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### CHAPTER

## 8 Promoting Healthy Practices in the Workplace: Making Workers' Health a Priority Before It Becomes a Problem

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### Abstract

The goal of this chapter is to engage more researchers in the study of “work and health” using the Midlife in the United States (MIDUS) study. Primary emphasis is placed on the fundamental role paid work plays in producing health outcomes, and modifiable elements of the workplace that could contribute to improvements in human health. Work and employment assessments are fundamental cornerstones of the MIDUS enterprise; consequently, it is well equipped to shed light on and advance thinking about health-promoting (or -damaging) effects of paid employment. The chapter begins with a basic description of theoretical models frequently used to understand how and why work may affect health outcomes. The chapter discusses the contributions made to the work and health literature by the diverse studies made possible through the MIDUS enterprise. The chapter concludes with recommendations for future studies that take advantage of the unique data presented by the MIDUS.

**Keywords:** [MIDUS study](#), [paid work](#), [health outcomes](#), [workplace](#), [human health](#), [employment](#), [work and health](#), [health promotion](#)

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## Introduction

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Individuals, particularly Americans, spend a significant portion of their adult lives engaged in paid work or employment. Although the absolute duration of work across the life course can vary substantially, the popular press contends the typical working adult will spend over 90,000 hours in the workplace (Pryce-Jones, 2010). Next to sleeping, engaging in paid employment consumes the single largest proportion of adults' time, accounting for 35% of total waking hours between the ages of 20 and 65. The large proportion of men and women who are employed, coupled with the sheer amount of time spent performing paid work, suggests the world of paid work and employment is a major leverage point for adult health (Grzywacz & Fuqua, 2000). Indeed, the amount of time spent in paid work offers substantial potential to help or harm human health, which partially explains why the Healthy People initiatives have consistently targeted the workplace as an essential partner in public health promotion for the past 30 years. More recently, the National Institute for Occupational Safety and Health (NIOSH) joined the effort through the Total Worker Health<sup>®</sup> initiative.

Considering the health implications of work or employment (used interchangeably here) is complex. Indeed, it is not unlike considering the brilliance of a fine diamond. A diamond's brilliance is the consequence of its dense atomic structure combined with its multiple facets. Whereas the naturally dense atomic structure of a diamond slows the speed at which light travels within the mineral, the multiple facets created by the craftsperson forces the light to bend as it ricochets around the internal structure, thereby revealing the full spectrum of colors in white light. Likewise, work is densely packed; its "atomic structure" is composed of myriad physical, ↴ social, and psychological elements that have the potential to affect human health. The health potential inherent in the dense atomic structure of work is minimized or exaggerated by the way the work is organized or the multiple facets dictating what is done on a job and how it is performed and managed (Sauter et al., 2002). Like the craftsperson shapes a diamond, organizations shape all aspects of jobs, ranging from what work is performed by human employees, to the tools available to workers, to the physical and social conditions under which it is carried out. Thus, like the diamond's brilliance results from the combination of its densely packed structure combined with craftsmanship, the health-related consequence of work is the combination of its densely packed structure and the craftsmanship underlying how the work is shaped.

Multiple features of the Midlife in the United States (MIDUS) design enable researchers to make substantial contributions to the work and health literature. The original sample design of MIDUS allowed detailed considerations of the role of paid work in age, socioeconomic, gender, and racial differences in health across the life span. The depths of direct and indirect assessments of work, employment, and characteristics of the work performed allow work and health investigators to focus on distinct components of the "atomic structure" of work or different facets of how work is organized to delineate specific attributes of paid work related to health. The now longitudinal nature of the MIDUS enterprise allows researchers to consider how the world of work may shape health over time, as well as the extent to which health shapes an individual's ability to successfully engage in paid work. The diverse array of health measures inherent in the MIDUS enterprise enables investigators to consider simultaneously how work may affect different domains of human health, as well as the pathways linking work and health. Indeed, the rich array of health assessments from rigorous survey measures of physical and mental health, to clinical, device, and biomarker assessments of bodily and system function offer an unparalleled opportunity to understand the health outcomes of work and the pathways leading to those outcomes. Finally, the combination of sample design, depth of work assessments, and diverse health outcomes allows nuanced investigations of how work affects health under different conditions for specific groups of individuals.

The goal of this chapter is to engage more researchers in the study of "work and health" using the MIDUS offerings. This goal will be achieved through two primary aims, the first of which is to situate readers in the

broader work and health literature. Toward this aim, the chapter begins with a description of three of the dominant theoretical models used by researchers to investigate how and why employment and work-related experiences may affect health outcomes. The second section of the chapter, which reviews work and health research completed to date using the rich and diverse array of MIDUS data, also serves the first aim. The second aim of this chapter is to provide readers with concrete steps to advance the work and health literature. Toward this end, the third and final section of the chapter presents a high-priority series of future studies to be pursued in the MIDUS study.

## Theoretical Foundations of Work and Health Research

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Work and health research is frequently informed, either implicitly or explicitly, by stress theory. The job demands–control (JDC) model (Karasek & Theorell, 1990) is among the most commonly used theories of occupational stress (Kompier, 2003). Most models of stress explicitly differentiate three sets of concepts: (a) stressor(s), (b) stress response(s), and (c) personal, psychological, or social resources for adapting to the stressor. The JDC follows this standard convention and argues that health outcomes (the stress response) are a function of experienced psychological demands on the job (the stressor) combined with a worker's ability to make decisions or exercise control in the workplace (social resource for adapting to the stressor). Although the original formulation of the theory placed workers into distinct typologies based on relative levels of “demands” and “control” (e.g., “active jobs” are those with high demand and high control), the hypothesis that control *only* buffers the effects of demands has received limited support, leading most investigators to focus on the independent effects of these characteristics (Pelfrene et al., 2002).

