"BAD JOBS" AND HEALTH: DO NEGATIVE WORK EXPOSURES WORK TOGETHER?

A. INTRODUCTION

Working for pay is a central feature of most adults' lives, providing economic sustenance as well as a source of esteem and identity, but some aspects of jobs are harmful to health. Paid work has changed dramatically over the past several decades: economic recessions, the industrial shift from manufacturing toward service, and rising global competition have all driven organizations to restructure in pursuit of enhanced flexibility and competitiveness [1]. Restructuring has added to the health risks many workers face, from the danger of hazardous physical exposures toward the more hidden burden of chronic strain and insecurity that characterizes many jobs in the postindustrial economy [2]. Furthermore, in the last several decades women have entered paid work in larger numbers, and the number of single-parent families has grown, leaving many individuals scrambling to meet the demands of work and family and suffering from the strain [3]. Epidemiologists, psychologists, sociologists and others have explored long-standing and emerging hazards at work, but these different research traditions have nearly always focused on the health consequences of one negative aspect of work at a time. Such a limited focus is problematic because attached to any given job are a bundle of exposures, negative and positive, and these may act together to influence health.

All jobs may have some unpleasant aspects, but harmful job characteristics appear to cluster heavily in "bad jobs." For example, a temporary position as a part-time cashier could involve low control over working conditions and relatively high job insecurity, as well as making an individual irritable during off-work hours at home. Taking account of this nonrandom distribution of negative characteristics across jobs is important because the effects of harmful exposures could accumulate to create a greater burden on health, or could even act in a synergistic way to create a particularly noxious work and home environment. Alternatively, it may be that one characteristic, such as job insecurity, could be the true underlying cause of health decline, but in studies that assess one particular characteristic at a time, health effects might mistakenly be attributed to some other negative job characteristic that tends to co-occur with job insecurity.

Just as bad job characteristics are not equally distributed across jobs, bad jobs are not randomly allocated across the working population. For example, workers of lower occupational status are more likely to report low control at work [4], and there is some evidence that accounting for job characteristics explains some of the relationship between socioeconomic position (SEP) and health [5]. In addition, bad jobs may cluster over the employment career for some people, particularly those with lower education or fewer skills, while more socioeconomically advantaged individuals may have limited or no exposure to such conditions. The accumulation of disadvantage over the career, or the movement into and out of bad jobs, may be important components of the SEP, work and health connection but have received relatively little research attention. This study will begin to explore the relationship between bad job characteristics and health by comparing two large cohort samples and will address the following questions:

(1) Do potentially health-damaging bad job characteristics cluster in particular jobs, and if so, how?
(2) Do one or a combination of bad job characteristics relate to health and health decline?
(3) Do multiple bad job characteristics act additively or interact to damage health?
(4) How do workers move through careers, encountering bad job characteristics singly or in clusters (do bad job characteristics cluster within person-level careers)?
(5) Are there socioeconomic differences in the clustering of bad job characteristics in jobs or across careers?

The analyses proposed here and the longer-term research agenda within which they are embedded would be among the first integrative assessments of the clustering and dynamic aspects of bad job characteristics and their effects on health in the United States. The proposed study could make an important contribution, as the first of 79 million baby boomers are turning 60 this year. The health of these men and women, influenced by the experiences of their working lives, will have implications for their impending health care needs and costs and for disparities in the health of the population more generally.

B. BACKGROUND AND SIGNIFICANCE

B.1.Work Characteristics and Health: Prior Research

Work is a central social role for most adults for four decades of their lives or more, so working conditions can exercise major positive or negative influences on health over the adult life course. Accordingly, working conditions have received a large amount of research attention, with three main areas of focus that concentrate on hazards to health. First, *hazardous physical exposures* in the workplace and their health impacts have been the focus of occupational epidemiology. The pathways from the physical environment to health include exposure to chemical and biological hazards, such as silica

