,569
50,000,000.....	1,441,027
75,000,000.....	1,944,782
100,000,000.....	2,428,319



TABLE I-B.--Standard errors of estimated percentages of persons with a disability in 1972

Base percentage (in thousands)	Estimated percentage						
	5 or 95	10 or 90	15 or 85	25 or 75	35 or 65	40 or 60	50
10,000.....	29.36	40.43	48.12	58.37	64.31	66.05	67.42
25,000.....	18.58	25.58	30.46	36.95	40.71	41.81	42.68
50,000.....	13.14	18.10	21.55	26.15	28.81	29.60	30.21
75,000.....	10.73	14.79	17.61	21.36	23.54	24.18	24.69
100,000.....	9.30	12.81	15.25	18.51	20.40	20.96	21.40
250,000.....	5.89	8.12	9.67	11.74	12.94	13.29	13.57
500,000.....	4.17	5.75	6.85	8.32	9.18	9.43	9.63
750,000.....	3.41	4.70	5.60	6.81	7.51	7.72	7.88
1,000,000....	2.96	4.08	4.86	5.91	6.52	6.70	6.84
2,500,000....	1.88	2.59	3.09	3.76	4.15	4.27	4.37
5,000,000....	1.33	1.84	2.20	2.68	2.97	3.05	3.12
7,500,000....	1.09	1.51	1.81	2.20	2.44	2.51	2.57
10,000,000...	.95	1.32	1.57	1.92	2.12	2.18	2.24
25,000,000...	.61	.85	1.01	1.24	1.38	1.42	1.45
50,000,000...	.44	.61	.73	.90	1.00	1.03	1.06
75,000,000...	.36	.50	.61	.75	.83	.86	.88
100,000,000..	.31	.44	.53	.66	.73	.75	.78