Jahoda's (1982) latent deprivation model is another commonly used framework in the work and health literature, particularly in research considering the health-related effects of employment loss. Jahoda (1982) argued that conceiving of work as the simple exchange of labor for financial compensation is overly simplistic and narrow. Instead, she argued that employment provides a wide variety of nonpecuniary benefits that have the potential to affect health. She argued the temporal structure of the workday and workweek provides a way of synchronizing an individual's life with broader society, and it can impose social controls on health-related behaviors. Employment is also a meaningful source of regular social contact and social support. Finally, employment provides a sense of personal identity and social value. Thus, the fundamental premise of the latent deprivation model is that job loss threatens health because it eliminates a structured form of social control that synchronizes individuals with society, it severs social contacts and potential sources of support, and it can impair individual identity and sense of purpose in society.

Theories of social stratification provide another example of common thinking in the work and health literature. Social stratification theories like “fundamental cause” (Link & Phelan, 1995) contend that social hardships, including “bad” jobs and elevated unemployment, are disproportionately borne by marginalized social groups, while social resources like access to healthcare through benefit programs attached to “good” jobs are less available to those same groups. Frameworks like fundamental cause underlie current debates about the growing precariousness of employment (Benach et al., 2007), as well as national and worldwide discussions of how employment, work, and diverse aspects of employing organizations, management strategies, compensation systems, and job design contribute to health disparities (Landsbergis, Grzywacz, & LaMontagne, 2014; M. Marmot et al., 2010).

Finally, Warr's (1987) vitamin model has a history of informing work and health research in Europe (Mark & Smith, 2008). As connoted by the name, the model contends that jobs can be broken down to specific features, each of which has a distinct potential for shaping the health of workers. Just like vitamin C deficiency (or overdose) has different health implications than vitamin B<sub>12</sub> deficiency (or overdose), the vitamin model

would contend that deficiencies (or overdoses) in opportunities for control would have different health implications for workers than deficiencies (or overdoses) in physical features of security. The vitamin model has two features that make it compelling to researchers interested in work and health. First, it identifies a discrete number (i.e., 12) of attributes or features of jobs relevant to worker health; this typology and illustrative subdomains of more distinct attributes provide investigators with an exhaustive yet manageable classification system for capturing workers' environments. Second and more useful is identification of plausible diverse linear and nonlinear linkages with health outcomes. Warr (1987) suggested that some job attributes, like vitamins, have different putative value to health. Just as some vitamins can have toxic effects at high doses, some job attributes can have deleterious effects at high levels. Similarly, whereas some vitamins are water soluble and require frequent replenishment, some job attributes require constancy while others have enduring health effects.

## Work and Health Research: Advances From MIDUS

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### Health Differences and Health Inequalities: The Role of Work

A fundamental question motivating the original MIDUS survey and its subsequent expansions is why health systematically varies by age, socioeconomic status, gender, and race (Ryff, Keyes, & Hughes, 2004). Other chapters in this volume speak to advancements in each of these scientific domains from MIDUS, but here we emphasize the fact that employment opportunities and the type of work performed by individuals frequently vary by age, socioeconomic status, gender, and race and therefore undoubtedly play a role in each form of health inequality.

### Age-Related Differences in Health and Work

Career advancement or job tenure tends to co-occur with aging for many individuals. Indeed, the average American will commit one third of their waking hours to employment between the ages of 20 and 65 (Pryce-Jones, 2010). Therefore, work has both immediate and long-term potential to shape age-related changes in human health. Although not a direct indicator of health per se, Barrett (2005) reported a significant association of age identity, which is the extent to which an individual feels older or younger than they are, with work stress in the MIDUS 1 data. Greater exposure to job stressors in the form of interruptions of excessive job demands was associated with people feeling older than their chronological age. Grzywacz and colleagues' (Grzywacz, Segel-Karpas, & Lachman, 2016) used cross-sectional data from employed men and women ( $n = 1,991$ ) in MIDUS 2 to examine the implications of exposure to physical hazards in the workplace, such as frequency of contact with radiation, hazardous equipment, extreme temperatures, and noise for cognitive functioning. The results indicated that individuals in jobs with higher levels of exposure to physical hazards had poorer episodic memory and executive functioning and were interpreted as meaning that chronic exposure to workplace hazards may deplete cognitive reserve and contribute to elevated declines in cognitive functioning in later life.

## Socioeconomic Inequalities in Health and Work

Prior to the collection of the original MIDUS data, Link and Phelan (1995) introduced the idea of fundamental cause, positing that individuals' socioeconomic status is a root cause of human health. Of key relevance to this chapter is the reality that socioeconomic status and employment are often intimately connected. Indeed, Hauser and Warren (1997) contended that occupation-based measures of socioeconomic status are among the most reliable and capable strategies for capturing socioeconomic status. Early on, researchers from the MacArthur Midlife Research Network (which conceived of the MIDUS study) engaged these kinds of questions, showing that relative to lower status individuals, those with higher socioeconomic status found themselves in jobs with greater control of their work and more opportunity to acquire and exercise new skills on the job (Marmot et al., 1998). Interestingly, Marmot and colleagues' analysis of data from MIDUS 1 indicated that neither control on the job nor the ability to acquire new skills was consistently associated with health outcomes.