exposure among miners, leading to vasculitis [6], or exposure to animal by-products and awkward positions on meat processing lines, leading to a variety of health problems [7]. Even outside the mining and manufacturing settings, ergonomic risks have been shown to lead to impairment, such as low back pain [8]. As more workers have moved into sedentary, service sector jobs, other risks at work have grown in importance. Epidemiologists and occupational psychologists have turned to an examination of the nature of work activities and tasks themselves, with a central focus on work stressors involving too little task control and high levels of demand. Much of the empirical research in this area has examined the biological sequelae of resulting acute and chronic stress in response to work characterized by *job strain* (the combination of high demands and low control) [9, 10], but has also expanded to examine the role of social support. Empirical findings show that high demands, low control, and low work social supports are associated with psychiatric morbidity [11], poor health functioning [12, 13], sickness absence [14, 15], and coronary heart disease [16, 17]. Also, with increasing globalization and the demand for greater flexibility, the contractual nature of jobs and accompanying *job insecurity* have started to receive attention from sociologists and epidemiologists. Potential pathways to health decline involve stressful appraisals in anticipation of involuntary job loss [18] and the stresses associated with economic hardship following job loss [19]. Existing studies have shown that perceived job insecurity exerts negative effects on mental health and well-being [20-23], with fewer studies showing negative associations with overall self-rated health or morbidity [23-26], physical symptoms [18, 22], and cardiovascular risk factors [27-30]. Job loss and unemployment have been extensively studied, and the empirical evidence shows links with an increased risk of psychological distress [31-35], increased physician consultations, illness episodes and hospital referrals and attendance [36-38], a greater number of reported medical conditions and pension disability use [39, 40], and poorer physical functioning [34] and self-reported physical illness [33]. Finally, there has been only limited attention to the health consequences of *work-family conflict*, which occurs when efforts to fulfill work role demands interfere with one's ability to fulfill family demands and vice-versa [41]. Each domain can "spill over" into the other, and this conflict has been linked to poorer psychological health [42, 43], depression [44, 45], poorer overall physical health [3], and elevated blood pressure [46], though some studies fail to find these relationships.

Some individuals are compelled to take physically dangerous, high strain or insecure jobs, or to try to balance work and family under suboptimal arrangements for lack of other options. Such individuals lack qualifications employers demand, such as education, and for these individuals we would expect the negative health consequences of bad jobs to be greatest. Furthermore, people in poorer health to begin with may be more likely to be hired for a bad job [47, 48], and their health outcomes will be poorer because of earlier health deficits, not working conditions. On the other hand, some workers welcome greater flexibility, or find that other resources or other, beneficial features of the job can buffer the strain of insecurity or work-family conflict, for example. The proposed study will consider the roles of health selection and other sources of confounding, as well as population sub-group differences, in the relationship between bad jobs and health.

B.2. Limitations of Prior Research

The bad job characteristics detailed above have all been shown to negatively impact health, but prior research has a number of weaknesses that limit understanding of the total burden of work exposures. Most vital for our purposes, health researchers have paid scant attention to the joint distribution of work attributes in particular jobs or across careers [49, 50], though social scientists have been interested in this occurrence. Jencks, Perman and Rainwater created an index to predict how "good" workers will say a job is, based on an array of 13 nonmonetary job characteristics and earnings [50], and Gittleman and Howell used dual labor markets theory [51] to identify the changing contours of "good" and "bad" jobs in the United States from 1973 to 1990, based on 17 nonmonetary characteristics and wages/income [52]. However, these approaches have not been adapted to studies of health. A few recent studies have begun to examine the effects of a small set of negative work exposures on health; one showed that insecure employment and high job strain (high demands and low control) each showed independent associations with physical and mental health [4]. Another examined quantitative demands, influence at work, possibilities for development, social support, and job insecurity, and found that women with low influence at work and low social support were at increased risk for severe depressive symptoms at follow-up, while among men, job insecurity predicted severe depressive symptoms [53]. While these studies signal a promising trend, neither study explored the joint distribution of the included negative job characteristics or reported tests for interaction between them. The formal demand-control model implicitly tests for interaction between its two components, but results have shown only mixed support for the interaction [54], and assessment of other potential synergistic effects is rare in the health literature on negative exposures at work. Since in the past the majority of studies used cross-sectional data, attention to cumulative exposures across the career has also been limited. The few studies that do look at accumulation

across the career have not explicitly considered the interaction of negative job characteristics [55]. A few recent papers have begun to assess the impact of changes in working conditions on health outcomes [56, 57], but these, like many of the other high quality studies, have been conducted using European data. Finally, relatively few studies have explicitly assessed gender differences in effects of bad jobs, though there is evidence, for example, supporting [58] and failing to support [3, 59] the contention that women might suffer greater negative health consequences of work-family conflict.

This study represents an advance because it will examine two high quality longitudinal samples from the United States with long periods of follow up and a wide array of job characteristics collected at several points in the career. These data are well-suited to examining the clustering of negative job characteristics within jobs and across men's and women's careers, with the potential for attention to interaction of exposures. This study will also consider health selection and other potential sources of confounding, with a variety of available measures of social background, family characteristics, other life stressors, and many other factors available in the two samples. I will focus on the nonwage characteristics of work, but will control for economic resources and nonwage benefits including pension coverage, union representation, health care coverage, and other relevant factors, whenever possible. There are also job characteristics that I will not address in the present analysis, including low pay, quality of workplace relations, and the availability of training; these could be added in future analyses. This study will help to elucidate mechanisms by which working lives may contribute to the persisting and widening gaps in health between the winners and losers in the United States labor market.