Despite the strong connection between socioeconomic status and paid work, few investigators have used the MIDUS to study the role of work and employment in socioeconomic inequalities in health. Kivimäki and colleagues' (2015) meta-analysis of data from 4 published (including one study using MIDUS 1 data) and 19 unpublished studies found that long working hours (i.e., > 55 hours/week) was associated with greater risk for diabetes among individuals in lower socioeconomic strata. Otherwise, only one other study considered the role of work in socioeconomic inequalities in health, specifically in the area of frequency of physical activity (Grzywacz & Marks, 2001). These investigators reported that observed differences in the frequency of physical activity between women with a high education and those with a low education *increased* once the ability to make decisions in the workplace was included in the statistical model. Grzywacz and Marks suggested that having the ability to make decisions at work might suppress socioeconomic differences in physical activity among women because the linkage between educational attainment and decision-making at work is weaker for women than men. Therefore, by accounting for the uneven distribution of decision-making at work by educational attainment for women, the benefit of socioeconomic advantage (estimated by educational attainment) came into sharper contrast to reveal a greater disparity.

## Sex and Gender-Based Differences in Health and Jobs

Women and men tend to occupy different types of jobs in different industries (Barbulescu & Bidwell, 2013; Bielby & Baron, 1986). Despite this reality, researchers infrequently use employment and work data available in the MIDUS enterprise to determine if employment or work-related experiences mediate (i.e., explain) gender differences in health. Indeed, no studies using the MIDUS could be located asking the general question, Are sex-related differences in [health outcomes] due to differences in [something at work or related to employment]?

The more common research strategy among researchers using the MIDUS is to ask the general question, Is the association of [something at work or related to employment] with [health outcomes] different for women than men? The tendency for researchers to focus on studies of how the effects of work on health differ by gender (as opposed to studies of how work and employment mediate gender differences in health) is readily visible in the studies published to date. The first study, discussed in detail previously in this section, highlighted how the effects of decision-making at work on physical activity differed for women and men (Grzywacz & Marks, 2001). In like fashion, Choi and colleagues' (2010) analysis of data from MIDUS 2 found that greater decision-making or control at work was associated with more leisure time physical activity among highly educated men (but not women), whereas the opposite was true among those with a low education. Finally, in their analysis of the link between workplace hazards and cognitive outcomes, Grzywacz and colleagues (2016) also reported that occupational complexity or the need to make decisions

about complex issues on the job with ambiguous information was robustly associated with episodic memory and executive functioning among women but not among men.

## Racial Inequalities in Health

p. 103 Two studies to date have considered the role of work and employment in racial differences in health. Meyer (2014), using data from MIDUS 1, indicated that blacks reported less control in their jobs and more psychological demands than whites, a finding that was reinforced by systematic review of the occupational health disparities literature published that same year (Landsbergis et al., 2014). It is also noteworthy that a greater proportion of blacks than whites who participated in the MIDUS 1 reported being denied a job or a promotion because of race. Finally, in considering longitudinal health effects, Meyer (2014) reported that job control and experienced discrimination in 1995 predicted self-rated health in 2005, controlling for self-rated health in 1995, for blacks. By contrast, job control in 1995 was unrelated to self-rated health in 2005 among whites, after accounting for self-rated health in 1995. The second study, elaborated further in this chapter, found that blacks (as well as women) were overrepresented among bad jobs and underrepresented among good jobs relative to whites (and men) (Grzywacz & Dooley, 2003).

In summary, work and employment have begun to be studied as potential explanations for age, socioeconomic status, gender, and racial differences in health, although notably more research is needed. These future directions in MIDUS are particularly salient given that all the primary bases of social stratification (i.e., age, gender, socioeconomic status, race) investigated in the study are intimately connected with participation in the labor force (i.e., employment yes or no) or the quality of jobs acquired (see Landsbergis et al., 2014, for review). Future MIDUS researchers are encouraged to exploit the bounty of available measures and strategies to pursue work-related explanations underlying health disparities.

## Depth and Breadth of Measurement: Work's "Effect" on Health

The MIDUS study is unparalleled in its depth and breadth of measurement on both sides of the work and health relationship. On the work side of the equation, researchers have several ways to operationalize elements of work. Some investigators prioritize structural elements, such as the number of hours worked, when during the 24-hour circadian cycle work is performed, or employment classifications. Other researchers focus on specific attributes of work or job-specific characteristics, such as the amount of decision-making or control job occupants have or the psychological demands imposed on workers. MIDUS findings related to these different approaches to studying how work affects health are detailed next.

### Structural Features of Work

Several structural features of work were queried through the MIDUS telephone-based interview. Boehm and colleagues (Boehm, Chen, Williams, Ryff, & Kubzansky, 2015) used occupational classifications derived from detailed descriptions of main activities and responsibilities at work obtained through these interviews to study psychological resilience among working adults. They reported that measures of psychological resilience, like optimism and life satisfaction assessed in the self-administered questionnaires, were highest among managers and professionals compared to individuals in other occupational groups. Results like these reinforce principles of fundamental cause theory (Link & Phelan, 1995) by highlighting that the possibility health-related resources like psychological resilience are more accessible to individuals in valued occupational groups like those in management or the professions (e.g., accountants, doctors, lawyers).