C: DATA AND ANALYSIS

C.1. Data Sources

The *Midlife in the United States (MIDUS) Study* is a national survey of over 3,000 Americans aged 25 to 74, with data collections in 1994-95 and 2004-05 (second wave to be made available in 2007) and wide coverage of work characteristics and work-family conflict. MIDUS also collected some information about employment history, extensive health measures for the respondent, his or her spouse, and the respondent's parents, and information about other acute and chronic strains. The MIDUS study is particularly well-suited for assessment of bad jobs because of the careful attention to the multitude of psychosocial factors that condition health for men and women. MIDUS respondents will be compared with respondents from the Wisconsin Longitudinal Study (WLS), a random sample of the Wisconsin high school graduating class of 1957 (N>10,000) who were interviewed in 1975, 1992-3 and 2003-5. The WLS includes a unique array of measures of early life experiences, environment, and aspirations that will be useful in assessing the role of confounding in relationships between bad jobs and health. WLS respondents have been followed for the majority of their working lives and have reached their mid sixties by the most recent wave of data collection. This will ensure that a significant fraction of respondents are reaching ages at which they are likely to experience health decline, improving the likelihood of detecting effects of the hazards of working careers. At the same time, the full range of ages represented in the MIDUS sample will allow some separation of the effects of aging from the effects of being part of different labor market cohorts. The proposed analyses will focus mainly on the measures of job characteristics and the respondent's health, with some attention to employment histories.

C.2. Methods

Question 1: Do potentially health-damaging bad job characteristics cluster in particular jobs, and if so, how?

To study the extent of clustering of self-reported negative work attributes in particular jobs, information about the respondent's current or last job will be used, collected in the two waves of MIDUS and the three waves of the WLS. Selected items are compared in Table 1 below (other variables from each category will also be used). First, the joint distribution of negative job characteristics will be explored with various forms of factor analysis to assess the degree to which measures of each category of negative job characteristics (physical exposures, job strain, job insecurity, and work-family conflict) hang together, as well as the degree to which characteristics from different categories are related. As a next step, scales will be constructed to measure the amount of exposure to each of the four categories of negative job characteristics. To create these scales, questions that use Likert-type response categories will be recoded so that responses are assigned new values ranging from 0-1 (see Table 2 below for examples), while questions with dichotomous answers will preserve the original 0-1 coding, and values will be summed within each of the four categories. The distributions of these scales will help to reveal the number and characteristics of workers facing a large burden of exposure on each of these aspects of work. Correlations between the scales will reveal the degree to which bad job characteristics cluster, creating bad jobs. These correlations can be assessed for individuals and across population sub-groups of interest (e.g., gender, age, class of occupation). The strategies used by Jencks and colleagues [50] and Gittleman and Howell [52] to

identify "good" jobs may also be explored. In some waves few items measuring physical exposures or job insecurity are available, so individual items will be used rather than scales. In general, the added value of using scales to reduce collinearity, versus using individual items, will be explored as part of this question.

Table 1. Examples of Question Comparability across Surveys, Items for Construction of Four Scales

	Hazardous Exposures	Job Strain	Job Security	Work-Family Conflict
Example Characteristic 1				
MIDUS	How often does your job require you to lift loads weighing 50 pounds or greater?	How often do you have a choice in deciding how you do your tasks at work?	If you wanted to stay in your present job, what are the chances you could keep it for the next two years?	Your job reduces the effort you can give to activities at home.
Available:	2004-5	1995-6, 2004-5	1995-6, 2004-5	1995-6, 2004-5
WLS	How often do you have to lift, pull, or carry heavy loads?	You job allows you to make a lot of decisions on your own.	What chance do you think there is of losing job completely in next two years?	My job takes so much energy I don't feel up to doing things that need attention at home.
Available:	2003-5	1975, 2003-5	1992-3, 2003-5	1992-3, 2003-5
Example Characteristic 2				
MIDUS	How often does your job require you to crouch, stoop or kneel?	How often do you learn new things at work?	n.a.	Job worries or problems distract you when you are at home.
Available:	2004-5	1995-6, 2004-5		1995-6, 2004-5
WLS	How often do you have to kneel or squat for prolonged periods of time?	Would you agree or disagree that a person on your job learns new things?	Importance of having low risk of losing job relative to having high pay?	Job worries or problems distract me when I am at home.
Available:	2003-5	1992-3, 2003-5	1992-3, 2003-5	1992-3, 2003-5

Table 2. Examples of Recoding Variables with Categorical Response Options for Scale Construction.