Even before the World Health Organization declared night-shift work a probable carcinogen because of circadian disruption, there was a long-standing interest in general health effects of the temporal structure underlying paid work. An analysis of data from the MIDUS 2 biomarker project indicated that night shift

workers were found to have poorer sleep quality, which in turn was found to be associated with biomarkers indicative of circadian disruption, including key indicators of inflammation such as interleukin 6 (IL-6) and C-reactive protein (Ko, 2013). Another set of investigators (Davis, Benjamin Goodman, Pirretti, & Almeida, 2008) exploited structural elements of work from the MIDUS (i.e., which days of the week individuals usually reported working) and combined them with the rich daily diary data from the National Study of Daily Experiences (NSDE) to study variability in the health effects of daily work stressors by socioeconomic status (Davis et al., 2008). These researchers found a complex pattern of results suggesting that experiences of work-related stressors depended on temporal structure of when work is both performed and by whom. Specifically, they reported that among white-collar workers, those who typically worked weekdays were more likely than those who typically worked weekend days to report work-related stressors on workdays. By contrast, among blue-collar workers, it was weekend workers who reported more work-related stressors on workdays than those who worked the more typical Monday-thru-Friday schedule.

### Work and Job Characteristics

An entire section of the MIDUS self-administered questionnaire assessed a variety of work and job characteristics, including some items adapted from Karasek's Job Content Questionnaire (Karasek et al., 1998), thereby allowing researchers to operationalize concepts like decision authority (i.e., control over work); skill variety (i.e., the opportunity to use a variety of skills at work); psychological demand (i.e., psychological stressors imposed on workers); as well as supervisor and coworker support. Other concepts are assessed as well, including perceived job insecurity, an increasingly important topic, as stable long-term employment increasingly fades into history and is replaced by contract and contingency employment.

Ettner and Grzywacz (2001) took a phenomenological approach to studying the work-health linkage. Specifically, they examined MIDUS 1 participants' ( $n = 2,048$ ) responses to two questions: What kind of effect does your job have on your *physical health*? and What kind of effect does your job have on your *mental health*? The response options to both questions were "very positive," "somewhat positive," "neither positive nor negative" (or balances out), "somewhat negative," and "very negative." They found that respondents who reported working long hours (i.e., typically working more than 45 hours/week) and working nights at least once a week were more likely to *believe* their work had a negative effect on their health. Additionally, they found that greater decision authority, more skill variety, lower psychological demand, and the absence of serious ongoing stress at work were all independently associated with the *belief* that work has a positive effect on health. A key contribution of this analysis was simple recognition that both structural elements of work and work and job characteristics may have independent contributions to adult health.

Grzywacz and Dooley's (2003) study, briefly introduced previously (see Racial Inequalities in Health), provides perhaps the most comprehensive handling of the rich array of work and job characteristic measures available in MIDUS. These researchers used the diverse set of employment and work-related measures available in the MIDUS to reconceptualize the basic employed/unemployed dichotomy into an employment continuum. In this continuum, "optimal jobs" were those that provided good wages, along with multiple financial benefits (e.g., pension/retirement plan, paid insurance, etc.) and multiple psychosocial resources (e.g., decision-making, skill variety, coworker support). Grzywacz and Dooley then differentiated "economically good" from "psychosocially good" jobs based on the presence of one benefit set and the absence of the other. Finally, they identified "barely adequate" jobs as those that paid better than poverty-level wages while offering few or no economic or psychosocial benefits. "Inadequate" employment was defined as currently working but receiving poverty-level wages, whereas "unemployment" was defined as "not currently working but looking for work."

The expanded employment continuum appeared to capture something distinct from socioeconomic status. Grzywacz and Dooley (2003) reported the employment continuum construct was only modestly associated with educational attainment in both MIDUS and another population data set. Further, in MIDUS, the employment continuum concept had a small association ( $r = -.31$ ) with the Duncan Socioeconomic Index. Collectively, the pattern of associations clearly suggested that location in the employment continuum was not simply an alternative way of capturing socioeconomic status. Nevertheless, results did indicate that historically socioeconomically disadvantaged individuals (i.e., women, racial and ethnic minorities, and those with little formal education) were disproportionately found in the barely adequate and inadequate job classifications.

The employment continuum demonstrated a clear stochastic association with self-reported health and number of depressive symptoms in both MIDUS and another population study. Findings from multivariate models indicated that individuals in optimal jobs had the best self-reported physical health and the fewest depressive symptoms. As would be expected, those employed in the worst jobs and those who were unemployed had reported the poorest self-rated health and most depressive symptoms, and those with “good” jobs were in the middle. Grzywacz and Dooley commented on the apparent salience of psychosocial elements of work for worker health from practical and theoretical points of view. First, they noted the findings were obtained during a historically strong period of the US economy when unemployment was below the lowest theoretical threshold. They therefore posited the apparent salience of psychosocial features of work (relative to structural and economic features) for worker health may have been unique to the economic context of the time simply because jobs with good economic packages were relatively “easy” to gain, so psychosocial benefits took on greater meaning to workers. Second and relatedly, they noted that the salience of psychosocial features of the job reinforced Jahoda’s (1982) notion that “work” involved more than the simple exchange of labor and time for money; rather (at least under strong employment), workers expect to get some sense of meaning or purpose out of their work.