Agree/Disagree?		How Often?		How Dirty?	
Original	Recode	Original	Recode	Original	Recode
Strongly Agree	1.00	Very Often	1.00	Very dirty	1.00
Agree	0.75	Often	0.75	Fairly dirty	0.66
Neither Agree Nor Disagree	0.50	Sometimes	0.50	A little dirty	0.33
Disagree	0.25	Rarely	0.25	Not at all dirty	0.00
Strongly Disagree	0.00	Never	0.00		

Question 2: Do one or a combination of bad job characteristics relate to health and health decline?

Linear and logistic regression models can be estimated to assess the relationship between the scales of physical exposures, job strain, job insecurity and work-family conflict detailed in Question 1 (as well as the individual items used to construct these scales) and respondents' self-reports of their health. In a first set of models, job characteristics/scales from a given survey wave can be used to predict health in that same wave. To assess the impact of health selection on these estimates, I will also estimate models predicting health in a given wave as a function of job characteristics/scales in the previous wave, controlling for health and other potential confounders at that previous wave. Scales (or individual items) will be included together in regression models to examine the net effects of each when others are controlled. Structural equation models will also be explored, particularly for relationships for which strong hypotheses are available.

Several health measures will be used in the proposed analyses, including self-rated overall health and psychological distress. Scales of physical symptoms, including cardiovascular and musculoskeletal symptoms, have been used in other studies [5] and may be explored here. One of the enormous strengths of the MIDUS data is the wide array of health measures obtained, including information about biological parents' health and the respondents' understanding of how their work affects their health. These measures and the extensive health insurance information will be important controls

for health selection and other forms of potential confounding. Different aspects of health may be associated with different negative job characteristics, and associations may vary across population sub-groups, so such possibilities will be explored. Because both work characteristics and health measures will be self-reported, bias may arise, so possible controls for negative affectivity will be explored. In addition, the appropriate lag times between the experience of bad jobs and resulting health problems could vary across health measures, an issue to be explored as part of this question.

Question 3: Do multiple bad job characteristics act additively or interact to damage health?
Building on Question 2, I will examine the impact of the sum of negative job characteristics a respondent reports, as well as the sums of scale scores, and interactions between the four scales or particular items in the scales as they affect health.

Question 4: How do workers move through careers, encountering bad job characteristics singly or in clusters?
The analysis of exposures over the career will require more complex strategies than those used for Questions 2 and 3. A first step will be to calculate the total accumulation of physical exposures, job strain, job insecurity, and work-family conflict as measured in all available survey waves, to examine whether and how certain career paths contain more exposure than others. These total accumulation measures can be compared across sub-populations of interest, as above. It may be possible to use latent growth curve models to assess "trajectories" of exposure to bad jobs (with the WLS data only) using the four scales individually, as well as a global measure of negative job exposures created by summing the four scales. However, such analyses may be limited by the restriction to three measurement points and the fact that the WLS asks about detailed job characteristics for the current *or last* job, leading to differences in the timing of some respondent's exposures and their current status. A complication that will require attention is the loss of respondents over follow-up due to death or non-response, or because they have left the labor force. Various strategies can be explored to address this selective loss of respondents, including selectivity analyses. Also, while nearly complete job histories are collected for respondents in the WLS, detailed job characteristics are only available at the survey waves specified above for the MIDUS and WLS respondents. Using WLS data, I will explore the creation of a person-year or person-month file of exposure to negative job characteristics using the imputation strategy outlined by Amick and colleagues in a study using the Panel Study of Income Dynamics [55]. Using the Job Characteristics Scoring System or a variant, exposure to physical job characteristics, job strain, and job security can be imputed based on the respondent's three-digit occupational code from each job in the job history, and exposure assessed for each month/year she held the job [60]. An additional advantage of using this strategy would be the ability to compare self-reports of these job characteristics (for example, for job strain in the 2003-05 wave) with these more "objective" imputed scores for that same job. This would allow an assessment of how sensitive the analyses may be to the use of self-reported measures for both exposures and outcomes. Results from the MIDUS analysis will be compared with the WLS results to explore the robustness of findings. In addition to chronic exposure, changes in work conditions can be explored as predictors of change in health, using fixed and random effects approaches. In general, Question 4 is the most exploratory and expected results the most difficult to project.

Question 5: Are there socioeconomic differences in the clustering of bad job characteristics in jobs or across careers?
The final question will build upon the analysis by carefully assessing and comparing the working lives of workers with lower and higher socioeconomic resources, to allow for differences in the exposure to bad job characteristics and combinations, and to account for any differences in the likelihood of movement into and out of the labor force.

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