A variety of investigators have used discrete measures of work and job characteristics from the self-administered MIDUS questionnaires and linked them with diverse health outcomes. As presented previously in this chapter, the amount of control or decision-making ability an individual has in the workplace has been linked with physical activity in both MIDUS 1 and MIDUS 2 (Choi et al., 2010; Grzywacz & Marks, 2001). Grzywacz and Marks (2000) also investigated the link between psychological demands in the workplace and midlife adults’ problematic use of alcohol. Informed by the JDC model, psychological demand was assessed through the MIDUS self-administered questionnaire asking participants questions like how often different people or groups at work demand things that are hard to combine or how insufficient time was given to get everything done on the job. Grzywacz and Marks reported a robust cross-sectional association indicating that increased exposure to psychological demand was associated with increased odds of reporting use of alcohol that could cause bodily harm.

Insecurity and unfairness in the workplace have been studied by MIDUS investigators. Burgard and colleagues (Burgard, Brand, & House, 2009) used data from MIDUS 1 and 2 to study the longitudinal association of perceived job insecurity with self-rated physical health and depressive symptoms. They reported that fully one in seven participants (15.9%) felt insecure in their job at MIDUS 1, and a comparable percentage (13.2%) was insecure at MIDUS 2, indicating considerable similarity in the prevalence of insecurity over time. Insecurity at MIDUS 1 was unrelated to self-rated health and depressive symptoms at MIDUS 2. The subset of individuals who experienced chronic job insecurity across both panels of data ( $n = 35$ , 2.9% of the sample) had poorer self-rated health, but depressive symptoms did not differ. Finally, trend-level evidence suggested that individuals who fell into job insecurity at MIDUS 2 may have experienced elevated depressive symptoms.

Ford (2014) documented an association of resting blood pressure with perceived unfairness at work, measured by self-ratings of whether the participant felt he or she was given unfair duties or was not taken



seriously by superiors. Specifically, using clinical assessments of blood pressure from the MIDUS 2 Biomarker project ( $n = 517$ , with 52% women), the results indicated that every one-unit increase in perceived unfairness was associated with 1.4-point increase in assessed diastolic blood pressure.

Perhaps one of the most elegant uses of the MIDUS 1 and 2 data is Block and colleagues' (Block, He, Zaslavsky, Ding, & Ayanian, 2009) study of how work characteristics may contribute to changes in body mass index (BMI). For individuals who were obese in 1995 based on self-reported height and weight over time (i.e., BMI > 33.8 for men and 35.4 for women), there was a strong and positive association indicating that greater psychological demand was associated with greater increases in BMI at follow-up. By contrast, for "lean" individuals (i.e., BMI < 22.8 for men and 21.7 for women) there was null and possibly negative association between psychological demand and BMI change. Further, among men only, low skill variety and low control at work were also associated with greater increases in BMI among those who were obese, whereas there was a null or negative association for nonobese men. These findings highlight a growing recognition in developmental science that both features of the individual (e.g., level of body fat, perhaps genetic predisposition reflecting his or her "nature") combined with features of the environment (e.g., demands at work, level of control reflecting his or her "nurture") are necessary for understanding the onset and perpetuation of health problems.

### Alternative Ways of Assessing Elements of Work

p. 106 From the beginning, MIDUS pushed the envelope to expand the array of measures capturing distinct features of participants' employment and work arrangements beyond those assessed through self-report. Every participant recruited to the MIDUS study is asked a series of questions (usually during the telephone interview) to obtain detailed descriptions of their main activities and responsibilities at work. Coders at the University of Wisconsin Survey Center use the descriptions of main activities and work responsibilities to classify each person into a discrete occupation and industry code (Standard Industrial Classification [SIC] in MIDUS 1, North American Industry Classification System [NAICS] for MIDUS 2 and later). These industry and occupation classifications open the doors to wide expansions of possible work and employment-related variables that can be linked to health outcomes.

The MIDUS 1 wave incorporated estimates of hundreds of variables reflecting different work and job characteristics derived from the *Dictionary of Occupational Titles*, (England & Kilbourne, 1988) matched to workers' occupations based on SICs assigned to the participant. Li and colleagues (Li, Zhang, Song, & Arvey, 2016) illustrated how extra measures of work and job characteristics that are not based on self-report data can be used to enrich understanding of the potential health effects of work. Specifically, guided by a behavioral genetics model and using the MIDUS Siblings and Twins subsample, Li and colleagues estimated how much of the sample variability in job characteristics could be attributed to genetics, shared environments, and unique environments. They reported that one quarter (25.1%) of the variability in job complexity, a *Dictionary of Occupational Titles* job characteristic reflecting how much workers need to make decisions about complex issues with ambiguous information, was attributed to genetic influences. They also reported that similar proportions of self-reported psychological demand (28.6%) and control (33.1%) were accounted for by genetics. The comparable level of genetic influence on these job characteristics, regardless of whether they were assessed based on self-report or harvested from another source like the *Dictionary of Occupational Titles*, reinforces the theoretical plausibility that genetic influences contribute to the types of jobs individuals pursue and the experiences they will have on those jobs.

Li and colleagues (2016) also went on to estimate the percentage of the associations between job characteristics and self-rated physical health that could be attributed to genetic origins. They reported that 56.7% of the correlation of psychological demand at work with self-reported physical health, 55.1% of the correlation of job complexity with self-reported physical health, and fully 80% of the association of job

control with self-reported physical health were due to genetic influence. Again, the level of consistency in the amount of genetic contribution to associations of job characteristics, regardless of whether they are self-assessed or obtained from other sources, with physical health is striking. Collectively, apart from demonstrating one application of using extended measures of work and job characteristics available in the MIDUS study, Li and colleagues' analysis reminds researchers of the potential importance that genetics plays in understanding the effects of work on health.

The *Dictionary of Occupational Titles* evolved into the O\*NET, which is a completely online database containing occupational characteristics associated with nearly 1,000 job titles. As with its predecessor, the O\*NET offers the ability to capture hundreds of work and job characteristic variables for classified jobs, thereby dramatically expanding the capacity of researchers to link diverse elements of daily work life to adult health and changes in health. Because of this potential, efforts are under way to add O\*NET data to all existing and future public releases of MIDUS data.

To date, three authors have used MIDUS data enhanced with O\*NET job characteristics to study health outcomes. Ford and Jin (2015), using MIDUS 2 data enhanced by O\*NET measures, assessed how workload incongruence may shape depressive symptoms. Workload incongruence was assessed using both the psychological demand variable assessed in the self-administered questionnaires and a measure of time burden from the O\*NET, which reflects the average time burden for all individuals with a shared NAICS code—or the “typical” level of time burden for the occupation. The investigators found that depressive symptoms were lowest when individuals self-reported psychological demand was similar to or lower than the typical level for the occupation, and that depressive symptoms tended to increase as experienced psychological demand exceeded the level of burden typical for the job. These results are compelling because, as the vitamin model would suggest, there may be thresholds of tolerance for different features of jobs characterized by what is typical or “usual” for the occupation rather than simply thinking about raw levels of exposure.

Two MIDUS investigators have examined the health-related effects of occupational complexity or the need to make decisions about complex issues on the job with ambiguous information. As mentioned in this chapter in the section focused on gender differences in health, Grzywacz and colleagues (2016), using MIDUS 2 enhanced with O\*NET data, found that greater occupational complexity was robustly associated with episodic memory and executive functioning among women but not among men. In a different study using longitudinal data from MIDUS 1 and 2 to allow operationalization of incident hypertension, Meyer, Cifuentes, and Warren (2011) reported that greater complexity on the job (assessed using the O\*NET) predicted incident hypertension. Specifically, for every one-unit increase in complexity, the odds of developing incident hypertension increased by 87%. The results of these studies are compelling because of their seemingly different “punchlines.” Whereas one study suggests that complexity may yield beneficial health effects, at least for women, the other suggests that complexity may pose health threats to job occupants. Of course, the inconsistency in itself is not problematic because of the different bodily systems underlying the two outcomes; nevertheless, the inconsistency does point out the need for additional research to better understand the role of occupational complexity (and other job and work-related characteristics) in adult health.

## Health as an Asset for Work

Although the predominant view is that work is antecedent to health, some investigators have questioned whether health affects individuals' ability to enter or excel in the labor force. The earliest MIDUS work in this area was Ettner's (2000) consideration of whether better health among the employed reflected the self-selection of healthy workers into the labor force or the possibility that good health follows from employment. Ettner (2000) concluded that health does not have a major influence on labor market outcomes. Most recently, Günes (2016) used data from the MIDUS subsample of siblings and twins to consider the consequences of teen pregnancy prior to 1995 on adult outcomes. Results from twin fixed-effects models indicated that teen motherhood was associated with minor decrements to health outcomes in adulthood, and that a portion of these effects was attributed to lower participation in paid work and subsequent gaps in income.

The remaining analyses linking health to work focuses primarily on productivity and performance outcomes. Advancing a long line of studies differentiating states of health characterized in terms like "flourishing" and "languishing," Keyes and Grzywacz (2005) documented notable performance and health cost savings between individuals who were classified as being "completely healthy" relative to those with good physical health (disease free) but poor mental health (not including psychiatric disorder) and those with good mental health but poor physical health. Essentially, workers who reported being completely healthy tended to use less healthcare and report higher productivity; thus, a healthy employee is a more productive employee (Keyes & Grzywacz, 2005). The primary "punchline" of these authors is that worksite health promotion programs need to move beyond reduction of risk factors for heart disease to consider employees' emotional health and worker vitality.

Although Keyes and Grzywacz's results are salient, the shift in focus for worksite health promotion programs from cardiovascular risk factor reduction to the promotion of employee mental health and a broader sense of "vitality" is driven by multiple realities. First, there is ample evidence, including from the MIDUS enterprise, that mental health conditions cost employers more in terms of work-loss time than physical health conditions (Grzywacz & Ettner, 2000; Kessler, Greenberg, Mickelson, Meneades, & Wang, 2001). Second, although physical and mental morbidity reduction is undoubtedly essential for containing healthcare costs, gaining competitive advantage in the marketplace is driven more by workers who are engaged and committed to creating an organization's future (Spreitzer & Porath, 2012). Being tobacco free and having a good exercise program may enable the creation of such an engaged or committed worker, but a better strategy is helping workers feel alive and passionate—outcomes that do not logically follow from visits to the corporate fitness center or participation in stress management webinars. Finally, there has been growth in studies suggesting that outcomes like "vitality" can be purposefully manipulated through worksite interventions targeting such things as mental resilience and mindfulness (Hendriksen, Snoijer, de Kok, van Vilsteren, & Hofstetter, 2016).

## Future Directions: High-Priority Topics for Work and Health Research in MIDUS

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The MIDUS study has enabled several incremental contributions to scientific understanding of work and health. Nevertheless, the deep potential of the MIDUS data to reveal the brilliance of the diamond underlying the health effects of work is yet to be realized. Indeed, the surface has hardly been scratched as whole components of the complex terrain of “work and health” remain relatively untouched. Several elements of the MIDUS 1 survey have been used in cross-sectional studies, but only a handful of studies have exploited the longitudinal MIDUS data to consider possible health consequences of work (cf. Burgard et al., 2009, Choi et al., 2010; Ford, 2014; Ford & Jin, 2015) or employment consequences of health changes. The biomarker data from MIDUS 2 are largely untapped, as are the MIDUS Refresher data. Only a small number of studies have used the daily diary data or cognitive function data. Consequently, the remainder of this chapter highlights important future research that would help realize this untapped potential.

Delineation of the role work and employment play in socioeconomic and racial disparities in health demands further attention. The original sample design and subsequent enhancements with the Milwaukee oversamples create a solid foundation for purposefully considering the distribution of employment and attributes of high-quality employment by race and socioeconomic status and for considering whether attributes of employment mediate differences in health. Consideration of Warr’s (1987) vitamin model is warranted, particularly features of work Warr referred to as “constant effect determinants,” which he argued requires a minimum level to enable and sustain health. Indicators such as physical safety on the job, protection from harassment from coworkers or clients, and a sense that the job is socially valued are all examples of constant-effect determinants that are available in the O\*NET and could be used to (help) explain racial and socioeconomic differences in health outcomes. Researchers are encouraged to test specific hypotheses from Warr’s model related to constant-effect determinants that posit that health decrements result from falling short of a basic need of some attribute (e.g., physical security, social value), but that health benefits do not accrue with elevated levels of those same attributes. Similarly, researchers should consider the differential effects of constant-effect determinants on racial and socioeconomic inequalities in health from those Warr labeled “additional decrement determinants,” which he presumed to garner greater health effects at higher levels, except at exceedingly high doses. Concrete examples of additional decrement determinants are concepts like opportunities to control or make decisions on the job and variety of occupational tasks. Compelling analyses would also use these diverse features of work combined with knowledge of specific condition etiology to consider racial and socioeconomic inequalities in both acute and chronic conditions. Researchers pursuing these lines of inquiry are encouraged to incorporate the use of O\*NET data given their successful use in previous MIDUS research (Ford & Jin, 2015; Meyer et al., 2011; Grzywacz et al., 2016; Li et al., 2016) as they will allow full operationalization of vitamin model.

The MIDUS study is poised to provide much-needed evidence of directionality of influences in the work–health linkage across adulthood. The MIDUS study now has three panels of data obtained from the original cohort, each at approximate 9- to 10-year intervals by which investigators can identify the extent to which transitions into and out of employment affect distinct domains of physical and mental health. Further, and perhaps for the first time with national data, investigators can fully operationalize Jahoda’s (1982) model contending that employment is more than the simple exchange of time and labor for wages or salary, and that employment can be a meaningful source of social interaction and may even help to provide purpose in life. Indeed, given that the MIDUS study has robust measures of purpose in life (Ryff & Keyes, 1995) and social coherence and social contributions (Keyes, 1998), researchers can consider whether loss of identity and social value link job loss with health outcomes. Parallel hypotheses can be tested to determine if transitions into more and less favorable jobs (Grzywacz & Dooley, 2003) mirror the health effects of job loss

and job gain. Perhaps even more exciting and scientifically novel is the opportunity afforded by the MIDUS Refresher and MIDUS 3 to consider the ideas presented in this paragraph in the context of the Great Recession. With the MIDUS 3 study, researchers can assess how differential experiences of the Recession, which could have included job loss as well as upward mobility, explained or exaggerated age, gender, socioeconomic, or racial differences in health. Similarly, though the use of the MIDUS Refresher, researchers have the ability to isolate potential period effects in the work–health linkage. One piece of low-hanging fruit is Grzywacz and Dooley’s (2003) supposition that psychosocial elements of work take on greater salience for worker health relative to economic elements of work in strong employment markets; this supposition could be subjected to empirical scrutiny with the MIDUS Refresher data collected in the wake of the Great Recession.

p. 109 The world of work is heavily subjected to technological advancements and broader economic forces. Elder’s life course theory (1998) posits the possibility that health effects of some job attributes may differ in loose economic markets such as those during periods of recession compared to those when labor is in short supply. These theoretical and empirical realities call for research to discern the lability of work–health linkages across historical time. Fortunately, the MIDUS enterprise is well equipped to move this line of inquiry forward. Researchers could, for example, test the basic premise of the JDC model that individuals in “high-strain” jobs, or those characterized by high demand and low control, are at elevated risk for hypertension under conditions of relative economic strength (e.g., MIDUS 1) relative to conditions dictated by recession (e.g., MIDUS Refresher). As the Healthy People initiative continues to expand the role of occupational health in its key indicators of public health protection, understanding of whether job stressors have immutable health effects regardless of the economic conditions has tremendous scientific and practical value. The tools available through the MIDUS study now allow for the testing of period effects. For example, the available data have captured the Great Recession period in a way that allows for understanding the experiences of job loss, job insecurity, and economic hardship were fundamentally different within the recession than outside of it. The use of the Refresher and MIDUS 3 data offers the opportunity to evaluate period effects on the links between work and health. As stated previously, despite the intimate connection between socioeconomic factors and work, there has been little use of the MIDUS to explore the connection. The ability to longitudinally examine period effects offers great potential for future study in this area, perhaps in the area of the distribution of inadequate jobs that have been shown to disproportionately affect minorities and other disadvantaged individuals (Grzywacz & Dooley, 2003).

In light of Li and colleagues’ (2016) findings, genetic factors account for approximately 50% of observed associations of work or job characteristics with physical health, the genetic underpinnings of work and health demands greater attention. Although compelled by Li and colleagues’ findings, the need for more genetics-informed work and health research rests on the simple reality that genetic predisposition contributes to health while also shaping the types of work individuals enter and their experiences on the job. Further, in light of the emerging science of epigenetics, attentiveness to the role of both genetics and environmental influences is sorely needed.

Investigators have several options to pursue this line of inquiry. The first is to build on Li and colleagues’ model to consider a fuller array of job, workplace, and employment attributes. Given that job control and psychological demand, both of which were considered by Li et al. (2016), are presumed to operate through stress pathways, it is possible that other attributes of work, such as training opportunities, contact with others, or physical security, and their effects on self-rated health may be less influenced by genetics. A second option is to consider a wider variety of health outcomes, ranging from more discrete disease end points (e.g., diabetes, hypertension, stroke), to subclinical indicators of disease (e.g., allostatic load), to health-related behaviors. Research of this variety is essential because the role of genetics is underresearched in the occupational health arena. However, it is also important because a first step in designing effective public health campaigns—including those through the workplace—is generating

definitive evidence of how much population variability in health is attributed to environmental factors. All else being equal, workplace interventions should target outcomes and strategies that are predominantly influenced by environmental factors such as work and job characteristics.

Research documenting the biological mechanisms through which the social world of work “gets under the skin” to affect discrete health end points is sorely needed. Different occupational health groups have created depth in narrow disease states, such as the focus on job strain and ambulatory blood pressure or hypertension (Landsbergis, Dobson, Koutsouras, & Schnall, 2013; Landsbergis, Travis, & Schnall, 2013), and Theorell and colleagues’ collective body of research in cardiovascular disease (Nyberg et al., 2013; Theorell et al., 2016). These investigations nonetheless focus on a small fraction of possible health outcomes, and they target discrete sets of work-related exposures. Analyses documenting both general (e.g., allostatic load) and system specific (e.g., cardiometabolic, inflammatory) pathways by which specific aspects of paid work may contribute to health outcomes is needed. Again, the presumed value of the vitamin model (Warr, 1987) and the distinction between indicators of constant effect determinants like physical security in the workplace or occupying a position that is socially valued is likely to have a different biological thumbprint than are indicators of additional decrement determinants like level of control, variety in job tasks, and frequency and clarity of feedback from superiors. Warr’s collective works along with a growing literature based on data from several European cohorts (de Jonge, Reuvers, Houtman, Bongers, & Kompier, 2000; Jeurissen & Nyklíček, 2001; Mäkikangas, Feldt, & Kinnunen, 2007; Meyerding, 2015) could be easily complemented by investigations using the MIDUS study.

p. 110 Finally, additional research designed to determine the business value for protecting and promoting worker health is needed. Thorough analysis of work loss time (full cutbacks and presenteeism) under different work conditions and associated health risks is needed to gain policy advocates’ and individual organizational leaders’ attention, and to serve as a catalyst for change when warranted. As mentioned at the beginning of this chapter, most adults spend up to one third of their waking lives between the ages of 20 and 65 engaged in paid work. If “work” does affect health, including health-related behaviors as we have seen in this chapter, perhaps the single greatest need for promoting population health is taking the emphasis off individual “choice” and “lifestyle behavior” as the predominant cause of premature morbidity and mortality and placing increased emphasis on the opportunities (or constraints) imposed by paid work in allowing individuals to engage in healthy practices. The ability to leverage these opportunities (or eliminate the constraints) demands a strong financial analysis of the potential economic benefits of such changes to employers and society more broadly. Keyes and Grzywacz (2005) provided one attempt, but it was based on cross-sectional data and focused on a small and discrete set of outcomes. Researchers are encouraged to replicate and extend these analyses to further flesh out the organizational costs of promoting worker health (as opposed to simply risk factor reduction) and the extent to which those costs are offset by associated efficiencies and productivity gains resulting from those initiatives. Further, although general population studies offer a helpful “average” perspective, industry- and occupation-specific analyses would also be helpful in recognizing that the factors affecting the health of workers in one occupational group (e.g., nurses) are likely to be different from the factors affecting another group (e.g., construction workers), and the associated strategies needed to promote worker health will also differ.

## Conclusion

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The workplace has incredible potential for promoting or compromising population health. However, the actual health effects of work are challenging to discern because paid work is simultaneously densely packed with attributes with clear health potential and because similar jobs can often be constructed very differently across organizations. Results to date from the MIDUS enterprise support the notion that work and paid employment are integral to human health; nevertheless, there are more questions than answers. Fortunately, the MIDUS study is well equipped and perhaps uniquely suited to definitively answer several important research questions that have a direct potential impact for population health. The MIDUS data are ready, the agenda is set, and all that is needed is for researchers to serve as craftspeople to reveal the brilliant complexities underlying work and its linkages to health.

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